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SIMPLY GREEN BY DEFAULT?

EXPLORING DIGITAL NUDGES FOR EMISSION REDUCTION IN CITIES

MASTER THESIS

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Abbreviations

BPMN	Business Process Model and Notation
COP	Conference of Parties
EC	European Commission
EEA	European Environment Agency
ERP	Enterprise Resource Planning
EU	European Union
GGI	Greenhouse Gas Inventory
GHG	Greenhouse Gases
GIS	Geographic Information Systems
GDPR	General Data Protection Regulation [of the European Union]
HCI	Human-Computer Interaction
IPCC	Intergovernmental Panel on Climate Change
INDCs	Intended Nationally Determined Contributions
IS	Information Systems
P1/2/3/4	Participant 1/2/3/4
PEB	Pro-Environment Behaviour
RQ	Research Question
SDG	Sustainable Development Goals
UI	User Interface
UK	United Kingdom
UNCED	United Nations Conference on Environment and Development
UX	User Experience
UNFCCC	United Nations Framework Convention on Climate Change

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Abstract

Cities are major contributors to greenhouse gas emissions which accelerate the negative consequence of climate change. Developing innovative solutions to alter citizens' lifestyle can be crucial for aiding efforts to limit our emissions and ease the transition to climate neutrality. This research explores the potential of nudging citizens towards pro-environment behaviour through digital choice environments. The primary questions sought to enquire which digital nudging mechanisms are most successful and how can they be applied by cities for aiding their efforts towards climate neutrality. Existing studies and experiments were considered through a review of literature to identify the most successful types of Digital Nudges. Qualitative interviews were conducted with public service representatives of ten European cities to collect data on target sectors for Digital Nudging interventions, their facilitating factors and potential challenges or barriers. The study found that Default Rules are the most effective type of Digital Nudges and that cities ought to prioritise their efforts in the mobility, energy/heating and buildings/construction sectors which are most often responsible for the most emissions. Having sufficient public engagement, adequate technological infrastructure and a conducive administrative and regulatory environment were identified as facilitating or prerequisite factors. The lack of focused research in this area is a major barrier, in addition to other systemic, policy and operational challenges and the requirement of cities to ensure transparency and privacy in the discharge of public services at all times. These findings enhance our understanding of how Digital Nudging can be introduced to encourage pro-environment behaviour, providing valuable insights for cities looking to utilise nudging through digital environments for achieving the goals in their climate action plans. Identifying innovative ways for the application of successful Digital Nudging mechanisms for behavioural change in major greenhouse gases emitting sectors of urban economy can inform future research and nudging policies.

1. Introduction

1.1 Research Problem and Questions

Concentrations of carbon dioxide unmatched for at least 2 million years. Glacial retreat unmatched for 2,000+ years. Last decade warmer than any period for ~125,000 years. Sea level rise faster than any prior century for 3,000 years. Summer Arctic ice coverage smaller than anytime in last 1,000 years. Ocean warming faster than at any time since end of the last ice age. Ocean acidification at highest level of last 26,000 years.

These are some of the evidences of global warming cited in the final instalment of the Intergovernmental Panel on Climate Change's Sixth Assessment Report, an eight year undertaking from the world's most authoritative scientific body on climate change (Boehm & Schumer, 2023; Intergovernmental Panel on Climate Change (IPCC), 2023; Ming et al., 2021). In other words, there is scientific consensus on climate change, with most research suggesting that emission of greenhouse gases (GHG) through human activity increases their concentration in the atmosphere, which leads to warming of the Earth and change in weather patterns (Rahman, 2013). Continual temperature rise in the future will dramatically increase the occurrence of hot extremes in some regions and is likely to impact them beyond the threshold for human adaptability (Diffenbaugh et al., 2007; Pal & Eltahir, 2016).

Taking cognizance of the alarming situation, countries around the world are committing themselves to the path of climate neutrality which refers to achieving "Net Zero" by way of reducing GHG emissions or developing trade-off mechanisms to offset unavoidable emissions (Panagiotopoulou et al., 2023). The EU has launched a flagship initiative to transform over one hundred cities into climate-neutral cities by 2030 (Hainsch et al., 2022; Ulpiani et al., 2023). Given that cities emit over 70% of emissions, these "mission cities" are funded to initiate pilot projects and would act as laboratories for innovation and social experimentation to produce a pool of good practices, concrete solutions and evidence-based results for the rest of the continent to emulate by 2050 (Panagiotopoulou et al., 2023).

Controlling the adverse effects of global warming would entail significant reduction in the emission of GHG. Research suggests that a majority of current emissions stem from the energy, industry, transport, agriculture, and buildings sectors (Lamb et al., 2021). A bulk of the emissions in all these major polluting sectors are linked to our consumption driven modern lifestyles.

Through adopting changes in their behaviour, individuals have the capacity to significantly influence environmental sustainability (Barr et al., 2011) and contribute to the success of policy

interventions (Skarmeas et al., 2020). Therefore, approaches towards emissions reduction that seek to involve citizens to collectively alter their emission-intensive habits and adopt a more climate friendly lifestyle have a potential to aid in mitigation of adverse effects of climate change.

Nudging as a non-coercive tool to reduce emissions

Lehner et al. (2016) suggests that nudging holds potential for reducing environmental impacts in the three environmentally critical domains of sustainable consumption – energy, food and transport. It is defined as an alteration of a decision-making environment that aims at a behaviour change without changing economic incentives (R. Thaler & Sunstein, 2009).

In recent years, scholars have started to explore the phenomenon of applying the concept of nudges through digital tools, platforms and networks. Termed as 'Digital Nudging', this may be defined as the use of user-interface design elements to guide people's behaviour in digital choice environments (Weinmann et al., 2016).

There have been prior studies on the effects of Green IS and Digital Nudging in encouraging pro-environment behaviour in specific sectors (De Bauw et al., 2022; Meske et al., 2022; Staudt et al., 2021; Zimmermann et al., 2023). However, there is a lack of scholarship intended for cities seeking to incorporate Digital Nudging in their plans to transition to net zero. By identifying the kinds of nudges that are most effective in influencing behaviour, their enabling conditions and target sectors which can benefit from their deployment, this research would aid city administrations in leveraging resources at their disposal to develop strategies for achieving their climate neutrality targets by guiding citizen behaviour towards a less emission intensive lifestyle. Therefore, this research would seek to answer the following questions.

RQ 1 What type of Digital Nudges should cities use?

1.1 What are the most successful types of Digital Nudges?

1.2 What factors determine the success of these Digital Nudges?

RQ 2 How can these successful Digital Nudges be applied by cities to nudge pro-environment behaviour?

2.1 In which sectors should the use of Digital Nudging be prioritised?

2.2 What factors facilitate the incorporation of Digital Nudging initiatives in cities' climate action plans?

2.3 What are the challenges and barriers to the effective incorporation of Digital Nudging initiatives in cities'' climate action plans?

1.2 Outline of thesis structure

This study begins with a review of literature on nudge theory and its application in the digital domain. It goes into the key themes and debates surrounding Digital Nudging and examines systematic literature reviews to come up with the answer to the first question and its sub-part.

As the second research question is answered through thematic analysis of qualitative interviews, the next part would clarify the methodology used for this research strategy. It explains the justification behind choosing the study cases and details the method followed in data collection. A segment on the conduct of the interviews precedes the description of the data analysis procedure used by the author. This part also contains a comment on the limitations and shortcomings of the methodology that may be subject to criticism.

The next part presents in details the findings or results from the interviews and data analysis. It is then followed by a chapter that summarizes the findings and discusses the implication. The thesis concludes with a set of recommendation for city administrators and researchers who may be interested in this work.

In the end, the bibliography contains all sources referred to in the thesis, followed by a list of appendices that include transcripts from all the interviews.

2. Theoretical Background and Literature Review

The concept of Digital Nudging lies at the intersection of multiple research disciplines including information systems and behavioural economics. In this chapter the relevant literature surrounding these topics is briefly reviewed, along with the research on the issue of GHG emission and the international response to the problem.

2.1 Review method

A systematic literature review was not feasible due to several factors. Firstly, the scope of the research question was highly specific and interdisciplinary, making it challenging to find a sufficient volume of relevant studies that directly addressed the topic. Additionally, the available literature in the field was fragmented, with disparate findings scattered across various disciplines and sources, making it difficult to conduct a comprehensive and systematic synthesis. Moreover, the time constraints inherent in the master's thesis process limited the capacity to systematically conduct an exhaustive search, screening, and analysis of a large number of studies. Instead, the focus was on conducting a thorough literature review using a more targeted approach, selecting

key studies and sources that provided valuable insights relevant to the research objectives. While a systematic literature review would have offered certain advantages in terms of rigor and comprehensiveness, the constraints and complexities of the research context necessitated a more pragmatic and focused approach to synthesizing existing knowledge.

In order to examine key studies, the core concepts were identified through exploratory readings. Initial insights led to more targeted searches on Google Scholar using search queries involving key words from the subject matter. Results obtained from the search were initially screened by evaluating publication titles and later through reading of abstracts, conclusions or the full-text. This procedure led to discovery of more relevant research referenced in the papers gone through, resulting in a 'snowball' reading pattern until a sufficient volume of research was found and new reading were devoid of any novel theoretical or empirical findings. Due to the unsystematic nature of the review, it does not present a representative section of the relevant literature on the subject matter.

2.2 Key themes and concepts

2.2.1 Climate change and GHG Emissions in Cities

While climate change denotes change in statistical distribution of weather patterns over long periods of time, policy propagation qualifies it as negative anthropogenic change of climate (Rahman, 2013; Werndl, 2016). The United Nations Framework Convention on Climate Change (UNFCCC, 1994), defines Climate Change as

> *"a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods".*

Emission of GHGs through anthropogenic activity increases their concentration in the atmosphere which, along with certain other issues, leads to the warming of the Earth and change in world temperatures (Rahman, 2013). Carbon emissions constitute a major part of GHGs and curbing the same without compromising economic growth is a major challenge for researchers and policy makers as energy consumption plays an important role in economic growth (Ahmad et al., 2016; Bano et al., 2018). As Earth's climate warms, the frequency and intensity of conditions such as extremely hot weather are expected to increase, affecting more than 350 million people globally, especially in urban and metropolitan areas (Matthews et al., 2017). This temperature rise in the future will dramatically increase the occurrence of hot extremes in some regions and is likely to

render them beyond the threshold for human adaptability (Diffenbaugh et al., 2007; Pal & Eltahir, 2016).

Cities and urban areas are the engines of growth and prosperity, hubs of government, magnets of habitation and platforms for commerce, production, innovation and transportation. However, their activities account for over 70% of carbon emissions globally (Dasgupta, et al. 2022). As urbanization has drastically expanded in the last few decades the issues of pollution and growing levels of GHG emissions from cities is a major factor for global warming as well as poor air quality, water scarcity, waste overproduction and environmental degradation, having impact on living conditions as well as natural ecosystems (Panagiotopoulou et al., 2023).

Studies have recommended green and sustainable urbanisation to achieve economic growth but not at the expense of environmental degradation and risk of natural disasters (Bekhet & Othman, 2017; Liu et al., 2019; Wang et al., 2016). As a diverse range of public authorities are getting involved into managing the Climate Change problem, the characterisation of the problem and the policy measure comes according to the specific authority's view (Anne Vlassopoulos, 2012; Rahman, 2013).

In 1992, countries across the globe started to publicly acknowledge the problems related to climate change on the international fora through signing Article 3 of the UNFCCC at the United Nations Conference on Environment and Development (UNCED), an indication of the willingness to implement policies to protect the climate system (Santos, 2017). Parties to the UNFCCC at the first Conference of Parties (COP 1) in Berlin in 1995 set to out to agree on specific targets on emissions. They adopted the Kyoto Protocol at COP 3 which set emission reduction targets only to the industrialized countries, something which led to a deep difference of opinion among developed and developing countries in matters of cooperation and equity on the issue of reducing carbon emissions (Santos, 2017). According to Robert O. Keohane and David G. Victor (2011), "In practice, because Kyoto placed no obligations on developing countries and because the United States never ratified the agreement, the practical effect was narrow, thin and ultimately symbolic".

From the Durban COP (2011), countries agreed to work towards reaching a new agreement in 2015 and ultimately, COP 21 at Paris was able to overcome many of the deadlocks by seeking to adopt a common framework that would commit all countries towards reducing emissions and end the strict division between developed and developing countries (Santos, 2017). The Paris Agreement is legally binding on countries as to the review and assessment of duties. The final document set out a long-term target of limiting average global warming to 2 degrees Celsius above pre-industrial levels. As per the agreement, parties committed to adopt individual pledges to meet

UNFCCC targets called Intended Nationally Determined Contributions (INDCs). They should present fair and ambitious targets and to be redefined every five years (Santos, 2017).

Scientific reports by the IPCC present a reference point for actions to be taken in order to meet the global temperature targets (Santos, 2017). Meeting the 2-degree ceiling would require carbon emissions to be limited to one trillion of tons (1,000 Gt of CO2), on the basis of the IPCC Fifth Assessment Report (AR5) (IPCC 2014).

The European Commission showcased their plans for combating climate change and associated challenges in the European Green Deal in December 2019 (EC, 2019). It is considered to be a medium for the EU to harmonize the United Nations's Agenda 2030 for Sustainable Development with the seventeen Sustainable Development Goals (SDGs) to put forwards a new growth strategy (Panagiotopoulou et al., 2023). Among other vows, it pledged adherence to the Paris Agreement by promising carbon neutrality or no net emissions of greenhouse gases by 2050 and before that, to reduce net GHG emissions by 55% until 2030 (Hainsch et al., 2022; Panagiotopoulou et al., 2023).

In 2020, in continuance of the previous Horizon 2020 programme, the EU reached a political agreement on 'Horizon Europe, a flagship research and funding programme with a budget of €95.5 billion for 2021–2027. It is targeted towards improving the success rates of researchers and aiding reform in National Research and Innovation systems of member nations (Ricciardiello et al., 2021). The programme defines its ambitious goals as five Missions which would aim to address some of the major challenges meant to be overcome by means of a portfolio of actions including research projects, policy initiatives or legislative measures. One of them is the Climate-Neutral and Smart Cities Mission which falls into the long-term EU strategy towards climate neutrality and seeks to improve urban resilience and sustainability by leveraging the concept of cities' nature and tech-enabled climate neutrality (Panagiotopoulou et al., 2023). Under this mission, cities are experimenting with a number of innovative approaches for tackling the issue of GHG emissions. Digital nudging can be one such promising approach in this direction through foster environmentally sustainable behaviour (Berger et al., 2022).

2.2.2 Behavioural Economics and Nudging

2.2.2.1 Nudging Definition

The literature on the theory of nudging is based in behavioural economics and is greatly influenced by the works of Nobel Prize-winner Richard Thaler and his colleague Cass Sunstein who refer to nudge as a tool that promotes behaviour that is beneficial for society or the individual, and that is

applied by policymakers to increase policy effectiveness (R. Thaler & Sunstein, 2009). Their seminal book *Nudge* initiated a dialogue on potential of choice architecture as an instrument of policy design to overcome citizens' bounded rationality (R. H. Thaler & Sunstein, 2021; R. Thaler & Sunstein, 2009). According to their studies, nudge theory can be defined as an approach of psychology and behavioural economics which posits that it is possible, through appropriate strategies in input selection, to influence individual behaviour. Behaviour is influenced by the presentation of different choices by the decision-makers, or in other words, choice architecture which draws on psychological effects like framing, loss aversion or anchoring to trigger users' intuitive and heuristic decision-making (Mirsch et al., 2017; R. Thaler & Sunstein, 2009).

Although the discipline of economics presumes that human decision-making is fundamentally rational, behavioural studies of social and cognitive psychology have empirically demonstrated that we have bounded rationality and do not always decide rationally (R. Thaler & Sunstein, 2009). Instead, we often rely on mental shortcuts and habits. According to dual process theories, there are two cognitive systems of thinking to assess information during the process of decision making. In 'Thinking, Fast and Slow', Kahneman (2011) postulates that there is an intuitive System 1 that is fast, effortless, automatic and emotionally charged; and additionally, there exists a reason-based System 2, which is more effortful, slower and deliberately controlled. Heuristics and biases are used for decision-making when System 1 is exercised for everyday activities. External environment is of much significance while relying on heuristics in decision making (Mirsch et al., 2017).

Policy intervention through choice architecture of external environment can be undertaken to encourage individual behaviour that is deemed socially useful, without the forced exclusion of other possible options. This may be regarded as 'libertarian paternalism', with the government, short of any coercive action, paternalistically setting up the design of choices to facilitate decision-making by citizens (R. H. Thaler & Sunstein, 2003). The underlying assumption behind this theory is that to be engaged in choice process and contribute to resolutions of collective problems such as anthropomorphic climate change and food waste, individuals need to be guided through behavioural pathways (Guazzo & Çekani, 2023).

There are several known successful applications of nudge theory. One of the most frequently cited examples is the research on changes in organ donation across several European countries (Johnson & Goldstein, 2003). This study compares organ donation trends between countries where donors are given a choice to opt-out (presuming consent to donate) instead of opt-in. This has resulting in a significantly higher percentage of donor population in opt-out countries such as Austria (99.98%) and Poland (99.5%) as against opt-in countries like Denmark (4.25%) and Germany (12%). The

Decoy Effect is a well-known marketing strategy often used in commercial enterprises. For example, movie theatres are known for tricking customers into buying more expensive portions of popcorn by providing a medium size option between the small and large portions that is priced marginally below the large portion (Sherlin et al., 2020). There are several other studies in the fields of energy consumption (Schultz et al., 2007), nutrition (Hanks et al., 2013), transportation (Gaker et al., 2010), food waste (Nomura et al., 2011) and charity (Shariff & Norenzayan, 2007) among others.

2.2.2.2 Nudging for smart city governance

Smart governance is described as investing in "emerging technologies coupled with innovative strategies to achieve more agile and resilient government structures and governance infrastructures" (Gil-Garcia et al., 2014). The concept is concerned with government's usage of technology for self-improvement and establishment of a better relationship with citizens (Guazzo & Çekani, 2023). Thus, policymaking toward usage of technology for exploring opportunities for more precise nudging emerges from the adoption of a smart governance approach.

In recent years, with the exponential strides in technology development, newer avenues for the deployment of nudging have opened.

2.2.2.3 Digital Nudging

The field of information systems has a core function and long history of supporting organisations and individuals in achieving desired outcomes. The emergence of Green IS as a field of research has highlighted the focus toward using IS to reduce ecological footprint and achieving pro-environmental behaviour and outcomes (Beermann et al., 2022). Digital Nudges are an example of using Green IS for behaviour change.

Digital Nudges are information technology artefacts that Weinmann (2016) defines as user interface (UI) design elements aimed at altering users' behaviour without precluding other options. UI design aims at maximizing usability, which refers to an IT artefact's ease of use and efficiency (Oppermann, 2002). It also aims to maximize the user experience (UX), which is associated with notions ranging from "traditional usability to beauty, affective or experiential aspects of technology use", thus fulfilling more than just instrumental needs. In other words, UX is a consequence of the internal state of the user and acknowledges the technology's use as a complex, subjective, situated and dynamic encounter (Hassenzahl & Tractinsky, 2006; Mirsch et al., 2017).

Scholars of human-computer interaction (HCI) domain have provided various guidelines and principles for good UI design (Shneiderman et al., 2009; Stone et al., 2014). Their application in the context of Digital Nudges involves choice architecture of digital choice environments such as ERP screens and web-based forms which make people to make decisions or exercise judgment. The effects of Digital Nudging can extend to various societal levels, including Green IS as well as E-government, E-health, E-learning, E-finance, insurance, security, privacy and social media (Weinmann et al., 2016).

There are inherent advantages that Digital Nudging has over physical nudging. For instance, the implementation of Digital Nudging is easier, faster and cheaper as it takes place in a digital environment. Moreover, functionalities provided by the internet, like user tracking, allow for personalization of the specific nudges being presented to users which improves their effectiveness and efficiency (Mirsch et al., 2017).

Mirsch et al (2017) have dwelled into the psychological mechanisms that underlie Digital Nudging through a systematic review to identify twenty psychological effects in the physical context that can be applied in the digital realm. Nine of the most important of these effects were explained in detailed and they are (1) *framing*, (2) *status quo bias*, (3) *social norms*, (4) *loss aversion*, (5) *anchoring & adjustment*, (6) *hyperbolic discounting*, (7) *decoupling*, (8) *priming* and (9) *availability heuristic*. **Table 1** briefly describes these psychological effects.

TABLE 1

Most Frequently Mentioned Psychological Effects (Mirsch et al., 2017)

#	**Psychological Effect**	**Explanation**
1	Framing	Designing a decision frame such that the 'decision-maker's conception of acts, outcomes and contingencies are associated with a particular choice is governed through psychological principles
2	Status Quo Bias	There is an inertia or tendency to remain with the status quo as individuals perceive disadvantages of leaving the current state as larger than the advantages associated with change

3	Social Norms	Individuals tend to orient towards the behaviour of others, looking for social proof when unable to determine the acceptable and appropriate mode behaviour in a given situation
4	Loss Aversion	Apprehension of losses and disadvantages have a greater impact on preferences than potential gains or advantages
5	Anchoring and Adjustment	A reference point or anchor provides a valuable tool for comparison between different choice options
6	Hyperbolic Discounting	Individuals value present and near-present over the future, preferring options with present effects, even though future effects may be better
7	Decoupling	During decision-making, individuals consider the costs of their choice, and full disclosure of otherwise hidden costs of their choices help in optimizing their choices
8	Priming	Individuals can be prepared for a situation where a decision takes place
9	Availability Heuristic	People tend to judge probabilities of event on the basis of the ease with which that are recalled

Many of these psychological mechanisms have found usage in nudging techniques. There are scholarly reviews which assemble lists of the most effective of these nudges.

2.2.3 Green Nudges

Pro-Environmental behaviour (PEB) refers to behaviour which ‘constantly seeks to minimize the negative impact of one’s actions on the natural and built world’, such as minimizing of resource and energy consumption, use of non-toxic materials and reduction in waste production (Kollmuss & Agyeman, 2002). This includes behaviour that seeks to reduce greenhouse gas emissions that emanate from human activity and resource consumption.

Nudges directed towards inducing such pro-environment behaviour are called green nudges (Beermann et al., 2022). They have gained traction in the recent years and have attracted scholarly attention in various areas. For instance in the context of sustainable consumption, Amatulli et al. (2019) investigated the role of shame and negative message framing. There have been other similar

studies on the issues of sustainable transportation (Kim & Hyun, 2021), waste and resource efficiency (Degirmenci & Recker, 2018), and energy and water conservation (Schultz et al., 2007).

Welfarist underpinnings are a defining feature of green nudges that set them apart from other nudges (Ölander & Thøgersen, 2014). This is due to the fact that they are majorly intended for collective benefit to societal interests. The benefits for a cleaner and more liveable environment are collective reaped by the society and its inhabitants.

2.2.4 Successful Nudging techniques

Sunstein (2014) summarizes ten important types of nudges. These are (1) *Default Rules*, (2) *simplification*, (3) *uses of social norms*, (4) *increases in ease of convenience*, (5) *disclosure*, (6) *warnings, graphic or otherwise*, (7) *precommitment strategies*, (8) *reminders*, (9) *eliciting implementation intentions* and (10) *informing people of the nature and consequences of their own past choices* (Sunstein, 2014b). In subsequent studies, these nudges were found to have application in various fields. **Table 2** briefly summarizes the definition of these nudges.

TABLE 2

Ten Important Nudges (Sunstein, 2014b)

#	**Nudge**	**Explanatory Comments**	**Examples**
1	Default Rules	Pre-set courses of action that take effect if nothing is specified by the decision maker	Automatic enrolment programs
2	Simplification	Programs should be easily navigable, simplified and intuitive to promote adoption	Reducing the benefits of health programs due to undue complexity
3	Uses of Social Norms	Informing people that most others are engaged in certain behaviour or what most people think people should do	“Most people plan to vote”; “9/10 people believe that people should pay their taxes on time”
4	Increases in Ease of Convenience	As resistance to change is often a product of perceived difficulty or	Making healthy foods or low-cost options visible

		ambiguity, reducing barriers is often helpful	
5	Disclosure	Openness can be effective if the information is both comprehensible and accessible, especially for consumers	Revealing environmental costs associated to energy use
6	Warnings, Graphic or Otherwise	Large fonts, bright colours and bold letters are generally effective in triggering attention	Graphic images on cigarette packets
7	Precommitment Strategies	By which people commit to a specific course of action	Smoking or drinking cessation programs
8	Reminders	Can have a significant impact when the reason for not engaging in certain conduct may be a combination of inertia, procrastination, competing obligations or forgetfulness	Overdue bills reminders
9	Eliciting Implementation Intentions	Eliciting implementation intentions from people makes them more likely to engage in an activity	"Do you plan to vote?"
10	Informing People of the Nature and Consequences of their own past choices	Providing individuals with information that they often lack can aid in shifting their behaviour	People's expenditure on health care or electricity bills

Investigating the effectiveness of nudging tools in the consumption domains of energy, food and mobility, Lehner et al. (2016) describes nudge as a collective term for different tools used to influence individuals' behaviour and catalogues four types of tools, i.e. (1) *simplification and framing of information*, (2) *changes to the physical environment*, (3) *changes to the default policy*, and (4) *the use of social norms*. In influencing residential energy consumption, changes to the default option emerged as the most successful nudge with application 'opt-out green electricity offers' resulting in 95-99% customers staying with the green energy default and 'opt-out from

smart grid trial' showing large effects (20%) in the study. For influencing food consumption, all four tools showing positive effects in studies as well as evidenced through widespread usage in retailing. In influencing personal transport behaviour, while defaults, changes to physical environment and simplification and framing of information showed positive effects, use of descriptive social norms returned mixed evidence of effectiveness (Lehner et al., 2016).

In the context of encouraging pro-environment behaviour, Zimmermann et al. (2021) identified seven distinctive classes of Digital Nudges. They divided these classes of nudges into three categories based on the stage of decision making by a person, i.e. (i) *nudges before a person decides to perform an action*: (1) *Priming*, (2) *Goal Setting;* (ii) *nudges while a person is deciding on an action*: (3) *Decoy*, (4) *Defaults* and (iii) *nudges after a person has decided to perform an action*: (5) *Social Comparisons*, (6) *Feedback*; with (7) *Framing* being a part of all three categories. **Table 3** presents the nudging categories. It was found that Digital Nudges in categories (ii) and (iii) are more effective that in category (i). Their research also found Default, Feedback and Framing to have been the most successful nudges, with Priming, Goal Setting and Social Comparison returning mixed results and decoys showing insignificant results (Zimmermann et al., 2021).

TABLE 3

Digital Nudging Categories for Pro-Environmental Behaviour along with Results from the Literature Review (Zimmermann et al., 2021)

#	Digital Nudge	Category	Results
1	Priming	Before Action	Mixed
2	Goal Setting	Before Action	Mixed
3	Decoy	During Action	Insignificant
4	Defaults	During Action	Positive
5	Feedback	After Action	Positive
6	Social Comparison	After Action	Mixed
7	Framing	Universally Applicable	Positive

In their review of green nudges, Beermann et al. (2022) extracted six types of recurring nudges from a total of 64 interventions. They summarize them into three application domains i.e. those that (i) *structure the digital choice environment* (1) *Defaults*, those which (ii) *signal non-personal*

or context information (2) *Priming*, (3) *Framing*, (4) *Social References* and those that (iii) *provide personal information or assistance* (5) *Feedback*, (6*) Goal-Setting.* In the context of structuring the choice environment, Default emerged as the most effective type of nudges in all of the cases where it was being studied. Social References and Framing were the most prominent in the second category, especially in cases where two nudges were combined. In the third category, most Goal-Setting and Feedback nudges were effective. Overall, while Default emerged as the most effective nudge with positive effects in all 13 cases in which it was applied, Feedback was the most used nudge with 26 applications, 22 of which were effective.

Furthermore, the review posits that there are three classes of behavioural change outcomes that can be achieved through green nudges i.e. (i) *altering existing behaviours*, (ii) *reinforcing existing behaviours* and (iii) *forming new behaviours*. Effective changes in pro-environment behaviour can be induced through employing different types and combinations of nudges (Beermann et al., 2022). **Table 4** presents the results from this review.

TABLE 4

Digital Nudging Types Sorted into Application Domains along with the ratio of effectiveness from the Literature Review (Beermann et al., 2022)

#	Application Domain	Type of Nudge	Rationale for Categorization	Studies with Positive Effects/Total
1	Structuring of the Digital Choice Environment toward PEB	Default	Defaults are preselected PEB options that provide structure for decision-making	13/13
2	Presentation of Non-Personal or Context Decision Information toward PEB	Priming	Primes are stimuli that activate associations regarding the PEB	1/5
		Framing	Framings highlight specific aspects of the PEB	13/19

		Social Reference	Social references orient toward other peoples' PEB	12/20
3	Presentation of Personal Information or Providing Decision Assistance toward PEB	Goal Setting	Goals are commitments to achieve a desirable personal PEB in future	5/9
		Feedback	Feedback causes reflection about personal PEB	22/26

The first research question of this thesis asked for the most successful types of Digital Nudges and the factors that determine their success. On the basis of the literature reviews conducted by Beermann et al., (2022) and Zimmermann et al. (2021), Default clearly emerges as the most successful digital nudge as it found success in all studies reviewed.

To give examples of the studies, Default was used to form target behaviours (Ebeling & Berger, 2015) and led the participants to contract with a green energy program (Momsen & Stoerk, 2014), persuaded them to use sustainable search engine in an experiment (Henkel et al., 2019) and pay carbon offset with default option with a correlation between the amount of compensation paid and the proposed default (Székely et al., 2016).

Further, Feedback has proved to be highly successful Digital Nudges as was observed in many studies. Feedback nudges were transmitted for energy and water consumption via interactive posters (Agha-Hossein et al., 2015), home energy reports (Bonan et al., 2021), questionnaires (Brandsma & Blasch, 2019), in-home displays (Aydin et al., 2018), web interfaces (Graml et al., 2011), e-mail (Klege et al., 2022) or mobile apps (Kroll et al., 2019).

Framing, Social Reference (or Social Comparison) and Goal Setting can return positive results in some contexts. On the other end, Priming and Decoy have failed to yield significant results.

2.2.5 Factors behind the success of Defaults

There are three contributing factors or explanations behind Default Rules exerting such as significant effect (Johnson & Goldstein, 2012; Sunstein & Reisch, 2013).

First, there is existence of an implicit endorsement or suggestion on part of the choice architects that devise the rule. In many cases, choosers presume it to be an implicit recommendation for a good reason and do not simply reject it without being privy to any information that would justify a change. It also comes across as the choice which is made by a majority of people. The psychological effects due to framing and social norms are behind this. Secondly, forces of inertia or procrastination are at work. Simply put, changing the Default Rules would require people to make an active choice to reject it whereas the tendency to procrastinate, coupled with the power of inertia often makes people simply continue with the current option. It is the work of the status quo bias. The third explanation is the establishment of a reference point by the Default Rule in people's minds. The psychological effects of anchoring and loss eversion are at work, as the Default Rule determines what counts as a gain and what counts as a loss.

For answering the second research question, a separate methodology was employed which involved qualitative data collection through in-depth interviews with representative of cities. It is explained in the next section.

3. Methodology

In this chapter, the research strategy of the thesis is described, along with the employed methods for data collection and analysis. It also contains a report on their respective successes and limitations.

3.1 Research Design

Figure 1 presents a graphical illustration using BPMN to describe the process followed during this research. Upon the approval of research questions, a literature review followed which was aimed at gathering information about the ideas surrounding the concept of Digital Nudging from existing scholarship. This process also resulted in the identification of the most successful type of Digital Nudge and the reasons that justify its success, thereby answering RQ 1.

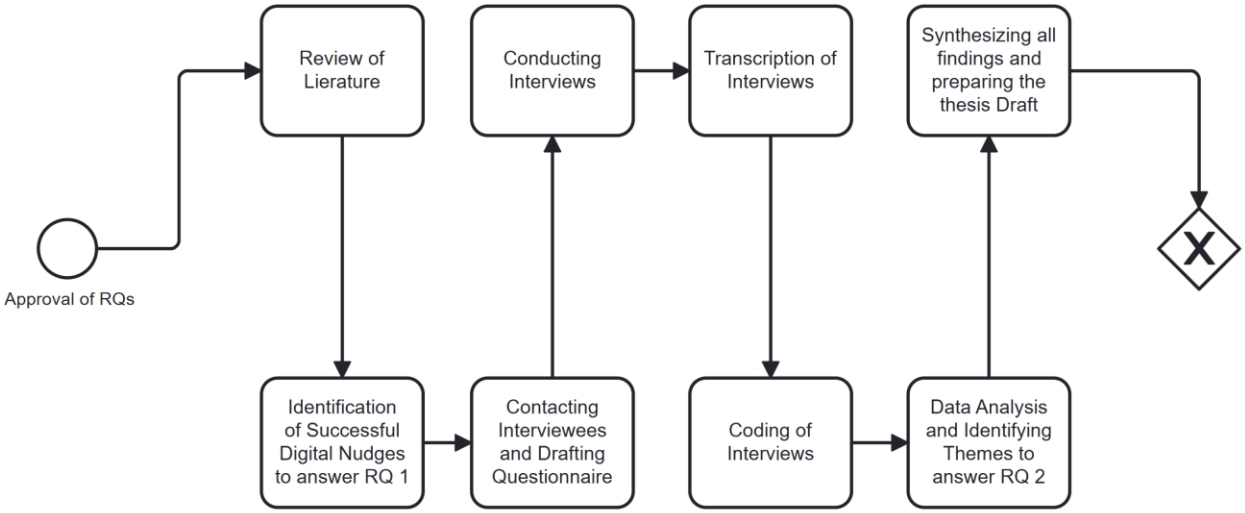

FIGURE 1: Overview of Research Design

As the next step was to collect and analyse qualitative data for answering RQ 2, a list potential interviewees was drawn up and they were sent invitations to take part in an online research interview. At the same time, a interview guide was prepared with the major question that would inform the data corpus. Conducting interviews, generating transcripts and subsequent coding of the data were the next steps which led to the process of data analysis and identification of themes for answering RQ 2 and its sub-parts. In the end, all the findings were synthesized together to complete the drafting of the thesis.

3.2 Study cases

This study aims to investigate the potential of Digital Nudging in emission reduction for achieving climate neutrality targets. Although there is a global trend of cities adopting measures towards sustainability, its qualitative empirical exploration is likely to be more rewarding with cities that have explicitly demonstrated willingness to undertake a transformation towards climate neutrality. These form the target cases for this study. To further narrow down on a set of cities that have agreed to be held accountable for their commitments towards climate neutrality, this study zeroed in on the cities associated with the European Union's Horizon Europe funding program. In choosing the cities to contact for this study, 112 cities in the wider European region that are associated with Horizon Europe's Climate-Neutral and Smart Cities Mission were shortlisted. It is presumed that in having to pass the application and selection criteria of the European Commission for participation in this project, these cities must have demonstrated a sufficient level of political will and administrative capability toward planning for climate neutrality transition. They have

collectively adopted the goal of 'net zero' greenhouse gases emissions by 2030 and are receiving guidance and support apart from funding from the mission program.

As cities are often abstract bureaucratic entities with complex internal organisational structures, the target entities of interest within the 'city' had to be defined. In a similar study conducted to explore administrative capacity towards climate neutrality in European cities, Braun (2023) defined the empirical target entities of interest as "(1) non-political (2) professional public servants (3) within the cities' municipal administration (4) with substantial and immediate operative or strategic responsibility (5) for the governance and/or high-level implementation (6) of the local climate neutrality transitions or local climate protection efforts generally (7), preferably those immediately responsible for enacting the EU Cities Mission (e.g. the head of the cities' 'Transition Teams')". This framework was borrowed to reach out to the subjects for data collection who could share, through their knowledge and lived experiences of working in official capacities, information and data that aids in addressing the research questions.

3.3 Procedure

3.3.1 Data collection method and instruments

3.3.1.1 Interviews

For the purpose of collecting data, interviews were chosen as a the preferred method. This was based on the understanding that they offer an unstructured and realistic means for gathering data, allowing for studying the topics at hand in sufficient depth, which is particularly suitable for the exploratory nature of this study (Alshenqeeti, 2014). In-depth interviews are well known in social sciences as a flexible method for collection of qualitative data which permits participants to articulate their opinions, perspectives and experiences in their own words. This approach of a conversation mirrors a familiar social interaction wherein participants engage in engage with each-other mainly through with questions and answers along with reflections and comments (Knott et al., 2022).

One of the potential downsides of this approach is the possibility of interviewer biases and subjectivity creeping in the content of the data generated due to the wording and tone of the questions or other comments. As the interviewer is an active participants in the process who shapes the responses of the interviewee(s), they ought to proceed with caution for ensuring the integrity and validity of the data corpus by minimizing any such biases, especially in the stage of interpretation and analysis of the data (Hofisi et al., 2014).

Interviews can be structured, semi-structured or unstructured. Semi-structured methods occupy the middle ground between two other approaches in those situations where there are open research questions but preexisting theory can help guide an inquiry (Wethington & McDarby, 2015). For this research, since the literature review already came up with an understanding of the theory for the concerned topics, semi-structured interviews were opted for. They also allowed the participants freedom and flexibility to express themselves without having to cling to a rigid structure. As opposed to unstructured interviews, semi-structured interviews are also well suited for exploratory research of topical paths as the discussion progresses around the pre-drafted interview guide (Magaldi & Berler, 2020). This allows the interviewer or researcher freedom to explore relevant ideas that may come up spontaneously without entirely deviating from the focus of the enquiry (Adeoye-Olatunde & Olenik, 2021).

3.3.1.2 Online Interviewing

This research uses online synchronous interviews for collecting data (Gubrium et al., 2012). They mirror traditional real time face-to-face in an online environment through the use of video conferencing software such as Microsoft Teams or Google Meet. This method offers the possibility of spontaneous interactions between participants and the researcher using VoIP (Voice over Internet Protocols) while bypassing the logistical limitations posed by distance. Since a majority of interviewees were located in different countries, it was not feasible to undertake offline interviews. The approach to online interviewing as a data collection method was guided by the advice offered in Gubrium et al. (2012) and Ritchie et al. (2013) which are well regarded academic handbooks for qualitative interview research.

3.3.2 Description of participant selection

Having identified the target cities for interviewing, the next step was to solicit interviews from the relevant departments or organisational units in charge of planning or implementing climate neutrality in their respective cities. In order to reduce bias and give each of the 112 shortlisted cities an equal chance of being represented through an interview, a standardised procedure for looking find relevant contacts needed to be followed.

In a recently conducted study on administrative governance of climate neutrality, Braun (2023) has developed a interviewee search protocol which yielded a list of contacts through reviewing city websites. This protocol used a six-step process to find out names and department-level contact data (preferably email) of the people, teams, units, departments or other organisational entities responsible for governance of the climate neutrality transition in the respective cities or associated

with the domains of climate, environment or urban development in general. Using the database derived from this protocol, valid contacts of 95 out of the total 112 mission cities were accessed.

Discounting the contacts over other mediums or those that were subsequently found invalid, a total of 86 emails were sent between 16-28 February 2024. The email template was drafted to request an interview before 25th of May 2024 from either the recipient directly or any of their colleagues working in a department relevant to the subject matter. **Appendix 7.1** contains a copy of the email template used.

Until March 7, 2024 a total of ten responses were recorded to the interview request emails with subjects indicating their willingness to participate in the study. In accordance with their availability, the prospective interviewees were offered possible time slots for the online interview and upon receiving their assent, meetings were scheduled over Microsoft Teams software.

Table 5 gives a brief overview of the cities whose representatives eventually agreed to the interviews. Of the ten cities from eight European countries with varying demographic profiles**,** Stockholm from Sweden is the largest with a population of almost a million while Kranj in Slovenia has the fewest inhabitants at less than 40 thousand.

TABLE 5

Overview of Cities

ID	City	Country	Population	City Website
1	Aarhus	Denmark	361,544	https://aarhus.dk/
2	Helsinki	Finland	674,963	https://www.hel.fi/
3	Antwerp	Belgium	506,922	https://www.antwerpen.be/
4	Heidelberg	Germany	160,355	https://www.heidelberg.de/
5	Tartu	Estonia	93,124	https://tartu.ee/
6	Leuven	Belgium	124,666	https://www.leuven.be/
7	Stockholm	Sweden	975,551	https://start.stockholm/
8	Kranj	Slovenia	37, 941	https://www.kranj.si/
9	Malmo	Sweden	344,155	https://malmo.se/
10	Riga	Latvia	632,614	https://www.riga.lv/

3.3.3 Interview preparation and interview guides

The format used for data collection was semi structured interviews. To maintain a uniformity and structure the interviews, an interview guide was prepared beforehand, which was updated with information from the initial interviews. The final version of the interview guide is enclosed in **Appendix 7.3**. Using the framework developed by Kallio et al. (2016), a list of question were prepared to direct conversation towards the topic. For initiating dialogue during the interviews, the form of the semi-structure interview guide was intended to be adhered to in a loose and flexible manner, allowing for opportunities to change the order of the questions and seamless movement from one question to the next. To obtain the richest possible data, the questions in the guide were drafted to be participant-oriented and open ended. The aim of the guide was to not nudge the participants towards any particular answers but to solicit spontaneous, vivid and unique answers which included their personal experiences and feelings (Kallio et al., 2016).

The interview guide consisted of the following main sections: (1) Background Information about the interviewee: featuring questions about the role of the interviewee in the concerned city administration and existing or planned initiatives for emission reduction, (2) Understanding Digital Nudges: featuring questions about the understanding of Digital Nudges and the city's approach towards UI/UX design in its digital interactions with citizens, (3) Opinions of Specific Nudges: including questions about the potential for among others, Feedback, Default and Social Comparison nudges for reducing emissions, (4) Exploring Applicability of Digital Nudges: featuring question about what sectors can benefit most from Digital Nudges and foreseeable challenges to implementation , (5) Closing: asking for any additional thoughts or recommendations before the interview is wrapped up.

Ahead of the interview, the interviewees were also sent an informed consent form as a PDF file through email. It was adapted through the KU Leuven template publicly available online which was edited to state the particulars of this research. **Appendix 7.2** contains the template of the form. It contained information about GDPR compliance, rights of the interviewees and contact information of concerned university authorities should they wish exercise their rights.

3.3.4 Conduct

The coordination and execution of the interviews was done completely through digital means. The researcher's Microsoft Outlook email account from KU Leuven was used for scheduling communication and Microsoft Teams video conferencing software was used for conducted the online interviews.

All interviews began with a similar initial protocol, viz (1) check for audio and video, (2) personal introduction, (3) declaring the agenda for the call, (4) brief introduction to the research, (5) asking for any doubts or questions, (6) requesting permission for recording the video. Following this initial protocol, the online recording feature of the software was turned on which automatically recorded the rest of the conversation till the conclusion of the call. The recorded audio-video, along with a rough software-generated transcript is readily available after the call for further use.

As communicated in the initial emails, the medium of communication for all the interviews was English. All the interviewees possessed a sufficiently good proficiency and except for a few instances, language was no barrier in articulation of concepts and ideas during the course of the interviews.

Table 6 gives a brief overview of the particulars of each interview along with a reference ID as a cross-reference marker for statements by respective interviewees throughout this text. 'The 'Role of the Interviewee' section is presented to give an idea of their job description while sufficiently anonymising the designation for protecting their privacy. The dates are in day/month format with all interviews taking place in 2024. Except for Kranj which featured four interviewees and Malmo which featured two interviewees, all interviews were conducted with a single interviewee.

TABLE 6

Overview of Interviews

ID	Date	City	Duration	Role of the Interviewee(s)
1	11/3/2024	Aarhus	33 min	Advisory role at the Climate Secretariat
2	14/3/2024	Helsinki	55 min	Leadership role at the Climate Unit
3	25/3/2024	Antwerp	47 min	Leadership role at Climate Mitigation Project
4	26/3/2024	Heidelberg	45 min	Office for Environmental Protection, Trade supervision and Energy
5	26/3/2024	Tartu	32 min	Climate Specialist
6	4/4/2024	Leuven	42 min	Advisory role at Smart City Leuven Economy and trade department
7	10/4/2024	Stockholm	30 min	City Executive Office, Urban Development
8	15/4/2024	Kranj	70 min	Office for Development and Smart Community
9	26/4/2024	Malmo	39 min	Office for Climate Transition

10	1/5/2024	Riga	42 min	Leadership role at the City's Energy Agency

3.3.5 Description of data analysis procedures

All the interviews were conducted through the Microsoft Teams video conferencing software which automatically generates a transcript at the end of the interview. As these are typically rough transcripts with several inaccuracies, they required a round of manual post-processing.

For this task, the rough transcripts were downloaded as .docx files to local storage. For each of these transcripts, a round of manual correction was done by simultaneously playing the interview video to fix blatant errors in speech recognition, the recognition of special vocabulary, and deletion of redundant text such as filler words. For instance, surplus utterances (umm, ohh, mhm, aha etc.) are not transcribed so long as they don't interrupt the interviewee's flow of speech. Punctuation and language were standardized wherever necessary to approximate written language. When there were clear, long pauses in speech or the speaker abruptly changed the train of through, it is indicated by three dots (…). In order to make the transcript more presentable, the timestamps were removed and portions with personal information were anonymised. In some instances, there are words which do not make sense in the text and were not clear from the audio as well; they were left as it was recognized by the software. **Appendix 7.4** contains transcripts from all the interviews conducted. Therein, P1 refers to the interviewer and P2, P3, and so on refer to the interviewee participants.

A data corpus emerged through the whole exercise of conducting interviews which needed to be analysed. Thematic analysis was chosen for the analysis of data as it is a widely used approach for data analysis through the generation of codes from qualitative data (V. Braun & Clarke, 2006).

There are six main steps to thematic analysis, namely familiarising oneself with the data set by transcribing if necessary, initial data coding, researching of themes, reviewing them, defining and naming themes and producing the report (V. Braun & Clarke, 2006). Coding is a process through which procedures that enable the compilation, categorization and organisation of data are applied, giving a structured framework for further interpretation. Thematic patterns are unveiled within the data sets through codes that establish clear directions for further classification of data to extract, articulate and document meaningful insights (Williams & Moser, 2019). In other words. themes are derived from these codes and are used as a framework for organising data and reporting observations with the aim of summarizing the content as well as identifying and interpreting key features in accordance with the research question (Clarke & Braun, 2017).

Upon manual correction of the transcripts, they were uploaded to the MAXQDA computer software which allowed for a range of functionalities in organizing data while ensuring transparency. Rädiker & Kuckartz (2020) were referred to for analysis of interviews using MAXQDA. It allowed for a cyclical coding process that involved multiple iterations of coding to refine the codes after each new interview transcript was coded to improve the efficacy and accuracy of the codes and subsequent themes. Often, codes was merged or deleted as per requirement. The software was accessed through the subscription of the University of Münster upon a request made through the thesis supervisor.

In the next step, the findings from the coded transcripts were extracted and drafted in the analysis and results section. The process of writing this section helped identify new patterns and further streamline the codes to come up with more accurate inferences. It was again an iterative process which led to multiple changes and updating of the draft. By contrasting the results from this section with the earlier findings from the literature review, discussion and conclusion part was generated.

3.3.5.1 Use of Artificial Intelligence

It is appropriate to mention here that the researcher experimented with artificial intelligence software to validate the findings from the analysis of the data corpus. The use was limited to checking whether the software would return that same patterns as identified by the researcher and did not involve writing of the draft itself.

3.4 Methodological Limitations

While the methodology employed in this research was carefully planned and executed to achieve reliable and insightful results, several limitations were encountered that need to be acknowledged. These limitations highlight the potential areas where the research approach could be refined or expanded in future studies.

3.4.1 Case Selection

The study focuses exclusively on cities associated with the European Union's Horizon Europe funding program, specifically those part of the Climate-Neutral and Smart Cities Mission. While these cities have demonstrated a commitment to climate neutrality, this selection may introduce a bias as these cities may already have more advanced sustainability initiatives compared to other cities not involved in the program. It is also potentially excluding valuable insights from cities outside Europe that are also pursuing climate neutrality. Therefore, the findings may not be entirely generalizable to cities outside Europe or in the Global South.

The study was conducted within a specific timeframe, with interviews taking place between March and May 2024. As policies and technologies evolve, the relevance and applicability of the findings may change, limiting their long-term validity.

3.4.2 Participant Selection

Out of 86 interview requests sent, only ten responses were received. Although the number of interviews may be fitting to the expectation from a master thesis, this relatively low response rate may limit the comprehensiveness of the study. The small sample size might not fully capture the diversity of experiences and strategies employed across different cities.

The study largely focused on non-political professional public servants with substantial responsibility for climate neutrality initiatives. This may exclude perspectives from other relevant stakeholders, such as political leaders, grassroots organizations, and private sector participants, which could provide a more holistic view of the Digital Nudging strategies.

3.4.3 Data Collection and Analysis

Conducting interviews online using Microsoft Teams presented several advantages, such as overcoming geographical barriers an in-built transcription functionality. However, online interviews may lack the depth of face-to-face interactions. Technical issues, such as internet connectivity problems, could have compromised the quality of data collected. The process of manually correcting transcripts generated by Microsoft Teams was necessary due to inaccuracies in speech recognition. This step, while essential, introduces the potential for human error. Additionally, some speech elements that were unclear in the audio were left as-is, which may affect the completeness of the transcripts. The interviewees came from diverse linguistic backgrounds across Europe. The speech recognition software did face some issues in recognizing the differing accents of the interviewees and in some cases, the manual correction took much more time.

Although all interviews were conducted in English and participants demonstrated sufficient proficiency, subtle nuances and cultural context might have been lost or misunderstood, potentially affecting the accuracy and depth of the data collected.

The use of thematic analysis, while effective for identifying patterns and themes, relies heavily on the subjective interpretation of the researcher. This subjectivity may have introduced bias, affecting the objectivity and reproducibility of the results.

By acknowledging these limitations, the study aims to provide a transparent and balanced view of its findings, while suggesting avenues for future research that could address these constraints and build upon the insights generated.

4. Analysis and Results

This section presents the findings of the research assembled through analysis of the qualitative data gathered through the interviews. Angular brackets are used to cite interviewees, using the reference ID seen is **Table 5**. Wherever the interviewees are quoted directly, the quoted text is followed by a reference to the date of the interview along with the relevant paragraph number from the transcript as available in the Appendices. Instead of the name of the interviewee, the date of the interview or the name of the city can be used for identification.

4.1 Statement of research problem

RQ 2: How can these successful Digital Nudges be applied by cities to nudge pro-environment behaviour?

In order to answer this question, this study needed to answer the three sub-question and then synthesize the findings. The first sub-question is ‘In sectors should the use of Digital Nudging be prioritised?’. This simply means to enquire what sectors of the local economy cause the most amount of GHG emission since cities have the greatest potential for emission reduction by focusing their efforts towards them. It was interesting to see the prevalent notions about Digital Nudging that the interviewees had. Many cities already have some sort of Digital Nudging projects in place with or without a stated policy in favour of nudging.

The second sub-question is ‘What factors facilitate the incorporation of Digital Nudging initiatives in cities’ climate action plans?’. In other words, it looks to identify prerequisite factors that impact the successful implementation of Digital Nudging initiatives or projects by the city upon recognizing Digital Nudging as a tools for encouraging PEB within their climate action plans framework. Factors that are prerequisite for having Digital Nudging in place were identified through the interviews. The third sub-question asks ‘What are the challenges and barriers to the effective incorporation of Digital Nudging initiatives in cities’ climate action plans?’. Here, the idea is to identify the potential challenges or barriers for applying the successful kinds of Digital Nudges for encouraging PEB. **Table 7** presents a short overview of the results vis-à-vis RQ 2 before their detailed presentation.

TABLE 7 Overview of Results			
RQ	**Theme**	**Results**	
2.1	Top GHG emitting sectors	Mobility	
		Energy and Heating	
		Buildings and Construction	
		Waste management	
		Food	
2.2	Facilitating/ Prerequisite Factors for DN	Public Engagement	
		Technological Infrastructure	
		Administrative and Regulatory Environment	
2.3	Challenges and Barriers	Systemic Challenges	1. Limited influence and powers for cities or municipalities 2. Unequal division of powers across countries
		Policy Challenges	1. Bureaucratic silos 2. Lack of political will 3. Budgeting
		Operational Challenges	1. Co-ordinating with other stakeholders 2. Data acquisition and management
		Transparency and Privacy	
		Need for Further Research	

4.2 Presentation and interpretation of results

4.2.1 Profile of Interviewees

One of the good things about the data corpus is that it encompasses a diverse range of perspectives. The interviewees represented a wide array of roles in administrative branches from their respective cities. They included advisory [1, 6], executive [4, 5, 7, 8, 9] as well as leadership roles [2, 3, 9, 10]. In addition, it was observed that they came from various backgrounds including human rights [3], geography [4], urban planning [5], academia [1] and business [8] among others before they joined public administration.

4.2.2 Climate Action Plans

After introducing their roles and backgrounds, the interviewees typically talked about the climate action plans of their respective cities and what it means for them for be climate neutral. They were adopted as far back as the 1990s and seek to align their targets with the UN Sustainable Development Goals [6, 7, 10]. These Climate Action Plans are iterative in nature and are timely updated to incorporate new strategies [1, 2]. Depending on the administrative and political structure of the countries, the cities' plans are complemented by national or regional climate protection targets or laws. The representative from Stockholm, for instance, described their city's climate action plans as follows.

> *"...so the city of Stockholm adopted the first climate action plan back in 98, so it's been a long work of emission reduction for...yeah, I would say maybe even longer time than the 90s.*
>
> *So from the beginning it was more of understanding the system, the system measuring like the emission emissions and see what's most important. And during the 80's and 90s it was the district heating and the electricity production that was the most relevant to work on, and also retro-refitting of buildings and so on.*
>
> *For now, the district heating system, for example, is almost emission fossil free. Ohh, so now it's more of working with the transport sector and also reducing plastics within the area."*
>
> *(Stockholm, 10 April 2024, Pos. 8-10)*

The cities may be entitled to additional funding from higher levels of government to fulfil their obligations. The case of the State of Baden Wurttemberg in Germany can be quoted as an example which enacted a climate change adaptation law that require large cities to have a heat plan by 2023 and was therefore obliged to finance it [5].

> *"And as soon as we have a law, we have to fulfil several obligations. And the governmental level, which passes the law, has to give you then money in order for you to fulfil what they want you to do.*
>
> *So for example, the state of Baden Wurttemberg already in 2021 or 22 had brought up the law that large cities have to have a heat plan, a local heat plan by the end of 2023. So for example, in this, you have the law and the municipality*

has to fulfil what the law says. They get funding from the state and then they fulfil their duty.

Now it's a federal law now since this year. So other cities in Germany, depending on the size, have to implement a district heat a plan until certain years. So, the connection between the different levels are task which are mandatory or obligatory. So if they are a duty you have to be financed by the state. If it's not a duty, you have to finance by yourself. So right now, most of the climate change and climate adaptation the measures we implement in Heidelberg, we have to finance by ourselves because it's our choice."

(Heidelberg, 26 March 2024, Pos. 15-17)

4.2.2.1 Key GHG Emitting Sectors

Most cities have identified the top sectors which are responsible for emissions and are increasingly incorporating non-core and external emissions that are caused by consumption [1, 7, 8, 9]. Some of the newer plans are focused towards sectors where the city can actually do the most. For instance, the city of Helsinki recognizes that, among others, it needs to work on construction as it has a lot of power to act in that sector since it dominates the ownership of land and housing [2].

"So we are much more close to the citizens, but also, I mean, we run schools, hospitals, you know, all the city planning, everything that goes on.

The economy of the city is strong and like I said, we own 63% of the land, which means that there's a lot of power that we can put into how the city is constructed. And so last year, for example, we introduced a life term carbon limit for all new residential buildings. So now everything that's being built in Helsinki has to look into the 50-year time frame of how much emissions they will use in the construction phase, in the heating phase, in the demolition phase, combined that altogether and stay under a certain limit that we are the first city in the world to do that."

(Helsinki, 14 March 2024, Pos. 16-17)

The interviewees thus stated key sectors that they are targeting in order to reduce their emissions for transitioning to climate neutrality. Although the cities differ significantly in their geographic and socio-economic positions, a few major sectors can be clearly discerned as bearing a sizable imprint on the emissions.

TABLE 8 Biggest GHG emitting sectors according to the interviewees		
ID	**City**	**Top Emitting Sectors**
1	Aarhus	Mobility, Waste, Industry, Agriculture
2	Helsinki	Heating, Construction, Mobility
3	Antwerp	Buildings, Mobility
4	Heidelberg	Heating, Energy, Mobility
5	Tartu	Energy, Mobility
6	Leuven	Mobility, Construction, Energy, Food
7	Stockholm	Mobility, Heating, Waste
8	Kranj	Mobility, Waste, Buildings
9	Malmo	Heating, Mobility
10	Riga	Mobility, Buildings

Table 8 presents the responses of interviewee when asked about the sector which cause the most emissions. The sector which all interviewees mentioned was mobility, which was often referred to by other terms such as transportation and traffic. Heating (4/10), energy (3/10), buildings (3/10) and construction (2/10) were other recurring sectors while industry, agriculture, food and waste management were also mentioned at least once. The following sections present the specifics of the issues with these sectors as recorded through the interviews along with some of the solutions that cities are working on to reduce their GHG emissions. Due to a certain degree of overlap in their references, are being presented together. Heating is clubbed with energy and construction is clubbed with buildings.

4.2.2.1.1 Mobility

The transportation sector was most frequently cited by the interviewees as one in which their respective cities need to work towards reduction of emissions. Primarily, the emissions in this sector are caused by vehicles running on fossil fuels. Moreover, the number of transport vehicles, especially cars on the streets has been rising in many areas [8]. Unfortunately, municipalities often lack capacity to directly undertake measures which can reduce emissions from this sector as ideas such as enforcing a limit of one car per household has been met with stiff resistance from citizens [8]. Therefore, they seek support from individuals through changes in their lifestyles.

Some cities have responded by adopting systematic strategies to regulate mobility. For instance, one of the interviewees mentioned a three-pronged approach which seeks to (1) reduce the demand of itineraries of driven kilometres, (2) transform rest of the demand to environment friendly modes of mobility and (3) replace the rest of the mobility with environment friendly propulsion [4].

> *"…you always have these 3 approaches in Mobility planning…*
>
> *One is, reduce the demand of itineraries of driven kilometres.*
>
> *The second is that the leftover demand should be transformed to environmentally friendly modes of mobility, with public transport or by cycling.*
>
> *And the one which is left, for example call Mobility, should be replaced by environmentally friendly propulsion, for example. So, this whole Mobility part or the transformation of the bus and tram fleet towards environment friendly population technology like H2 or e-mobility buses."*
>
> *(Heidelberg, 26 March 2024, Pos. 25-28)*

When citizens do not need to travel long distance for their everyday needs, it would result in a direct reduction in fuel demand. Strengthening digital infrastructure and adopting nudging approaches can help in this. For example, Malmo has a system for choosing schools for children which always puts the kids in a school which is closest to their houses [9]. This saves fuel demand because then kids can more often simply walk or bike to school and back, and parent do not always have to use vehicles to arrange transportation for their children. Similarly, as more and more city services can be accessed remotely online [1, 2, 3, 4, 6, 7, 8], it ultimately results in saving a lot of trips and helps in reducing fuel demand.

Promotion of environment friendly or sustainable modes of transport is central to the mobility plans of many cities as they aim to prioritise walking, cycling and public transport over usage of private cars [2]. For mobility apps like Google maps, suggestion of greener transportation options such as walking, cycling, e-scooters or public transport could be presented by default [7]. This also implies steps being taken in the re-design of urban infrastructure such that cities are walkable, cyclable and offer good connectivity through public transport. For instance, the interviewee from Tartu talked about their 'Cycling Promotion Action Plan' for sustainable mobility which involves incorporating bike lanes in the road infrastructure and having cycle storage sheds closer to buildings than parking spaces [5]. Heidelberg's 'Climate Neutral Mobility Plan' seeks to enact measures to reduce inner city traffic which is largely by caused by commuters using cars [4].

"...we are right now in the process of developing our office's Climate Neutral Mobility Plan and that very much, like I said before, focuses on measures to make public transport and cycling more attractive, like optimising the cycle lane grid in the city. Or speed cycle lanes which connect cities and also to improve the whole public transport system like the ticketing system. Optimise the ticketing system, make it cheaper, or optimising the schedule of buses and trams or improve the Mobility points. You know, where tram and bus come together or tram, bus and bike lanes come together to develop a more sufficient itinerary change.

Just to make using public transport easier and more attractive for example. The most Mobility emissions in Heidelberg come from commuting in and commuting out of the city, so especially the inner city traffic is very much dominated by cycling and public transport, but the car emissions, which are the most problematic emissions, are caused by commuters."

(Heidelberg, 26 March 2024, Pos. 33-34)

Interviewees also stressed on the importance of optimising and simplifying the ticketing systems for public transport [2, 4, 5]. For example, one of the interviewees citied the system in London wherein one can simply use their debit card. Therein, the system collects all the travels in a month and then bills the commuters in the end while applying the cheapest option by default [2]. This is much simpler than the system in place in some other cities which require downloading an app or buying a bus card which makes ticketing itself a hurdle in using public transport [2, 5]. Apps such as Bolt combine multiple mobility services in one place [5], offering people an easy way to choose sustainable mobility options. Incorporating the simplicity nudge (Sunstein, 2014b) in UI/UX design of mobility and navigation apps could help in overcoming inertia and boosts adoption.

One of the other major problems mentioned by the interviewees with regard to mobility was that emissions from flights operating from airports within geographical boundaries of cities are added to their overall tally [8, 9].

"According to the methodology, yeah, it is a bit stupid, but nevertheless it has a direct effect, of course. But you know there's an International Airport here. Half of the flights go to our emissions, let's say. But yeah, then it's different kind of thing, so we need to neutralise that to some extent. But again, Slovenian International Airport is like something local in India, believe me. So it's not such

a big deal, but for the number of habitats that we have, of course it's quite a burden."

(Kranj, 15 April 2024, Pos. 32-33)

Since, they often have no control over the air traffic and infrastructure, it is the domain in which they are the farthest from reducing emissions [9] and are hoping for faster development and adoption for sustainable aviation fuels [8].

4.2.2.1.2 Heating and Energy

Cities are big centres of human activity with an appetite for tremendous amount of energy. In the last few decades, reliance on fossil fuels for their production has reduced drastically [10]. Many countries are now using cleaner sources of energy such as hydro-electric stations, cogeneration plants and local biomass based thermal plants [10]. As far a heating requirements are concerned many cities have a bulk of their heat supplied through a district heating system which allows for production of heat with sustainable sources such as waste incineration and bio-fuels [1, 7, 9]. Other cities are also aiming to build their district heating infrastructure and expand the grid [4, 8]. However, due to the large scale demand for energy, even in cases where district heating facilities are mostly fossil fuel free, heating and energy sectors remain a top emitter of GHG [9].

"Yeah, because we have a large district heating facility here in Malmo and it's run on waste. And I think they are 93% fossil fuel free, but since it's quite a large city, there are also heating some other smaller cities that are connected to Malmo. The carbon emissions are quite big, so even though there are 93% fossil free, it's still the biggest emitter."

(Malmo, 26 April 2024, Pos. 23)

The way forward is for cities to focus on structural changes such as continuing to expand the share of fossil fuel free energy and retrofitting of buildings so that they are better insulated and require less energy [4, 10]. For households in the outskirts of the cities which still use coal or other non-renewable fuels for heating, cities are offering incentives to shift to more sustainable heating systems [1]. Cities with industrial plants are also working on capturing the heat generated in production and channelling it for heating homes as much of the dead heat could be given a new life, resulting in massive savings, both in terms of emissions and money [8].

"So we're talking about the second life of this energy that is there here, especially the Goodyear plant is the one that is running 24/7, 340 days a year.

And being there and also in the industry alike in my previous life if I can say so, there's normally 90% of dead heat that can be reused again because otherwise it's just, you know, evaporates from the facility and according to the science behind and the experts that are connected to that half of that extra which is there can be always captured to one extent.

So we are talking about pessimistically, a realistic scenario. I mean the optimistic one could be even 75% and in some of that cases we talk about millions of Euros that can be really captured and the idea is to have it of course as additional financial motivation for those companies that will not only see the possibility but there were also willing to do that. But on the other hand, much less or lower much lower invoices, monthly invoices for the households that use this kind of an energy."

(Kranj, 15 April 2024, Pos. 73-75)

In addition, expansion of other clean energy sources is in works [3, 4, 8]. Cities are offering incentives and technical support to private home owners, farmers and large roof owners to install solar panels [3, 4, 9]. Erecting more wind turbines is even being seen as a federal and state duty [4].

In addition all these measures to make the energy and heating supply greener, cities acknowledge the need to reduce the demand itself. Using more energy efficient technology such as better bulbs is one way to do this [4]. In the last few years, the war in Ukraine has had the consequence of people being nudged into being aware of their energy consumption due to geo-political and financial concerns which has resulting in significant savings through lowering of temperatures in buildings [2, 3]. This reflects that the potential for energy savings through behavioural changes is tremendous and psychological mechanisms can be powerful tools to tap them.

There have been instances of Digital Nudging being an enabler for these behavioural changes. For instance, electricity prices are dynamic in some areas and are updated every few minutes [2, 7]. People can use their electronic devices to track the real-time changes in pricing and are thus financially incentivised to avoid using electrical appliances such as dishwashers or washing machines during peak hours when it shows higher prices due to greater demand [2, 7].

"So now they publish the pricing of electricity every 15 minutes. And so, for example, my father has chosen to have that sort of electricity bill. And so whenever like, you know, you're turning on a dishwasher or something, you

check what's the electricity price right now, because it can go between like zero and a euro per kilowatts and so there's been huge fluctuations. And I was just asking yesterday when visiting him "can I turn the dishwasher on?" and he was just like he went to check "Yeah 4 cents, so go ahead!" and I was just like, "how, does it make a difference?" And it's just like it makes you so much more conscious because it's there's an economic benefit, for "do I turn something on now or at 8:00 PM or tomorrow?" Because they are also giving prognosis about this.

So I think that this would be a good example of Digital Nudging, but it also is not just nudging for the sake of behaviour change, but it has that big incentive of, you know, having big savings and like my father was saying that he's saving a lot of money compared to old."

(Helsinki, 14 March 2024, Pos. 29-30)

Similarly, the use of Default Rules can have an impact on switching to greener energy contracts [3, 4]. There have been a few experiments in Southern Germany in which the default type of energy presented was a greener option. When offered multiple tariff choices with the default being green, about 94 percent customers simply remained with the default despite the less greener option being eight percent cheaper (Sunstein & Reisch, 2013).

4.2.2.1.3 Buildings and Construction

Buildings are a major issue for climate change as they make up around half of all global carbon emissions when factoring in the entire building value chain from raw material production, construction and usage to eventual demolition (Isaksson et al., 2022). For all their utility in providing shelter, residential buildings are an important constituent of the cities' climate neutrality strategies.

Some cities like Helsinki have started to take control over this sector by setting lifetime carbon limits for all new residential buildings. It means that everything being built therein would have to look into the fifty year time frame of how much emissions they will use in the construction, heating or demolition phase and that total has to stay under a certain limit [2]. This forces the construction companies to adopt more sustainable building practices to stay under the stipulated limits.

Given the climate of Europe, a lot of energy is required in heating of buildings during much of the year. While new buildings can be mandated to follow the latest technology in insulation, older

building have a need for retrofitting and renovation since most of the buildings across European cities are not sufficiently insulated [4, 8].

> *"The statistics here is pretty much the same like it is in Europe. So 80% of buildings are not at all insulated or they are not enough insulated. It's not just the problem of Slovenia, it's the challenge for the whole Europe and the best energy is the one that you don't even use. So we strive for that, the retrofit should happen as soon as possible.*
>
> *And then it's a question how to motivate people to put the, you know, money out of their pocket and invest into their installation. So unfortunately, here Putin is the best advertisement for that, you know, because having a high price of the energy meaning the gas directly needs, I mean forces you or motivates you to some extension to the investment into the installation. That must not have been in the past because the energy was too cheap."*
>
> *(Kranj, 15 April 2024, Pos. 48-49)*

As it is a tough ask to expect people to put money into doing something by themselves, some cities are setting up services for citizens looking to get support with renovating their houses and reducing energy usage [3, 10].

> *"...we have what we call the Eco House, that simply is a House where citizens in Antwerp can go to and get support on renovation, energy usage, everything. Every question you could ask, every question that has linked to climate, you can take up this question and go to the Eco house and they will explain it."*
>
> *(Antwerp, 25 March 2024, Pos. 29)*

In some areas, retrofitting big multi-apartment buildings has been a huge challenge [10]. They have started to experiment with Digital Nudging strategies to get residents to agree to building renovation programs. For instance, Riga is developing heat maps connected with the centralised heating of buildings to give more visual Feedbacks about the energy efficiency class and enable social comparison with neighbouring buildings [9, 10]. Moreover, as the municipality itself owns a small share of these apartments, consent from a majority of the residents is needed to be obtained for carrying our renovation work in these multi-apartment buildings. As they have found it tough to get a positive vote for these changes, the authorities are planning to introduce a default vote for retrofitting so that residents can be nudged into agreeing for retrofits [10].

4.2.2.1.4 Waste Management

Due to a high degree of variance in distribution of powers among the levels of government between countries, municipalities do not always have control over all the majors GHG emitting sectors. For waste management however, they are indeed responsible in most cases [2, 9].

If citizens can be encouraged to sort their waste, there is potential for making gains. For changing behaviour it is important that separate bins for sorting are places at accessible locations and that instructions for sorting are placed at those very spots where people are sorting their waste [2, 6]. Stockholm, for instance, is investing in a pilot where they are trying to inform citizens about waste management through an app which enable social comparison with others [7]. Another interviewee had the idea that since disposing non-recyclable waste is much more expensive, it is something for which households could be informed when they receive their bills [4].

Reducing plastic usage and more efficient sorting of waste is connected with mitigating emissions [7]. However, even in cases where waste incinerators are used for district heating, reduction in plastics are key to lowering carbon emissions from burning of waste [7].

> *"And then we are using waste incinerations and yeah, burning the waste and use it for the district heating and uh, about 25% of our emissions connects to the fossil plastics. So yeah, that means reducing plastic in society. I mean, we can work with sorting. So now for example, we are building a large scale sorting facility that can sort out plastics, metal and food waste. But still, since the market for recycling of plastics is not that very well-functioning. So yeah, we need to work more on reducing the plastics in society. And for the municipality, its maybe not the core work, but that's connected to our emissions really much."*
>
> *(Stockholm, 10 April, 2024, Pos. 16)*

4.2.2.1.5 Food

The production of food for our consumption, particularly through industrial agricultural practices, causes significant emissions of GHGs. Dietary preferences vary and so does their climate footprint. For example, studies show that emissions from a meal with tomatoes, rice and pork are up to nine times larger than potatoes, carrots and dry peas (Carlsson-Kanyama, 1998). While meat and dairy production is largely associated with higher emissions as compared with plant-based foods, emissions form supply chains have a part to play in this disparity (Berners-Lee et al., 2012).

Cities are grappling with questions such as how to make sure that people choose local ingredients instead of those flown in from other parts of the world, or how to encourage people to recycle and use leftovers in the fridge [5]. They are trying to inspire consumption of more vegetarian food in places such as schools or city events where they have a control over setting the menus by practices such as having the vegetarian options first for the most prominent in the menu [2, 9]. Saving surplus food from going to waste through food rescue apps is also becoming an increasing popular choice [2].

> *"There's an app here called Rescue, a rescue club and it's basically selling like surplus food in restaurants or supermarkets for a lot lower prices at the end of business day or something like that. And it's become very popular and you get it much cheaper. Also, because it's a digital tool and you can check you know, your favourite places or places nearby. And then I've heard that you know, supermarkets give these like they put like a big bag of things in a plastic bag and then they sell it for 10 euro's or something and sort of surprise bag and those go in like one minute. I think that that's a good nudging way.*
>
> *Also, because it's kind of like there the food that would have otherwise would have been wasted is now not wasted the company or the supermarket makes some money out of it and people get food for a lot less and it really needed that digital tool because otherwise it wouldn't work, you wouldn't know where to ask for that.*
>
> *So I would assume that that's a good kind of nudging, also in the exactly right way, because it's between the producers and the customers…"*
>
> *(Helsinki, 14 March 2024, Pos. 104-106)*

4.2.2.2 Scope Framework

As cities are evolving systems with porous borders housing a complex array of social-economic activities, accounting of urban carbon footprint by determining what activities fall within which scope of management is crucial. To address these problems, cities have adopted the concept of emissions scope developed from one originally proposed for organisations (Bhatia et al., 2004; Kennedy & Sgouridis, 2011). Three scope levels are defined in order to draw conceptual boundaries around the different categories of emissions for which any city is to be held accountable.

Scope 1 consists of all emissions that come from the municipality as a company or the city as a geographical area. For example, it would include emissions from all the traffic that is there and from any heating plant situated within its borders [1, 9].

Scope 2 includes emissions from core external emissions such as from energy that is imported into the geographical area of the city [1, 9].

Scope 3 consists of non-core emissions that come from consumption by the organisations or people that reside in the city. For instance, when people buy products such as a cup of coffee, the emission caused by them come from transportation and production which does not happen within the geographical limit of the cities [9].

At this stage the municipalities have generally lacked direct means to regulate scope 3 emissions [1] and as a consequence they are largely focusing on scope 1 and 2 which involves sectors such as energy [3]. However, they are aware that, due to the overlapping nature of the framework, taking measure towards scope 1 and 2 would inevitably affect scope 3 and are therefore taking steps to incorporate that into their climate action plans [1].

> *"The previous plans have actually predominantly focused on emission reduction in scope 1 and 2. So that's within the boundaries of the municipality as a company and also its geographical borders.*
>
> *But the new plan also aims to, at least to a certain extent, to include scope 3, and this means that we expect a more strategic focus on the emissions it that we actually as a municipality do not have that direct access to regulate as such. So, because we cannot regulate citizen behaviour as such, we cannot dictate how they should drive to work. We cannot dictate how they should consume, so we don't have access to that on the ordinary incentives. You know, or regularity or regulations. It doesn't mean that we haven't previously worked with citizen behaviour or company behaviour, but it has been more on an ad hoc initiative basis."*
>
> *(Aarhus, 11 March 2024, Pos. 7-8)*

4.2.3 Attitudes towards nudging

The interviewees had varying levels of familiarity to nudging and Digital Nudging. Some of them were aware of Digital Nudges [3, 8, 9], with one of the interviewees being well acquainted with academic literature on nudging theory [3]. Many others were either totally unfamiliar with Digital

Nudging or were just aware of nudging in general [1, 2, 4, 5, 6, 7, 10]. In the course of the discussion, many interviewees could think of sectors where Digital Nudging is being applied in their cities or has a potential to be applied, including mobility [4, 7, 10], energy [1, 7] and waste management [4, 7]. Their perspectives regarding two of the more successful Digital Nudging types are presented in the following sections.

4.2.3.1 Familiarity with Digital Nudges

4.2.3.1.1 Default

As previously established in this paper, the potential of green Default Rules for having a positive impact on GHG emissions is tremendous. The interviewees largely concurred with this assertion and suggested that cities be able to choose the most sustainable option as the default in cases where citizens are free to decide on other options [3, 7, 9].

Using defaults rules for energy sector has demonstrated positive outcomes for emission reduction [9]. One of the interviewees also gave the example from a paper of Sunstein and Reisch (2013) about experiments in Germany and Switzerland on the use of green energy where the default type of energy being presented is the green one, and the positive consequences of it. In addition, they talked about their efforts in incorporating such Green Defaults in the energy sector in their country [3].

> *"I discussed that with the people from what we have in Flanders, the VREG. It's really the regulator of energy. If you look at VREG and then energy suppliers, you will have a whole overview of all suppliers. They compare it on prices, they compare on what they offer. What I asked was, put the default always Green that the first thing what the person sees is simply the green prices, but it was not (…), well we have discussed it, what was just, uh, one workshop and after that, they did not proceed."*
>
> *(Antwerp, 25 March 2024, Pos. 78)*

The case of successful application of Default Rules in organ donations was also highlighted to illustrate how the enormous potential of defaults can be realised by incorporating such rules or choices in the existing forms and processes [3].

> *"…organ donations in Flanders is big, like in Belgium is big. It's simply because the minister years ago said by default it's yes. Every time you get your driving*

license permit, there's somewhere small checkbox that says 'yes, I donate', it's there, it's not somewhere else, it's simply there."

(Antwerp, 25 March 2024, Pos. 88)

There is potential for application of green Default Rules in the mobility sector as well. As one of the interviewees noted, if ride-sharing or maps applications can suggest the fastest mode of transport as the default option, for them to perhaps suggest the least emitting mode of transport by default is also possible [7]. It would work best if there is no direct price differentiation between green and non-green options [8].

"…it could be when you're booking some kind of travelling. So now you need to like know by yourself, which is the most sustainable way of travel?

Like in Google Maps? Sometimes like when you're looking for the best way to move from A to B, sometimes you can find an E scooter and they say that's faster than the public transport. And you could have something like that maybe about Mobility [emissions] if you could have something that highlights timing, how long time things take? I guess."

(Stockholm, 10 April 2024, Pos. 46-47)

One of the interviewees was concerned by the informed consent aspect of using Default Rules, especially in light of strict GDPR regulations in Europe [5].

"…you have to watch out with the default choices that you have GDPR regulation that states that people have to be free to make their own decisions, that they can give informed consent. So putting stuff in default and making choices for them, I would not know if it would hold up against the sometimes very strict GDPR regulations…"

"…there is a lot of regulation and legislation in Europe that is focusing on the this informed consent principle. So like making people by default choosing some options over others, I don't know I'm not an expert, but maybe that could, could bring some problems."

(Leuven, 04 April 2024, Pos. 98-100)

However, another interviewee referred to the work of Sunstein to explain how there is simply no neutral way to present choices and the existence of a default option is always there and that for

public institutions, the judgment in favour of active choosing or choosing not to choose ultimately depends on the costs of decisions and the cost of errors. (Sunstein, 2014a).

> *"...Sunstein's book "Choosing not to choose", where he explains that yes, not choosing is choosing. There's always a default. Every person who writes the rules creates a default. Even if he wants to be neutral, the default is there.*
>
> *And then yes, glad that you will make your thesis on, "What if it would be simply green by default?" (25 March Antwerp, Pos. 39)"*
>
> *(Antwerp, 25 March 2024, Pos. 38-39)*

4.2.3.1.2 Feedback

From the review of literature, Feedback emerged as another one of the most effective Digital Nudging tools. The interviewees talked at length about some of the projects and initiatives that apply Feedbacks and share their opinions about the challenges associated with it.

In many cases the usage of Feedbacks is not intended to nudge consumers into saving energy but rather to give information and ensure transparency. However, the same infrastructure and policies can be used to help people and public authorities monitor energy consumption in order to limit it [1].

> *"Well, we do have some very basic, very basic Feedback. Ways of working with it within actually the energy area. You can track your energy and water consumption overtime, so you can do that online and I think it's very interesting that this is framed within the climate agenda because I don't think it's articulated as related to Climate or as conservation as such, but as a means to ensure transparency and in order to enable the citizen to take ownership of their own consumption. So I think it's part of a democratic conversation rather than a Climate agenda. And so Climate is kind of a side benefit. "*
>
> *(Aarhus, 11 March 2024, Pos. 30)*
>
> *"...we're developing, will be ready very soon, this heat map of the buildings and Geo-location map, where the building's connected to the centralised heating, will have the possibility to see like red, yellow, green. Also, energy efficiency class. So basically the main idea is just to tell you, yeah, that you are as good*

as, as neighbour and so on. So that then this will be a lot of information to work further."

(Riga, 01 May 2024, Pos. 49)

One of the consequences of the current geopolitical situation following the Russian invasion of Ukraine is the energy crises in Europe. Sanctions imposed by the European Union on Russian gas and oil imports caused a raise in energy prices across the region (Martínez-García et al., 2023). This was noted as an additional triggers that have prompted people to reduce their energy consumption [2].

"...we've had lots of pilots about people seeing electricity consumption, like in real time in their houses. I would think right now that's not really a digital nudge but it could have been a digital nudge earlier, but now it's just because of the situation with war in Ukraine and the sort of energy crisis in Europe that a lot of people changed. So we used to have very cheap electricity most of the time and then the price started getting higher and most people had like a 2 year contract with the set sort of price. And those started to get higher and higher. So I guess it was always available, but people weren't thinking about it (to go into real time pricing).

So now they publish the pricing of electricity every 15 minutes."

(Helsinki, 14 March 2024, Pos. 28-29)

Regardless of whether they are interested in the political or environment consequences of their consumption patterns, people can be more effectively be made to alter their behaviour when Feedbacks remind them of the financial burden of their energy bills. One of the interviewees recalled an earlier experiment which supports this notion [7].

"So like 10 years ago, I know we had some project with digital screens in people's entrance halls where they had a Penguin on ice and if you spent a lot of energy the Penguin was sad. I mean it's like a digital animal in your entrance and I'm not sure if people like changing the behaviour based on the Penguin. Uh, but if it's like more expensive, people kind of start to react."

"But this was just like an example of...When people started to talk about, like, how can we, how can we inform people so that they can be more aware energy consumption and like how can we make them care about the penguins.

But the result was that most people didn't care, they care for like some days and then it was just the screen. So I guess that's my reflection that if it's expensive, people started to actually change the behaviour."

(Stockholm, 10 April 2024, Pos. 61-66)

Perhaps the biggest challenge for this approach is that it is heavily dependent on acquisition of accurate data which can be shared with users or consumers to give a Feedback about their consumption. This would require not only having the infrastructure such as digital meters in place but also employing sound methodology for accurate calculation. As one of the interviewees noted [5],

"…the problem is that you would have to have control over the data to see how people would compare, because if people would really start to be using it, then you have to deliver them with correct information and not only just like a gamification."

(Leuven, 04 April 2024, Pos. 71-72)

Another interviewee hinted that it may be the case that Feedbacks are collected without a sound scientific methodology or are presented in a manner that is not easily comprehensible for the general public [2].

"…Turku, they got money from the pilot program of the Mission 100 climate neutral cities. They wanted to have like a real time emission showing in the city. So, at least for us, it takes months to get the actual emission data. So I don't know if it's possible to have real time emission data, but I'm also very doubtful that even if you see like 225,000 kilotons today and then tomorrow you see down by 2 like how does that change your behaviours like that?

I'm not convinced about that, that that is changing anything…"

(Helsinki, 14 March 2024, Pos. 118-119)

4.2.3.2 Scepticism

The idea of using Digital Nudging for reducing emissions was often met with some scepticism. Some of the interviewees were of the opinion that climate transition needs a faster change and giving real incentives or having harder regulations in place can be more efficient measures to

achieve it [9, 10]. For others, it was hard to recall any successful nudging projects that made a significant difference without there being a motivation to do a certain behaviour [2].

4.2.3.2.1 Prioritising Structural Changes

Cities are aware of the limitations that influencing citizen behaviour can have in terms of gains against carbon emissions. Even though the effects of changing the consumption patterns of the masses are crucial, they may sometimes pale in comparison to structural measures that can directly tackle the biggest sources of emissions. To illustrate, one of the interviewees recalled how the impact of every citizen following pro-environment behaviour by lowering their apartment temperature, taking fewer showers and reducing electricity usage would pale in comparison to when they closed down a coal burning power plant [2].

> *"...we've also calculated that like individual actions actually have quite little impact on things, whereas we as a city where we own 20% of the housing and uh, you know 63% of the land and things like that. When we set regulation for things or we changed the way that we heat our own buildings and so on can make a huge difference compared to getting each individual to change things.*
>
> *So for example we calculated last year that if a person who wants to do as much as they can, does everything about the heating in their apartment, which is basically lowering the temperature by 3 degrees, which is about the maximum that the house can take, and you know it takes fewer showers and use as little electricity and things like that, the impact on emissions is only about 1.8%, and even if every person in Helsinki does those individual actions that would reduce our emissions by 0.5%.*
>
> *So it's kind of like where we closed a coal burning plant last year and that reduced the emissions immediately by 20%.*
>
> *(Helsinki, 14 March 2024, Pos. 9-11)*

Indeed, some others observed that changing of citizens' behaviour could only be part of larger approach and so we must be aware that we do not focus very much on the individual lifestyles instead of the systemic and structural transformation that makes green choices an integrated and non-decisive part of human life [1]. In other words, one can view nudges as facilitating merely a surface-level rather than an integral change of behaviour that makes sense to the people.

4.2.4 Prerequisite Factors

There are several factors that were referred by the interviewees which can be conceived facilitators or prerequisites for successful incorporation of Digital Nudging mechanisms in delivery of public services for encouraging PEB.

4.2.4.1 Public Engagement

Cultivating trust and acceptance among citizens is crucial for successful introduction of Digital Nudging initiatives. The interviewees mentioned how their cities prioritise engaging citizens and other stakeholders in decision-making and execution processes concerning climate strategies and plans to ensure that all climate activities make sense to them [1].

One of the important aspects of this principle is to collect feedback and opinions from citizens on existing and future initiatives that are planned by the public authorities. Some of the interviewed cities have mechanisms in place to encourage this.

> *"...we have something called a citizen barometer. It's a digital barometer where citizens can express their opinion in on particular matters. We use it to kind of take the temperature, so to speak, on what currently concerns the citizens. So that's also kind of a digital way of interacting with the consumer or the citizens […] we would send out questions regularly, and I think it's segmented when we ask particular questions, but we could also use it for more general responses like for instance the views on sustainability matters, or climate neutrality matters, for instance, that would be across any segment, yeah […] It's for internal uses, but we have a lot of, you know, meetings with citizens where we discussed the result. They are not public. You cannot access them digitally, but you can come and join the meetings where we can then talk about some of the results, as part of the puffing public hearing process.*
>
> *(11 March Aarhus, Pos. 24-29)*
>
> *"This is an online platform that we have for participation. It's called "Leuven, maak het mee!", so it's called Leuven, We make it together. You see, it's like almost 9000, more than 8000 users. So we do projects in that these are digital web project and in this for instance, we asked people so which places in the city would be interesting to Green to de-pave and to Green and there you could see all the people that were participating. You could see all the different steps that*

we had and all the ideas that people come up with and they could upvote it down vote it and stuff like that."

(04 April Leuven, Pos. 60-61)

Cities also have participatory budgeting initiatives as part of their citizen participation plans to lend more legitimacy to their projects [6, 8]. Such an approach also tries to alleviate the concerns of geographical inequity in the distribution of public funds [2].

"...we have a pretty big participatory budgeting project. I think it's like €8,000,000 annually that go into that and that's a digital platform where you can first give your ideas and then vote for ideas. And then it's also like they try to make it so that every district gets it because you know that often there more rich areas where you have more educated people or more tending more to these things."

(Helsinki, 14 March 2024, Pos. 37)

"...we have a portion of the city's budget that is allocated for public ideas to implement so that there's like this whole 9 month process of gathering ideas, then working through them and the doable ideas will be put on public, basically voting. And then the 2 most popular ideas will be implemented throughout the next budget year."

(Tartu, 26 March 2024, Pos. 37)

"When we discuss with the European Commission, for us, it's very clear that if you don't include the citizens, so our customers in, this is not going to be the war that is won and in this respect, for sure, we want to include all citizens, even thinking of some yearly, let's say, payment of our citizens into this, I would say consortium budget or whatever."

(Kranj, 15 April 2024, Pos. 99)

On the specific issue of encouraging pro-environment behaviour, the interviewees were of the opinion that living a more sustainable lifestyle and caring for the environment may not be the only incentive that can motivate people towards behaviour change. As different people have different incentives that work for them, adding real economic benefits work better [2].

"So in our case of the city of Kranj, every time that you will have some green solutions having either less cost so lower price or getting some additional points to using it in order to gamify a bit, the whole idea will definitely change the habits of the people…"

(Kranj, 15 April 2024, Pos. 201)

As mentioned in previous sections, Digital Nudges such as Feedback can help in monitoring of costs for public services such as energy [2]. The extent to which emissions can be cut down on through such measures which inform citizens to better track the economic costs of the consumption patterns can be the subject of further research.

4.2.4.2 Technological Infrastructure

The utility of Digital Nudging cannot be effectively harnessed in the absence of adequate digital infrastructure and inability of the citizens to access public service digitally. Therefore, it is crucial for cities to be moving on from the analog to digital in their processes.

Of the interviewed cities, all have their own city websites which are set up to provide a channel for information and communication (**Table 5**). They are also tools for ensuring transparency as citizens can use them to access city council decisions and documents digitally [1]. These websites are often integrated with platforms through which municipal services can be applied for [7]. The greatest scope for Digital Nudging lies in the delivery of public services through digital mediums. During the course of the interviews almost all interviewees acknowledged that in their respective cities, a bulk of the public services can now be accessed digitally [1, 2, 3, 4, 5, 6, 8].

"A lot of requests that the citizen has to make in Antwerp is simply online. As you design the form, yes, you could start to influence people."

(Antwerp, 25 March 2024, Pos. 27)

"…the whole digital strategy of the city is to move everything to the digital world and get rid of paper and get rid of a lot of like having to go somewhere to apply."

(Helsinki, 14 March 2024, Pos. 46)

"Everything. So we have a whole citizen service, all the services for citizens are digital right now."

(Heidelberg, 26 March 2024, Pos. 46)

"… almost all the citizen services are available digitally…"

(Aarhus, 11 March 2024, Pos. 20)

There are more than a few examples of such services. In the waste management sector, managing waste schedule or booking waste cans can be done online [4]. Parking licences can be simply applied for and obtained digitally [2, 4]. Citizens can rent public infrastructure such as seminar rooms and sporting facilities online [6]. Meetings or consultations for municipality services linked to building renovations and retro-fitting can be booked online [10]. Businesses such as restaurants can apply for using the space on the streets outside for monthly fees online [6]. Education related services such as applying for schools are managed online [2, 6]. Family services such as applying for divorces or naming of the child can be accessed online instead of having to show up at an office [1]. In some cases citizens are also given a public electronic mailbox where all relevant information is shared to facilitate direct digital communication between individuals and the municipality [1].

"All citizens have a public or, you know, yeah, public electronic mailbox. So an official mailbox where all relevant information are sent to, so as a municipality we actually have direct digital communication access with the individual citizen and the citizen can always reply directly on any information they receive there."

(Aarhus, 11 March 2024, Pos. 21)

The interviewees from Kranj talked about how it is possible to integrate the city website and digital service platforms with the city's smart card to transform the digital infrastructure of the city [8]. Their idea is to combine the various service platforms into one. Through this, various data lakes can be combined to form a single big data lake. The information from that can be used to inform data driven decision-making. They used to have various cards for public services such as library, sports and cultural events which they plan to replace with a single smart city card which they are developing along with a major Slovenian bank. This card is to be free for all citizens and not have transaction fees. Being linked with the user's city account and identification number would enable to access any special offers or discounts for citizens directly. Since they intend to have it integrated with global payment service such as Visa or MasterCard, it would also work as a regular bank card [8].

4.2.4.3 Administrative and Regulatory Environment

Even within the EU, states and municipalities are organised very differently and some countries municipalities have a lot of influence and can decide much on their own while the same is not the case in other countries [9]. The differences in their roles and powers make it difficult to compare

cities. While some cities are in control of many functions such as heating and energy systems, there are others that may only be responsible for a narrower set of services [2].

The distribution of powers varies due to differing governmental structures. As one of the interviewees noted,

> *"...we are sort of influencing also the industrial lot. But like I said, this is something that we can do because we have those powers. And then there's another city in another country that's completely differently structured because you have, like a lot of countries where it's very centralised. So that's the central government that's governing most of the things. So then you have, like Germany's a lot like regional, France is very central and so on. So I'm not saying that this is the way to do for everyone. Then you can't have the same actions. I'm saying is that everyone should sort of analyse their own powers and try to see like where they can make most impact."*
>
> *(Helsinki, 14 March 2024, Pos. 17-18)*

In some Nordic countries, cities or municipalities have greater share of responsibilities including schools, elderly care and social welfare [7]. And so, understanding a city's power to act under their given mandate ought to be one of the first steps in designing solutions that can help them in reducing emissions. A city like Helsinki which controls around 80% of public services and owns more than 60% of land can work on more structural changes than Oxford which in only largely responsible for waste collection [2]. And this disparity especially affects cities which are dependent on regional or federal government levels for digital infrastructure.

> *"...government communication is tied in different rules and we use a lot of different digital building blocks coming from other governments, so we don't have a real we don't have a real good impact on our own digital flows. Did you see it when I showed you the, the, the, the prime that you could ask that we were switched towards the Flemish Government for authorization and authentication?*
>
> *So you can change that because it would be totally stupid if every city in itself would start building their own authentication engine. So we reuse one of Flanders of the higher government, but we don't have impact on the way they design their UX&UI. We can change some colours and themes, but that would be it.*

So that's a second big thing is if you're thinking about governmental services and things like that, that you have a lot of rules and a lot of already existing building blocks that are not owned by the city itself. So it would be a real big challenge to change that. It would be really interesting. It can be done, but that said, I think that's the challenge also."

(Leuven, 04 April 2024, Pos. 91-94)

4.2.5 Challenges and Barriers

Implementing Digital Nudges to promote pro-environmental behaviour in cities, while promising, is not without its challenges and barriers. This section explores the multifaceted obstacles that cities encounter in their efforts to integrate Default Rules and other Digital Nudges into their environmental strategies. Key challenges include technological limitations, privacy concerns, and behavioural resistance among residents. Additionally, logistical issues such as the digital divide, financial constraints, and the complexity of interdepartmental coordination within city governments further complicate the implementation process. Understanding these barriers is crucial for devising effective and sustainable Digital Nudging interventions that can aid cities in achieving their climate neutrality targets.

4.2.5.1 Systemic Challenges

When discussing the sectors that are the largest emitters, some interviewees lamented the fact that their city government exercises limited influence over their regulation and functioning. For example the interviewee from Tartu said [6],

"…the city government itself has very little influence on where the energy comes from, what sources it comes from or how people consume it.

We have very vague influence on that. It's mostly things that can be changed and influenced on a national level. What we can do mostly is, um, focus on the city government's or the municipal institutions impact, but also Mobility in the city and this is something like nudging, basically, or the city environment.

(Tartu, 26 March 2024, Pos. 30-32)

When cities carry out functions on behalf of higher layers of government, they also lack control over the systems design. The UX and UI design of digital services in an arena where Digital Nudging can play a part but when the building blocks of the governmental services are not owned

by the cities, it is a real challenge for them to be able to change or customize it [5]. One of the interviewees recalled an example of house renovation in Belgium to highlight this point [3],

> *"Say you want to do renovation on your house and then you have to, depending on the changes you want to make, you have to request a permission. That software is built by Flanders and is not built by the city. It is simply all municipalities, all local municipalities in Flanders will use it. It is being developed by Flanders itself. And we simply cannot interfere.*
>
> *Even if you would say that there is a majority to say, "we must influence this", this is pure down on the level of Flanders."*
>
> *(Antwerp, 25 March 2024, Pos. 28-29)*

It may be unrealistic to expect harmonisation across countries in the way they are structured. However, it could be fruitful to encourage more engagement from cities at various stages from framing legislation to design and implementation of services. An interviewee recalled that there have been attempts made in this direction during the time when the Dutch chaired the Council of Europe [3].

4.2.5.2 Policy Challenges

A number of policy based challenged emerged from the interviews which pose hurdles to integration of a Digital Nudging based approach in the cities' plans to reduce emissions.

Fostering interdepartmental coordination and securing political will are critical policy challenges. Despite having evidence-based solutions for achieving climate neutrality, bureaucratic silos and competing priorities often hinder effective collaboration among municipal government departments or political entities. Moreover, there is no guarantee that politicians or decision-makers will prioritize and implement these strategies, as political considerations and short-term priorities may overshadow long-term sustainability goals [10].

The same issue also reflects in budgeting. Despite efforts to foster interdepartmental coordination and align sustainability goals, the ultimate decision making authority regarding budget allocation and project financing rests with politicians. Integrating projects based on Digital Nudging in municipality budgets faces significant hurdles due to competing priorities and political dynamics. While departments may be aligned in their objectives, the final decisions on budget allocation remain difficult to change [10].

"I think that the most important thing where it should be, it's like municipality budget or budget planning or also development and planning in general. So, this is something very, very and I would say for maybe next 5 years maybe unrealistic because the city budget (…)

So everything depends on the budget and from the priorities, but the main decisions are still made by the politicians. So even if all departments are like in one boat still, but still it is hard to make for example climate neutrality or green transition as a default setting for a municipality budget for the projects for the next year, which will be financed in the municipality because the last decision of what gets how much is made by politicians and this is not as easy to change."

(Riga 01, May 2024, Pos. 81-82)

Therefore, addressing the challenge of political will and budget priorities is crucial for advancing sustainability agendas and effectively deploying Digital Nudges to drive positive environmental outcomes. The need to ensure geographic distribution is also highlighted as it was mentioned that in some instances rich areas tend to be allocated a greater share of the projects [2].

Many cities also lack a centralised unit that is tasked with incorporating psychological mechanisms in their service delivery. A notable instance was in Flanders, where discussions took place about the potential establishment of a behavioural insights team similar to that of the UK's Behavioural Insights Team. This group was focused on exploring how behavioural science could be harnessed to influence public behaviour in beneficial ways. However, despite the discussions and interest, Flanders ultimately decided against forming such a team. This decision was seen by an interviewee as a missed opportunity, considering the substantial benefits that could be reaped from a structured approach to Digital Nudging in government operations [3]. The UK's approach, particularly through *gov.uk*, has been highlighted as a model worth emulating [5]. They have implemented comprehensive UI/UX styling guidelines for all government agencies, supported by a UX principles guidebook that ensures consistency and effectiveness in user interactions across digital platforms. This strategic use of behavioural insights in digital design aims to simplify processes, improve user experience, along with potentially incorporating Digital Nudges.

4.2.5.3 Operational Challenges

Perhaps the most significant impediments to using Digital Nudging for effectively influencing citizen behaviour are structural barriers that highlight the necessity of a broader, more integrated approach to behaviour change and urban development.

For emissions emanating from consumption of services in private property, cities' administrative authorities often lack a direct control and have to work together with other stakeholders. In such cases, it is impossible to expect just the municipal government to be responsible for effecting large scale emission reduction and rather, is something for which all stakeholders would need to work together [5].

> *"So the city itself has not a direct impact on that. So we have to work together with a lot of other players like the university, like homeowners and others. So that's pretty bigger than only looking at the city. This is a challenge that is not only there for the City, you know, would be impossible to, to expect that only government can make sure that the emissions are reduced. It's a thing that business, academics, private home owners, et cetera, all have to do together."*
>
> *(Leuven, 04 April 2024, Pos. 86)*

The city's role could lie in facilitation and coordination of these efforts to enable a collaborative approach as no single entity has the capacity to independently address all aspects of climate action. Cities are also lacking in authority to dictate how citizens should behave, and often do not have the access or capacity to offer incentives that may affect personal choices [1]. In fact, cities often simply do not interact with citizens on that level where they can mould lifestyle choices such as what they eat or where they go for their next vacation. Rather, they can work on systematic planning and development of essential infrastructure such as transportation and waste management [9].

Digital Nudging cannot simply be adopted in isolation but needs go hand in hand with the adoption a multi-faceted approach to public service delivery as digital solutions cannot simply be substituted in place of the actual physical space that we live in [6]. As many of the interviewees mentioned this larger approach incorporates digital solutions with a redesign of physical and social environment [3, 5, 6].

> *"For me, the Digital Nudging is like really a small part of something much bigger. So changing people's behaviour only by digital means is I think it's impossible because that's not the influence you have. It's not big enough, I think, for doing big things, huh?*
>
> *And so that's first. So it has to be part of a bigger approach that also has to change people's behaviour in real life and through the impact of media and role*

models and your social environment that has an impact on you. So it should be part of something of a larger approach."

(Leuven, 04 April 2024, Pos. 89-90)

"I still think that there's so much more to do than just Digital Nudging. Digital Nudging has to go hand in hand with all the other actions, whether it's like actual investments, the redesign of urban structures. Also, other communication actions and then when you have the possibility or it's easy for people to do the sustainable decision, then this nudging is something that can do the final 5 to 10% of the effort, but usually the 90% of the effort is I think maybe done somewhere else."

(Tartu, 26 March 2024, Pos. 55)

Data is a key component of this transformative approach in which digital infrastructure is to play a vital role. And therefore, its collection and availability is also a potential hurdle [4]. To show a change in behaviour one would need the data. For instance in energy or mobility sectors, to show variance in consumers' costs over the years on the basis of their consumption levels, adequate data is required [4]. It can be a big hurdle in some case to acquire such data. In Flanders for instance, the default setting in digital meters for communicating the data is off, even though it is mandatory to have a digital meter [3]. Because of psychological effects, people generally do not change it and thus, Feedback or social comparison based nudges can simply not be employed.

"So I don't see the usefulness of one very good project and one data sector when everything else is like chaos or you don't have a system. Should be as you mentioned a systematic approach so that we need to have this database or data repository where all the data is stored?

How it's stored, how employees and residents can perceive them or visualise or what they can do with them and don't. So I think that it's very important and all of the things to start from scratch, from the beginning of the system."

(Riga, 01 May 2024, Pos. 96-97)

"...to have really this one to one data with the citizen, not only the citizen, also to the foreigners or all kind of tourists, Slovenian tourists, foreign tourists coming to Slovenia and when you have this kind of digital infrastructure, then you can who do the whole game behind, the nudging."

(Kranj, 15 April 2024, Pos. 97)

"...to show a change in behaviour or energy consumption, you need the data to show that and I think that's one of the largest barriers that you have to have the data to show someone that their energy consumption raised or their costs on Mobility raised in comparison to the year before, or if it is lowered to motivate to follow that path. I think the data would be one of the most important obstacles I would suggest or I assume."

(Heidelberg, 26 March 2024, Pos. 69)

4.2.5.4 Transparency and Privacy

The successful implementation of Digital Nudges to promote pro-environmental behaviour faces several transparency and privacy challenges which were pointed out during the interviews.

Firstly, there is a pervasive distrust in government-led initiatives among citizens. This scepticism stems from the perception of government actions as overly intrusive, contributing to a "Big Brother" effect. While people tend to trust private companies like Google and Facebook with their data, they are hesitant to extend the same trust to local or national governments [8]. This distrust can be a hurdle in the utilization of nudging through digital mediums, potentially undermining their effectiveness. As one of the interviews noted,

"If you are missing the supply side, you have a problem. If you're missing the demand side, you have a problem. So really getting there, but then at the end of the day, it's all about people.

Again, if people do not trust the government, so the City platform, which is a governmental one, local governmental one, then we cannot win the war right. In this respect, we want to get them there proactively as volunteers and having something back out of it."

(Kranj, 15 April 2024, Pos. 123-124)

Ethical concerns also arise from the lack of transparency in the influence exerted by Digital Nudges. In absence of a declared policy towards nudging, citizens may be unaware that they are being guided in a certain direction, leading to mistrust and resistance. Although tracking energy and water consumption online can empower citizens by providing transparency and enabling them to take ownership of their consumption, it is often framed within a democratic conversation rather

than explicitly linked to climate agendas. [1] To mitigate these concerns, policymakers must communicate the intent and mechanisms of Digital Nudges upfront, ensuring citizens are fully aware of the intent to shape the choice architecture in favour of pro-environmental choices. This transparency aligns Digital Nudges with democratic principles and builds public trust, helping make these interventions more acceptable and effective in promoting pro-environmental behaviour and contributing to climate neutrality targets.

Finally, privacy considerations pose a significant barrier to the adoption of Digital Nudges [3, 9]. Citizens are increasingly cautious about sharing personal data, particularly when it involves comparing their information with others'. While many of the nudging approaches such as Default Rules do not have the issue of personal data being processes, others such as social comparison and Feedback may involve this aspect.

> *"...so the barrier I think is to ensure that, from a privacy perspective, it is working. Ensure that a lot of people are joining your experiment. Better would be, much better would be, that by default the regulator says this will happen, so that is not on a voluntary basis, but simply mandated. But mandated in a way that there can never be any issue on privacy."*
>
> *(Antwerp, 25 March 2024, Pos. 87)*

Ensuring privacy safeguards is crucial to overcoming this barrier. Regulatory mandates requiring the implementation of nudges while guaranteeing GDPR compliance could alleviate concerns and increase acceptance.

4.2.5.5 Need for Further Research

A recurring theme through most interviews is a pressing need for more focused research into the potential of Digital Nudging to contribute to reducing emissions through behaviour change. While the concept holds significant theoretical promise, its practical applications remain underexplored [5]. Digital Nudging can influence various aspects of daily life, such as encouraging the choice of green energy suppliers, promoting sustainable mobility decisions, and improving household energy efficiency. There have been some projects aimed at assessing the potential for this approach such as a European Union-subsidized project in Antwerp, which aimed to apply Digital Nudging to foster sustainable behaviours in a newly developed district. Despite substantial funding and innovative approaches, the project yielded mixed results due to insufficient participant engagement, highlighting the challenges in practical implementation [3].

As already mentioned, the scope of Digital Nudging is vast, encompassing numerous sectors from housing to transportation, which can make it appear overly broad and theoretical. The interviewees were at time hard pressed to properly contextualize the questions in absence of specific focus.

> *"I'm really having trouble to answer your questions because it's very vague for me. If you would have another approach, like for instance, how can we digitally nudge people towards a sustainable choice in mode of transport, for instance then it would be much clearer for me also to point out some of the interesting projects and stuff like, because now it's really big, big, big.*
>
> *Yeah, to make it implementable, should be a bit more focused on and I don't think you should be worried about making a choice. So like it's all about it's all about transport modes. It's all about construction, and it's all about energy supply to the housing and I think these are the 3 main contributors to the to the emission at this at this moment. And then food, of course."*
>
> *(Leuven, 04 April 2024, Pos. 106-107)*

To make this concept more tangible, research should concentrate on specific, actionable areas [10]. By focusing on specific areas, future studies can provide clearer insights and more robust data, supporting the efficacy of Digital Nudging in emission reduction strategies. As found though the analysis of the interviews, mobility, construction and energy supply are the main culprits behind cities' emissions and any future research can be undertaken in these areas of activity. Such targeted research can help bridge the gap between theoretical potential and practical application, ultimately contributing to more effective environmental policies.

5. Discussion and Conclusion

5.1 Summary of key findings

The purpose of this study was to investigate the potential of Digital Nudges to make a positive impact on cities climate neutrality goals by guidance citizen behaviour towards a less emission intensive lifestyle. The primary research questions were:

RQ 1 What type of Digital Nudges should cities use?
1.1 What are the most successful types of Digital Nudges?
1.2 What factors determine the success of these Digital Nudges?

RQ 2 How can these successful Digital Nudges be applied by cities to nudge pro-environment behaviour?

2.1 In which sectors should the use of Digital Nudging be prioritised?

2.2 What factors facilitate the incorporation of Digital Nudging initiatives in cities' climate action plans?

2.3 What are the challenges and barriers to the effective incorporation of Digital Nudging initiatives in cities' climate action plans?

The first major finding from this study that lays down the basis of answering the first part of RQ 1 is that Default Rules is the most successful type of digital nudge. This is followed by Feedback digital nudge which has demonstrated a very high degree of success. Further, Framing, Social Reference and Goal Setting can be successful in most contexts.

This finding is supported by literature reviewed which gives three reasons as justification behind the success of Default Rules which forms the basis of answering the second part of RQ 1. Firstly a pre-selected Default is often implicitly perceived as an endorsement or suggestion from the choice architects for the selected option. Secondly, the tendency of inertia or procrastination often work in favour of the pre-selected Default or the status quo when people would have to make an active choice to select another option. Thirdly, a Default Rule acts as a reference point, allowing for the psychological effects of anchoring and loss eversion to affect the perception of loss as opposed to the other options in favour of the pre-selected option (Johnson & Goldstein, 2012; Sunstein & Reisch, 2013).

During the interviews, it was observed that many of the city administrators concur with the idea of that cities choose the most sustainable options as Default in cases where citizens are free to change their preference to other options. Moreover, there have been previous studies (Sunstein & Reisch, 2013) which have demonstrated successful application for Defaults for encouraging adoption of green energy. The city administrators also mentioned that Feedbacks can be used to share information with the citizens about their consumption patterns in such a way that it links economic and other incentives to behavioural change. Although this type of Digital Nudging is heavily reliant on availability of data, it can nevertheless be a useful tool for encouraging PEB.

This suggests that cities or municipalities looking to make use Digital Nudging can start by adding Default Rules to their toolkit when designing digital public service artefacts. Beyond Defaults, Feedback can also be used to motivate people for PEB. Due to the already broad scope of the research, the scholarly justifications behind Feedback and other successful Digital Nudges were not expounded.

RQ 2 is divided in three sub-parts. The first sub-part enquires about the sectors in which used of Digital Nudging is to be prioritised. Put simply, the sectors which are responsible for the most GHG emissions were needed to be identified so that cities can prioritise them in their efforts when incorporating Digital Nudging. The question was posed to the interviewees and it was observed that Mobility, Heating/Energy and Buildings/Construction are the three board sectors most often responsible for a bulk of the GHG emissions in cities. Any efforts to incorporate Digital Nudging in the delivery of public service should prioritise making a difference in these sectors. Further Food and Waste Management are also emission intensive sectors wherein efforts can be put to encourage PEB among citizens.

The second sub-part of RQ 2 concerns the factors that facilitate incorporation of Digital Nudging in cities' climate action plans. In other words, it sought to understand what factors are prerequisite for Digital Nudging to be able to effective in encouraging PEB. From this research three broad factors come to light.

Firstly, public engagement is crucial for cultivating trust and acceptance among the citizens for measures like Nudging. Mechanisms that allow people to share their feedback such as citizen barometers were recalled by the research participants as possible means to foster public engagement along with ideas such as participatory budgeting.

The second factor identified in this part is technological infrastructure. There can be no Digital Nudging in absence of adequate digital infrastructure including online public service delivery portal or platforms. All the cities that were studied for this research have a website and almost all of them mentioned a trend of more and more public services being accessible online. As citizens engage with their cities digital and use digital communication channels for accessing public services, possibilities of Digital Nudging will open up, especially in sectors which are responsible for much of the GHG emissions.

The third factor in this part is administrative and regulatory environment. Across countries and especially within the EU, division of power among different layers of the government vary and as a consequence cities, which lie at the local or municipal level, may not always have sufficient power to make a difference in the sectors that cause major GHG emissions for them. An assessment of each case thus reveals the mandate and capacity that the city has in incorporating Digital Nudging mechanisms for encouraging PEB. This implies that the sectors and activities on which a city must prioritise its efforts can vary depending on the responsibility that the division of power in its country bestows.

RQ 2's third sub-part enquires about the challenges and barriers to incorporation of Digital Nudging initiative in cities' climate action plans. During the course of this study, five broad kinds of challenges have come to light. The first are Systemic Challenges. They are concerned with governmental hierarchies and division of power among local, regional, national and in some cases supra-national levels. One of the barriers that can limit local governments may be lack of power in regulating sectors that are responsible for the most GHG emissions. Over-relying on other layers of government for digital infrastructure and lack of co-ordination among them all can be possible challenges that may emerge. This is made more complicated in the case of EU by existence of another layer and lack of harmonisation across countries in their governance structures.

The second are Policy Challenges. For Digital Nudging to be effectively be incorporated in the cities' climate action plan, it would require certain degree of policy intervention and political will, which may prove to be a barrier. Bureaucratic silos and competing priorities may hinder effective collaboration among municipal government departments or other stakeholders in various sectors. In cases where Digital Nudging requires certain installation of certain infrastructure, budgetary allocation may turn out to be a significant barrier as well. Moreover, the lack of any centralised team for managing behavioural insights to design effective nudges may hinder successful adoption of Digital Nudging mechanisms.

The third are Operational Challenges which have more to do with an integrated approach for behaviour change. This requires establishment of communication channels with the residents and in many cases, collaboration with other important stakeholders within the city or region that interact with the citizens on a regular basis. The city's ability to foster links with private stakeholders and engage with the public are key to overcoming such a challenge. Availability of relevant data is another potential hurdle as not all cities may have adequate data collection infrastructure or properly accessible databases which can support nudging projects. There may also be a need to invest in redesign of the physical infrastructure of public services for better integration to enable successful nudging.

As with any other public function or project, ensuring transparency and establishing safeguards for the privacy of citizens is a crucial challenge. Compliance with legislation such as the GDPR ought to be maintained while incorporating any kind of Digital Nudging mechanism for encouraging pro-environment behaviour.

Lastly, ensuring that the digital nudging interventions designed for emission reduction are backed by scientific literature is important. The lack of adequate scholarship on the topic of Digital Nudging for local governments and the potential of various kinds of nudges to limit emissions in

the major emitting sectors may pose a hurdle in justifying adoption innovative approaches in this area. There is a need for more specific studies on the effects of existing Digital Nudging projects to quantify the extent of potential GHG savings.

5.2 Synthesis of findings

Several patterns emerged from the findings. Notably, due to the scale and complexity of the issues across various sectors of the economy that necessitate cities to push for climate neutrality, it is safe to say that no single known solution can simply solve the problem of unsustainable GHG emissions. Cities are responsible for a disproportionality large chunk of emissions and they must look to combine multiple approaches and solutions for their mitigation.

At the forefront of these approaches is the need to rethink the way our demand for energy, transportation and commodity needs are fulfilled and to enforce structural changes to the status quo. Encouraging citizens to change their behaviour is not an easy goal and can only supplement the aforementioned structural changes. Digital Nudging is not something that will propel cities to climate neutrality and at best, it can help in facilitating the behaviour change that can give an extra push to minimize our carbon footprint, provided that citizens are willing to transition to more sustainable lifestyles. And so, cities to be careful not to pursue such digital solutions like fads but back their initiatives with rigorous scientific research and evidence.

Effective Digital Nudging would require governments to invest in their digital infrastructure and adopt a data driven approach to public service delivery. A push for digitalisation may require a rethink of the way public sector is organised for better coordination and communication between the different layers of government. The knock-on effects of these efforts would be creation of platforms and databases that can facilitate citizens' behaviour change through Digital Nudging.

It is encouraging to observe that cities across countries, by virtue to having dissimilar mandates and responsibilities, tend to focus their efforts on the major emitting sectors in which they can make a difference, irrespective of the overall potential of their immediate efforts for achieving the targets of climate neutrality. In cases where the most polluting sectors are regulated by or in coordination with regional or national governments, there needs to be a collective ideation of how nudging approaches can be best utilised to aid the collective achievement of climate neutrality targets. There can be a greater potential for emission reduction when suitable projects or interventions are applied at a wider level, provided that there is efficient centralized ideation, management and monitoring.

The major findings are interrelated in that they point out towards a roadmap that can help visualize the readiness of a city to incorporate Digital Nudging in their delivery of public services. Cities can start evaluating their capacity by checking if they satisfy the requirements for the prerequisite factors which can facilitate Digital Nudging interventions. If they do have adequate technological infrastructure in place with sufficient public engagement in a conducive administrative and regulatory environment, they can start to rethink the design of their digital service delivery artefacts to encourage behaviour change, prioritising the major emission causing sectors in which they have the power and influence to change things.

5.3 Limitations

Several methodological limitations should be considered while judging the conclusions from this study. There was no unified methodology used to answer the two main research questions. Rather, RQ 1 was answered on the basis of a review of the existing work of known scholars in this field. In fact, there was no systematic literature review but one with a more targeted approach and reading of material found through a 'snowball' method. A point of criticism may well be the reliance on the work of Beermann et al. (2022) and Zimmermann et al. (2021) for drawing conclusions about the most successful types of Digital Nudges.

In answering RQ 2, qualitative data collection through interviews was undertaken and the data corpus was subsequently analysed thematically through coding. That there were only ten participants in the interviews who all represented cities that have already shown commitment to climate neutrality by virtue of being a part of the Climate Neutral and Smart Cities Mission of EU's Horizon Europe funding program raises questions about the general validity of the findings in the context of other cities in the region and beyond. Further, as only non-political professional public servants with substantial responsibility for climate neutrality initiatives were approached for participation, this study lacks perspectives from citizens and other stakeholders in urban areas.

The methodology is also much reliant on the subjective interpretation of the researcher of the qualitative data gathered through interviews. While this has been good for including experiences and perspective of the participants, some kind of quantitative data collection may have been well suited to complement the findings.

The lack of a focused approach due to the exploratory nature of the thesis resulted in many interviewees founding it tough to answer some of the vague questions about Digital Nudging [6]. It would have been better to deep dive in one particular sector and explore the possibilities of incorporating Digital Nudging therein instead to seeking views on any of the major sectors that

cause emissions. Thereby, it would have been easier to identify examples or pilots that can show results and to check for the possibility for their large scale adoption. Seeking their perspective on multiple kinds of Digital Nudging mechanism may have been counter-productive in defining a focus of this research and perhaps it would have been better to ask the interviewees about the opinions only on Default Rules which emerged as the most successful type from the literature review stage.

5.4 Conclusion and Recommendations

In this study, we explored the potential for Digital Nudges to help cities reduce their GHG emissions. Our findings suggest that cities should prioritise using Digital Nudges that have been the most successful in encouraging pro-environment behaviour, namely Default Rules, followed by Feedback. These successful nudges can be applied by cities to encourage pro-environment behaviour if they focus on sectors that are responsible for a significant amount of GHG emissions in cities, namely mobility, energy and heating, and buildings and construction. Having public engagement, adequate technological infrastructure and a conducive administrative and regulatory environment are factors that can facilitate such application by cities, provided that they are able to tackle systemic, policy and operational challenges associated with this approach. Maintaining transparency and privacy while basing their interventions on scientifically proven research are other major challenges.

The results of this study contribute to the literature of Green IS for exploring the its potential for behaviour change in public sector. The findings are align with the work of Cass Sunstein and Richard Thaler on Nudging Theory and Daniel Kahneman's insights in behavioural economics, suggesting that no choice is made in a vacuum and that presentation of choices in certain ways can nudge people's behaviour in predictable ways. Sina Zimmermann and Markus Weinmann's work on Digital Nudging is also advanced, maintaining that the nudging theory can be extended to the digital environment for encouraging pro-environmental behaviour.

Despite the significant findings, this study has several limitations. The first is a lack of a systematic literature review and second relates to lack of representation in selection of cases. These limitations, along with a purely qualitative nature of data collection and analysis suggest that the results should be interpreted with caution and highlight the need for further research in the effects of Digital Nudging for pro-environmental behaviour change.

Future research should focus on identifying specific measures through which individual nudging mechanisms can be applied for redesign of digital public services for pro-environmental

behavioural change. Additionally, investigating the challenges and barriers to such design could provide further insights into the practical issues that hinder successful Digital Nudging. Addressing these areas would help cities in incorporating efficient nudging artefacts in the design of their digital public service tools and platforms.

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7. Appendix

7.1 Email Template

Hello,

I hope this finds you well.

I am reaching out to you regarding a **short research interview**.

We would like to draw on **your expertise regarding the governance and implementation of the climate neutrality transition in [XYZ City]**. Of particular interest is the **usage of digital nudges** to guide citizens towards pro-environment behaviour. Your municipality could be a leading study case, as you have recently joined the EU Mission for "100 Climate Neutral and Smart Cities by 2030".

For context: This is part of my thesis research in the Erasmus Mundus M.Sc. in Public Sector Innovation and e-Governance (PIONEER) graduate program, jointly hosted by KU Leuven, University of Muenster, and Tallinn University of Technology.

Interview Outline:

Duration	20 – 60 minutes (depending on your availability)
Period	15th March 2024 – 25th May 2024 (depending on your availability)
Format	Semi-structured online research interview Technical platform: Microsoft Teams (or comparable video meeting software)
Interview language	English
Documentation	Following academic reporting standards, I would like to record and transcribe the conversation. If you have any concerns or wishes regarding this, I would be happy to discuss this openly.
Topic	The goal of this study is to understand how digital nudges can be incorporated into cities' transition to climate neutrality by guiding citizens' behavior. We further seek discuss some specific types of digital nudge and whether your city has the requisite resources and conditions to make use of them.

Your participation would support important research on the governance of climate neutrality transitions. The result may help to identify shared challenges, critical capacities, and future best practices for cities across Europe.

Unfortunately, due to an upcoming deadline, we would need to conduct this interview before the start of June. Please excuse this short lead time. If you are available for an interview, please feel free to suggest dates and times that would work for you. Please also feel free to forward this invitation to any colleagues working in this thematic area. Thank you in advance for your time.

Best regards

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About this project: This research project is being implemented by Anshul Agarwal, a graduate student in the Erasmus Mundus M.Sc. in Public Sector Innovation and e-Governance (PIONEER) degree program a program jointly hosted by three leading European universities in public governance research: KU Leuven (Belgium), University of Muenster (Germany) and Tallinn University of Technology (Estonia). The research project is supervised by Dr Tobias Brandt (Professor, University of Muenster).

7.2 Informed Consent Form

Informed Consent for Master's Thesis Research

Please read this informed consent document carefully.
Make sure to pose all your clarifying questions about the research before participation.

Title of the master's thesis:
Exploring Digital Nudges for Emission Reduction in Cities

Institutions(s)
University of Muenster, KU Leuven, Tallinn University of Technology

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Aim and methodology of the master's thesis research:
This study aims to identify digital nudging approaches that can be used by cities to realize their commitment to climate neutrality by guiding citizens' behaviour. Through a review of existing literature, a set of successful digital nudges are identified which are then discussed with cities' representatives to record a list of factors that make the development and implementation of these digital possible.

Period/duration of the study:
Feb-June 2024

- I have received sufficient information about the purpose of the research and understand what is expected of me in the study.
- I am aware that I will participate in an online interview and consent to the it being audio (video) recorded.
- I understand that my participation may involve risks or inconvenience.
- I understand that my participation in this study is voluntary. I am aware that I can discontinue my participation at any time. I will not have to provide a reason for this and I will not suffer any disadvantages.
- My participation offers a voluntary contribution to scientific research and advancement. I know that I will not receive any further reward or compensation for my participation.
- Under the GDPR, the data collected during the study will be processed on the grounds of public interest. This implies that if and when I withdraw from the study, any previously collected data can still be lawfully processed and do not need to be deleted by the researchers. In case a third-party act as a processor of the collected data, it can be requested at any time to have the processing of the data stopped and, where appropriate, have the collected data deleted.

I understand that some of the data collected for the purposes of this study are classified as 'sensitive personal data' under the General Data Protection Regulation. I hereby expressly consent to the collection of these data for the purposes of this study.

- The findings may be used for research purposes and may be published. My name will not be published; confidentiality of the data is guaranteed at every stage of the research project.

- In case you if you wish to remain updated on any published results of the study, please provide the researcher with an email address to contact you at: _____

- In the context of transparency in scientific research, the data of this study may be shared with others, such as researchers and administrators from different public institutions and universities. In that case, only non-identifiable data will be shared. It will not be possible for others to know that I have participated in this study or to know which data belongs to me.

- I understand that I can contact:
  the student researcher (see above for contact details)
  the supervisor or advisor (see above for contact details)

for any questions or to exercise my rights (access to or correction of data, ...) after participating in the study.

- For any complaints or other concerns about ethical issues relating to this study, I can contact KU Leuven's Social and Societal Ethics Committee: smec@kuleuven.be

I have read and understand the information above and have received answers to all my questions regarding this study. I agree to participate in the study.

Date:

Anshul Agarwal

Name and signature of the respondent/participant

Name and signature of the student researcher

7.3 Interview Guide

INTERVIEW GUIDE

Exploring Digital Nudges for Emission Reduction in Cities

Background Information about the interviewee	
1	Can you briefly describe your as a city administrator and how it intersects with efforts and goals to reduce emissions within the city?
2	What initiatives or strategies has your city implemented or considered to address emissions reduction?
Understanding Digital Nudges	
3	Are you familiar with the concept of digital nudges? If so, could you provide a brief explanation from your perspective and tell me about what kinds of digital nudges have worked for your city? - If the interviewee is unaware about DN, give an overview - Briefly list and explain the main types of DN
4	What are the ways in which the city digitally interacts with citizens? In other words, for which services or entitlements offered by the city do citizens use internet or electronic devices?
5	Does the city follow any nudging approach towards the UI/UX design of service portals or digital environments that interact with citizens?
Opinions on Specific Nudges	
6	Let's discuss some specific digital nudges that have been successful in studies. What are your thoughts on using **feedback** nudges; for example, about real-time energy usage to encourage energy conservation behaviours among residents or businesses?
7	**Defaults** have proven to be an effective nudge in a lot of studies. Can you think of any online forms or portals where they can be incorporated to nudge citizens towards more sustainable decisions?
8	What do you think about using **social comparison** techniques through digital platforms to motivate individuals or organizations to reduce their carbon footprint?
9	Are there any other digital nudges or innovative approaches you think could be more valuable for emission reduction efforts in the city?
Exploring Applicability of Digital Nudges	
10	Considering your expertise, **which sectors or areas would benefit most** within the city from the implementation of digital nudges to reduce emissions? Can you provide examples of specific digital nudges that you believe could be effective in these sectors?
11	Given the unique socio-economic and geographical circumstances of your city, what potential **challenges or barriers** do you foresee in implementing digital nudges for emission reduction?1
12	How can these challenges be addressed or mitigated effectively?
13	Are there any ethical or privacy concerns associated with the use of digital nudges in this context, and how should they be addressed?
Closing	
14	Is there **any additional information or insight** you would like to share regarding the use of digital nudges for emission reduction in cities?
15	Do you have any final thoughts or recommendations for further exploration in this area?

7.4 Interview Transcripts

7.4.1 Aarhus

1	Aarhus, 11 March 2024
2	Interview Text
3	**P1** Could you briefly describe your role as in the city of Aarhus administration and how it intersects with the efforts to reduce common emission within the city?
4	**P2** Yeah, and well, I work as a consultant at the Climate secretariat, and I've actually only worked there for 5 months now. Before that, I was an associate professor at the university, and so I have had a lot of thesis masters students under my wings. So, I think it's very, very important that we take part in this so. And I have a a speciality in sustainability and communication, so it's very like my early here. And so, in the Climate secretariat, our job is to develop the climate strategy and the action plan and then to and manage the many different projects that relate to this plan. So we have, as you also know, we have politically decided the goal of becoming a carbon neutral in 2030. So all plans and actions aims to support that goal, yeah.
5	**P1** And what initiatives or strategies has your city developed or implemented or is considering to develop to address the targets that you have set?
6	**P2** Well, currently actually we are working on our 3rd 3 year Climate Action Plan. So this it's the 3rd time that we develop these strategies here and we expect the City Council to reach a political settlement within the next few months.
7	So this plan, the new plan will run from 25 to 28. The upcoming plan focuses on the largest emission domains. So this is Mobility, energy, waste, industry and agriculture. The previous plans have actually predominantly focused on emission reduction in scope 1 and 2. So that's within the boundaries of the municipality as a company and also its geographical borders.
8	But the new plan also aims to, at least to a certain extent, to include scope 3, and this means that we expect a more strategic focus on the emissions it that we actually as a

municipality do not have that direct access to to regulate as such. So, because we cannot regulate citizen behaviour as such, we cannot dictate how they should drive to work. We cannot dictate how they should consume, so we don't have access to that on on the ordinary incentives. You know, or regularity or regulations. It doesn't mean that we haven't previously worked with citizen behaviour or company behaviour, but it has been more on an ad hoc initiative basis.

9 **P1**

I was just wondering when you say that you aim to be climate neutral by 2030, does that mean the cities operation or does that also include the citizen behavioral emissions?

10 **P2**

Well, first of all, the cities emissions. So as a company, the city as a company, right?

11 **P1**

Hmm.

12 **P2**

And also within what we actually affect as a company. So when we buy supplies for the company, for the the municipality and the city, so how does that affect beyond the borders? But in order to reach that, we cannot work in independent from scope 3. So we need to have some kind of voice or anchor into that scope 3 yeah.

13 Ohh and I think the most important part here is that we can say as a municipality that we want all cars to be electric, electrified; that comes within the city borders. So we can for instance say that, but it would also affect the scope 3 because you produce a lot of cars even though they are electrified. So we affect scope 3.

14 So to become carbon neutral, we need to actually transform all the Mobility within the city to public transport, transportation or like that. It kind of intersects.

15 **P1**

Are you familiar with the concept of Digital Nudges and, if so, could you please provide a brief explanation from your side?

16 **P2**

Well, I'm not that familiar, but because I haven't worked with it within the city here, but

I understand that you will notice as the use of digital devices to encourage a particular behaviour by means of different incentives, so to speak, yeah.

17 **P1**

So just to give an overview, it's basically choice architecture and in the context of digital environments. So, like everywhere, people have to make choices. Like if we order something from delivery app like the first things that would come up would nudge us towards that. There are psychological mechanisms and Digital Nudges, basically, like nudges on a whole. Users use the things like default Feedbacks and social comparison like what others have.

18 So these things applied on a digital context through the user interface, and when you fill out an online form. So that's basically what we mean here.

19 And so I would ask you, what are the ways in which your city digitally interacts with the citizen? In other words, what are some of these services or entitlements that are offered by the city for which citizens have to use electronic devices or the Internet?

20 **P2**

Well, you know, just the top of mind, I think I will just go through some of the things that I know. First of all, of course we have a website. So I think the main purpose of the website is of course to provide a channel for information, but it's also a means to transparency. So you have access to all City Council decisions, all the all the documents and so on and so forth. I think that's a very important channel that we use digitally here also almost all the citizen services are available digitally. So you can get a divorce. You can get different licenses. You can name your child etcetera instead of showing up at at an office. So it is very much developed to be digitalised also in Denmark.

21 All citizens have a public or, you know, yeah, public electronic mailbox. So an official mailbox where all relevant information are sent to, so as a municipality we actually have direct digital communication access with the individual citizen and the citizen can always reply directly on any information they receive there.

22 So they will, if they reply on some kind of invitation or something, they have a Direct Line to a coworker at the municipality.

23 Yes, we also have a digital or online hearing portal where the citizens and all the associations can draw attention to their views on specific consultation cases. So all consultation responses are read and answered also individually we and then hmm.

24 Finally, I think we have something called a citizen barometer. It's a digital barometer where citizens can express their opinion in on particular matters. We use it to kind of take the temperature, so to speak, on what currently concerns the citizens. So that's also kind of a digital way of interacting with the consumer or the citizens.

25 **P1**

Can you like briefly tell me more about the barometer?

26 **P2**

Well, then we would send out questions regularly, and I think it's segmented when we ask particular questions, but we could also use it for more general responses like for instance the views on sustainability matters, or climate neutrality matters, for instance, that would be across any segment, yeah.

27 **P1**

And how and where do you publish the results? From what I could understand, you would get information about the citizens perspective, collectively on a lot of things. So, do you publish these or is it just for your internal consumption?

28 **P2**

It's for internal uses, but we have a lot of, you know, meetings with citizens where we discussed the result. They are not public. You cannot access them digitally, but you can come and join the meetings where we can then talk about some of the results, as part of the puffing public hearing process.

29 **P1**

OK, maybe it's the time we talk about some specific nudges and see if like they fit within our topic. What do you think of Feedbacks? Like real time, energy consumption maybe or for example like on your watch you can get alerts, you know, like this month you have already consumed this much units and something like that. Do you think it could be a good idea and if so, how can something like that be implemented in your city?

30 **P2**

Well, we do have some very basic, very basic Feedback. Ways of working with it within

actually the energy area. You can track your energy and water consumption overtime, so you can do that online and I think it's very interesting that this is framed within the climate agenda because I don't think it's articulated as related to Climate or as conservation as such, but as a means to ensure transparency and in order to enable the citizen to take ownership of their own consumption. So I think it's part of a democratic conversation rather than a Climate agenda. And so Climate is kind of a side benefit.

31 **P1**

Hmm, yeah, I think another the nudge that can relate to that is social reference or social comparison. When, like you could maybe like get a Feedback that ohh in your neighborhood, the typical household energy consumption is 20% less than what you are doing in something like that.

32 You think that can also fit in this?

33 **P2**

Yep, I actually think you can do that because you can make geographical, you know, settings and then you can compare your own your own consumption by looking at it your graphical, you know the average in the geographic area.

34 And so I think that's actually also part of it and I actually think that social comparison is extremely relevant in, in our context because and a recent study actually a national study, I don't remember who who made it but this study showed that all Danes are actually very, very interested in making more Green choices and change their behaviour, but not if he's the only one that does it.

35 **P1**

So if they see that OK, this is something that is typically being done, then they would feel more comfortable with that behaviour.

36 **P2**

And so we can see both, you know, as an at an individual level, he doesn't want to do it if his neighbour doesn't do it. So, then it doesn't make any sense. Then I should not sacrifice anything but also. And I think that's a very Danish way of thinking, not on also on a global level, because why should we? As Danes, this small, small country sacrifice a lot of things. If we have the Americans just never opting in for non-sustainable choices,

right? So I think that this so social comparison could actually be very beneficial. Um and also very beneficial in a Danish context.

37 **P1**

And what about defaults, like in a lot of studies, the most effective nudge has been default options. For example, you might have come across studies of organ donation. In some countries it's an opt out instead of opt in and people just don't bother about changing it. And a lot of times they just stick with the default, like the ringtone on your mobile phone. A lot of people just just keep whatever is there.

38 So how do you think that can be incorporated in the context of your city?

39 **P2**

Umm, I haven't really thought about that. Could you try to give an example?

40 **P1**

Okay for example, like we talked about this social comparison and Feedback as far as energy comes up, consumption is concerned. Maybe one example could be that you maybe when you get an electricity connection.

41 I'm not sure how it works there, but then maybe you could get a nudge like by default, you commit to this these many units, and maybe what that means is that when you are about to reach that limit, then you get warning or beyond that you maybe get a higher rate. So basically, a default option that encourages sustainable behaviour.

42 **P2**

Yeah, I think it's very interesting, but I also, I also kind of intuitively feel that it becomes very easily becomes very ideologically. Because I think we have a City Council that doesn't want to make Climate an ideology. And in the end, how do how could I explain that?

43 Because, um, they would, I think they would argue that as a municipality and as politicians, you cannot dictate which company to use. And I think this free will and commercial interests. I think because they are free and the politicians should not influence that.

44 **P1**

Hmm.

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45 **P2**

I intuitively I think that would could be a counterargument from the City Council's perspective. So I would be kind of a bit reluctant to suggest that, but maybe it's because I don't have the fantasy to. Yeah.

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46 **P1**

Are you aware where does your city typically get their energy from, are they from renewable sources or a mixture of renewable and non-renewable?

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47 **P2**

Um, well, previously we had the what's called district heating so that's system was actually owned by the municipality but now it has become a separate company. I would hesitate to actually give a very clear answer because I'm not totally sure.

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48 **P1**

First of all, this whole topic of nudges is about like libertarian paternalism, like you suggest something that's good for everyone, but the other option is always there for everyone, for citizens.

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49 So I was thinking maybe like in a lot of places you could make the default option of the renewable energy, which may be slightly more expensive than non-renewables, but you always allow people to switch to the cheaper option, maybe that's a domain.

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50 **P2**

Yeah, almost all households are connected to the district heating systems and they experiment with all kinds of renewable energies. So that's one thing. And then we have a lot of, you know, in the outskirts of Denmark we and also in the municipality we have and you know, local households that uses coal or whatever to heat the houses. But they are actually offered compensation to shift, so they have economic incentives to change their heating systems into a more energy positive, yeah.

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51 **P1**

Considering your expertise, which sectors or areas would you think would benefit most

within the city from the implementation of Digital Nudges, energy, mobility, agriculture, what kind of sectors do you think will be most useful?

52 **P2**
Probably within the energy and water. Yeah, the energy because it's not controversial, because if it comes to consumption of products, it becomes more I think the City Council would more oppose. I think it's too ideologically infused, and I think maybe the energies more is less controversial.

53 I think there's another aspect of it. Because, as I remember you had a question that was more of a, if there were any alternatives or that we could think of. And I think considering that question, I think that here in Aarhus, we actually have a history of directly engaging all stakeholders in decision and execution processes. So all our climate strategies and plans rest on this foundation of a democratic dialogue.

54 If you can say that and collaboration, so the City Council as well as city management, I think they are very focused on ensuring that all Climate activities actually make sense to the citizens and all the stakeholders. So, it may just, you know, considering this topic, I think it may have been some kind of strategic choice not to use Digital Nudges. You know, as strategically they may use it as more sporadic initiatives.

55 And but, but that they rather turn to dialogue and stakeholder collaborations and, for instance, just recently the municipality facilitated a lot of partnerships with different stakeholders and for instance they formed some partnerships with different companies in order to find solutions for reducing the heavy transport in in the city. So, the companies have made these joint forces to suggest, actually, that the City Council implements a payment ring around the city. So that would have been very, very difficult for the City Council just to decide.

56 But because the suggestion actually came from the industry themselves, it kind of paved the way for difficult decisions, for the politicians. So each company has also committed by being part of this partnership they have committed and to change the heavy transport vehicle to electricity. And in a similar vein, we also have a lot of the, you know, workshops with citizens on how to how to actually we do send, reuse and upcycle different consumption products.

57 And also, currently we are experimenting with these living labs. I know they are also part of the net zero city and to transform the food system and yeah, so these are also, you know facilitated and governed by the municipality. But all the innovations and the testing and the implementations they are made by the relevant actors themselves.

58 So it could be, I'm just trying to make sense on why don't we use all those Digital Nudges. But I think that could be, you know, a more fundamental explanation on that.

59 **P1**

And it's good that you talked about the political situation because my next question would be, given the given the unique social, political, economic and geographic circumstances and the wider community in Denmark, what potential challenges or barriers do you foresee in implementation of digital natives or not just in general for emission reduction?

60 **P2**

I think one of the main barriers would maybe be that if we implement these Digital Nudges we would very much focus on the individual instead of focusing on the systemic and the structural transformation that makes kind of Green choices just an integrated and non-decisive part of human life, right? So I think that would be the main barrier and here in Denmark, I don't know if it's actually general to, you know, globally, but here in Denmark at least, we have a very alarming high degree of Climate anxiety among young people.

61 And I think that, you know, by focusing on the individual behaviour and I think that would speak into that at least if it doesn't come with any direct solutions on how to actually change behaviour very specifically.

62 So I think that could be a main barrier and another one would also and I think I can hear some of the politicians say this, that if we make, if we turn to the nudges, it would be kind of a surface change of behaviour and not an integrated part into the human. And I think I can hear some of the critiques from some of the politicians would say that , “well, if I want the citizen to make fundamental changes in their lives, it has to make sense to them”. It should not just be surfaced a yeah. And so I think that could be a barrier.

P1

And like, what's your opinion, do you think Digital Nudges or nudges in particular, for

this particular problem for climate change, are they really having the potential for some change, or is it really just surface level buzz?

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63 **P2**

I think particularly when it comes to the social comparison, I actually think that would be very, very interesting to move on to go on with because that it is so much so it is such a social thing, our consumption behaviour, at least when it comes to Scope 3, right? So I think that could definitely be potential there in also considering this national report that just came out right? Um, so I think that would be very interesting.

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64 Do you have any suggestions on how we could move on from there?

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65 **P1**

You are actually the first person I'm interviewing and, I expect that like from you, I think that barometer idea, I really like that. I see potential in that and I expect that after maybe 10-15 interviews I would maybe be able to make a list of potential ideas and then maybe I can share that with you. So that would be I think maybe helpful.

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66 **P2**

Yeah, I think that would be very valuable for me at least. And for my work, yeah.

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67 **P1**

Are there any ethical or privacy concern that you see that might come up with this whole approach of Digital Nudges?

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68 **P2**

Well, not other than, you know, any ethical concerns with using the nudges where you are not aware that you are actually being pushed in a certain direction. I think that, there is this policy, um, political level as well, because the politicians would be very aware of using something that might not be ethically correct sometimes. But I think it's if it's communicated upfront then I think it is fine.

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69 **P1**

Yeah, I think those were the main questions that I had. Are there any other additional thoughts or insights that you have around this topic or then why the topic of Climate net zero in general that you would like to share?

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70 **P2**

No, not for now, I think. But if I come up with anything I can write you.

71 **P1**

Thank you for your time and insights. Do you have any further questions from me and or about the research in general?

72 **P2**

No, no, I don't.

7.4.2 Helsinki

1 Helsinki, 14 March 2024

2 Interview Text

3 **P1**

Can you briefly describe your role as a city administrator and tell something about how it intersects with the efforts and goals to reduce emissions within the city?

4 **P2**

Yeah. OK, so I work for the Climate unit of the City of Helsinki and so um, it's about 3 year old department or unit. And before that, climate change was mostly dealt with from the Environmental department. And then with the first climate neutrality plan for 2035 that was set in 2017, the city also started to think about like whether it needs a separate because the Environmental Department has a little bit of a different approach and it was set for the next goal from 2021.

5 So, we are in the second iteration of the climate neutrality plan and um, the second one was also with the establishment of the unit and with the lowering the target year for 2030. So our current carbon neutrality plan is for 2030 and also to change the whole way that the strategy works and how we approach the problem. So, we went from a very traditional or sort of like what most cities go through and the EU is asking through the mission cities to do.

6	So a lot of citizen participation and participatory codesign processes for developing actions, and we did that in the first phase, came up with 147 actions and had 300 indicators for the goal and then a couple of years later, some people (this was before I joined) started to calculate and realised that 6 out of the 147 accidents actually directly reduced emissions and zero of the 300 indicators actually measured Co2 so I thought that hat sort of plan will never get us there.
7	So now the current plan is very much more focused on the sectors where the city actually can do most. The Nordic cities are quite powerful players, so the city of Helsinki is the biggest employer in Finland. We have 40,000 people working in a 6-billion-euro budget, then right to collect taxes and planning monopoly and things like that. So, we have quite a lot of power to act.
8	And so now the current plan is more based on the things where we really can make an impact. So, it's more like calculating which ways of dealing with emissions we can make most impact. So we are concentrating on heating construction and mobility most of all. And then this will come later on of course because I looked at your questions and you are more talking about like Digital Nudging towards citizen and so on.
9	So we are doing a lot less of that because we've also calculated that like individual actions actually have quite little impact on things, whereas we as a city where we own 20% of the housing and uh, you know 63% of the land and things like that. When we set regulation for things or we changed the way that we heat our own buildings and so on can make a huge difference compared to getting each individual to change things.
10	So for example we calculated last year that if a person who wants to do as much as they can, does everything about the heating in their apartment, which is basically lowering the temperature by 3 degrees, which is about the maximum that the house can take, and you know it takes fewer showers and use as little electricity and things like that, the impact on emissions is only about 1.8%, and even if every person in Helsinki does those individual actions that would reduce our emissions by 0.5%.
11	So it's kind of like where we closed a coal burning plant last year and that reduced the emissions immediately by 20%. So we are kind of like looking into the things where we can make more structural changes compared to like trying to get individuals. And as you know, not everyone is going to do that. So we will never get the 650,000 people to do those measures and even if they did that, the impact would be would be quite small.

So that's kind of like just to tell you that the starting point is that we are not doing a lot of these nudging things that you are asking about.

12 **P1**
Ok. So I am feeling like this is also due to the specific circumstances of Helsinki. How much is the population?

13 **P2**
About 680,000.

14 **P1**
So it's more like a medium size city.

15 **P2**
Yeah it is. That's why I've been mentioning the sort of specific circumstances that we have because we understand and I work a lot with international cities on global scale and have been doing that for the past 6-7 years in different organizations. And I think that everything's starts from understanding the specificity of the city: the power to act.

16 And like I said, we take care of about 80% of all services to citizens. So basically, just the police and the army are not city run. So we are much more close to the citizens, but also, I mean, we run schools, hospitals, you know, all the city planning, everything that goes on.

17 The economy of the city is strong and like I said, we own 63% of the land, which means that there's a lot of power that we can put into how the city is constructed. And so last year, for example, we introduced a life term carbon limit for all new residential buildings. So now everything that's being built in Helsinki has to look into the 50-year time frame of how much emissions they will use in the construction phase, in the heating phase, in the demolition phase, combined that altogether and stay under a certain limit that we are the first city in the world to do that. But that's the kind of things we do where we are sort of influencing also the industrial lot.

18 But like I said, this is something that we can do because we have those powers. And then there's another city in another country that's completely differently structured because you have, like a lot of countries where it's very centralised. So that's the central government that's governing most of the things. So then you have, like Germany's a lot like regional, France is very central and so on. So I'm not saying that this is the way to

	do for everyone. Then you can't have the same actions. I'm saying is that everyone should sort of analyse their own powers and try to see like where they can make most impact.
19	I remember once meeting with the mayor of Oxford and I was asking like so what are your tasks of your city? And she was just like waste collection. And that's about it. So if that's the role of the city, there's very, very little that you can do. So you cannot change energy systems. You cannot change the heating systems in place. So you go more into how can you talk to citizens and so on. But we've sort of thought that it's more important that we take care of our role in as big a way as we can because that's kind of like, being responsible.
20	**P1** Could can you shed some more light on some specific initiatives or strategies that are you have implemented in general to address the problem of carbon emissions?
21	**P2** Ohh well look, I said we have an annual action plan that's looking into the kind of actions that will (…) So basically the way that we look at it is there's 3 categories of actions.
22	The first one has to be the biggest, so over 50% have to go into the first category, which is directly cutting emissions.
23	Then there's the second category, which is enabling actions. So for example, building a bike lane does not cut emissions directly, but it enables people to bike more and thus use less cars.
24	And then the 3rd one is piloting a research and things like that. So, we try to because a lot of the solutions already are there. It's just about implementing them and so every year we look into like what's the emission level in mobility and what's the emission level in heating and so on. And where can we find the most impactful actions.
25	**P1** OK, so let's get to the topic of this interview. Maybe we can learn from your experience.

26	First of all, are you familiar with the concept of Digital Nudges, and if so, can you please give a brief about your understanding of it?
27	**P2** Well, um, I mean, nudging in general is, yeah, talked about. I would assume that Digital Nudging is using digital means to make people behave in a different way, just like using nudging.
28	So I would, I mean, we've had lots of pilots about people seeing electricity consumption, like in real time in their houses. I would think right now that's not really a digital nudge but it could have been a digital nudge earlier, but now it's just because of the situation with war in Ukraine and the sort of energy crisis in Europe that a lot of people changed. So we used to have very cheap electricity most of the time and then the price started getting higher and most people had like a 2 year contract with the set sort of price. And those started to get higher and higher. So I guess it was always available, but people weren't thinking about it (to go into real time pricing).
29	So now they publish the pricing of electricity every 15 minutes. And so, for example, my father has chosen to have that sort of electricity bill. And so whenever like, you know, you're turning on a dishwasher or something, you check what's the electricity price right now, because it can go between like zero and a euro per kilowatts and so there's been huge fluctuations. And I was just asking yesterday when visiting him “can I turn the dishwasher on?” and he was just like he went to check “Yeah 4 cents, so go ahead!” and I was just like, “how, does it make a difference?” And it's just like it makes you so much more conscious because it's there's an economic benefit, for “do I turn something on now or at 8:00 PM or tomorrow?” Because they are also giving prognosis about this.
30	So I think that this would be a good example of Digital Nudging, but it also is not just nudging for the sake of behaviour change, but it has that big incentive of, you know, having big savings and like my father was saying that he's saving a lot of money compared to old.
31	You need to have the want to check prices and go on the sites and sort of plan your activities “When am I cooking.? When am I doing this or that?” But I've I would assume that that would be a good Digital Nudging way.

32 **P1**
Yeah, certainly.

33 So the focus of this research sees nudging also, as like the way cities digitally interact with citizens and sort of the UI and UX design of the various web forms or web portals would be included in that category.

34 Then there's a choice architecture. Basically, where citizens have to make certain choices and you design it a certain way, which is, so to say libertarian paternalism, you are free to make any choices, but the city tries to nudge you towards something that is socially good choice like that.

35 So I would ask you what services or entitlements does your city offer citizens which are offered through the digital medium or what are the ways in which your city digitally interacts with citizens?

36 **P2**
Well, we have quite big and influential citizen participation unit, that's doing a lot of things. That's of course, more about like democracy and having people's voice heard.

37 I mean, we have a pretty big participatory budgeting project. I think it's like €8,000,000 annually that go into that and that's a digital platform where you can first give your ideas and then vote for ideas. And then it's also like they try to make it so that every district gets it because you know that often there more rich areas where you have more educated people or more tending more to these things.

38 So they would otherwise get all of the projects, but they make sure that that it's a geographically just so that would be one. But and I think that they used different criteria there also for what kinds of projects are chosen. And I think like environmental values and Green values are one of them. But there's also, like, you know, things about making sure that the youth is active and things like that. So it's not necessarily a just a green thing.

39 There's SDG work that's done here, but I am not totally familiar with the actions there. I just know that we follow a lot of those things.

40 There's a lot of stuff going on in schools with different ways of nudging kids towards green solutions and so each, like grade has a different program. So you start with

	kindergartens and then you're in the elementary school and then high schools have different things where they are teaching you about the environment and climate change and things like that. And there's lots of projects and so a lot of times also like things that like recycling and things like that come from schools, from the kids learning things there and there's quite a lot of digital tools used in school. So they are also using those that are not directly something like that, but I think it's more like in the curriculum of the schools too, to teach both of these things.
41	So we our schools changed into something called phenomenon based learning a couple of years ago, which means that they had just looking at different phenomenon and then learning about a lot of things and using a lot of also digital tools to learn those things and then applying them in life.
42	**P1** And do you know if the city follows any nudging approach in the design of its websites, web portals, or places where people send their data and decide on different things.
43	**P2** Well, I think these days, so just to nudge to digital tools you mean (?) Well, I know that for example these days things like applying for your school spot and things like that are all done digitally. Um, so I mean, everyone is guaranteed a spot but you have to do it in a digital system. I think that they that the city administration is basically paperless.
44	So we have a big, huge administrative system where every decision is done and all the chains of different decisions are (…) it's a very difficult system to use, so you need specialists to do it. But basically, like all City Council meetings and everything else, is completely paperless these days.
45	You know, Healthcare is digitalised.
46	So I think that there's like the whole digital strategy of the city is to move everything to the digital world and get rid of paper and get rid of a lot of like having to go somewhere to apply.
47	So, for example, the parking license where you used to have to go and prove where you live to get the parking license to park somewhere is now completely digitalised.

48	It is a like a strategic decision that everything that we do, so I guess that's nudging in a way because you don't really have a choice anymore.
49	**P1** And are you aware if in those digital mediums there is any conscious effort to nudge citizens, for example, when you're buying a parking ticket, does it nudge towards using less cars, for example you know?
50	**P2** Well, not in the digital system, but, they just hiked the prices quite a lot. So that's nudging people to to use less cars. But is not through that (…) it was a decision to just (…) I mean, they've pretty much taken away all free parking spaces in the city and then even like the citizen, like the resident parking.
51	So I live in a particular part of the city and I can park in, you know, one kilometre each way with my parking license, it went up like, I don't know, like 80% last year.
52	So it's a lot, but those are more like the Climate decisions, but the digital system was there anyway So those are like separate.
53	**P1** Okay, let's talk about some specific nudging techniques and the first one would be Feedback. So like you mentioned, with the real time energy prices indicator. So what are your thoughts on such Feedback nudges to encourage conservation behaviours and like what other sectors do you think are using such mechanisms?
54	**P2** Well, I mean, there's always like different people have different incentives that work for them. So just to see your electricity consumption? I think there's always some people were just interested in that and might, you know, tweak it because of having that real time view into it. But for most, I think there has to be something behind.
55	It's all like I said about this, this, new pricing system for an energy is nudging it way more than just having some sort of meter in your house that shows you something, and I think we ran quite a lot of pilots with those different energy consumption meters that would also like could be used as a sort of remote control that you know when I'm walking, like using your mobile phone also like when am like one kilometer before my

	home, I'll turn on the electricity at home or I turn on the oven or whatever else that you want to do.
56	But I don't think that they ever got, like super good results from that, that it really change (…) it's always like a pilot of 100 people or something like that because it becomes quite expensive to have all of those things.
57	So of course, for some people just saving energy. Like I said, there's always people whose incentive, whose motivation is to live in a greener way. But I think that that combined with the economic benefit is seems to be working a lot more.
58	**P1** One of the most successful nudging mechanisms in various studies that I went through was default options. For example, I don't know if you know, but like a lot of countries switch to an opt out system of organ donation when everyone is a donor unless you opt out.
59	What do you think about this kind of mechanism in the context of emission reduction? Do you think they can be [effective] approaches to that?
60	**P2** First of all, maybe can I ask why is changing their organ donor system nudging?
61	**P1** It is nudging. So basically, citizens, people in general, individuals, have a kind of inertia. Uh, changing something that is, you know, in an ordinary way there takes a lot more mental energy, like even your phone, you are probably more likely to have the ringtone that just came with the phone and you never change it. If you don't feel like it, it's not affecting your life that much.
62	That's how a lot of people just don't bother about their organs after their death, so they never change it. And that's how often it works in.
63	**P2** Right, because we changed it also and now everyone is a donor.
64	But what I'm not getting is like where the nudging was because that's just like a set of like how it is. So the regulation changed that I don't have to do anything and I always

feel like nudging something where I am nudged towards making a better decision, but if I'm not making that decision, so is it more like because you have to specifically deny if you want to.

65 I just don't get where the nudging is when we change the system completely.

66 **P1**
Yeah. I think nudging, as I've seen in various literature about it, is not always about overt, things that you do to elicit a response. It can just be about changing the choice architecture in a way that people have all the freedom to, like in that case, raising prices will not be nudging for the for the parking example because like there, there has to be no disincentive.

67 Basically, the choices should be designed such that people are nudged, but they are always free to do something the other way.

68 **P2**
Yeah, OK, I get it.

69 So for Climate. I think that that well, because our philosophy is kind of the other way and basically that the same way that we change the default in a way that we changed the way that construction companies now have to act in Helsinki, so that they have to stay under this this particular life time limit of emissions.

70 So, but there's not really a way for anyone to opt out, because then you can't build in Helsinki unless you agree with that. And for individuals, I mean, you can move out of the city, but like so that, that that can't really because they're there is no choice. So I can't think of that.

71 I mean Mobility, I was having this argument about a year ago with someone who was trying to explain or he had an app that he said is nudging people towards using public transport instead of taking a car because they were giving some sort of compensation. If you used it and so you were collecting points and something and then the prices where whatever.

72 And you know that this was also used in the city of Latin in Finland, they had a big EU project where they were using a digital app in which if you took a bus instead of your

car, you got some points and when you had enough points, you got like a free access to a swimming pool or something like that.

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73 And again, there are maybe some people who use that and you can maybe get the data from them if you if you're interested. That got a lot of publicity because it kind of like sort of works in this way. But I think that it was not very successful in actually getting the users and so this discussion that I had with this guy who had a similar app. Like he was explaining that this is just how it works. Like if people get these points, they will do. And I was saying that, I don't think that something like that changes it because it's about your everyday life choices. Like if I think that, it matters much more that I for example, have a direct tram line to work instead of if I have to change tram lines, that's not gonna like some points that I get for, you know, then having some sort of tiny benefit somewhere that's not gonna help because I mean, maybe for someone who has all the time in the world and he's really like collecting something like this again, some people, something works.

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74 But I think in general it has to be about fitting into your everyday habit. So in Helsinki the general Mobility plan in the cities is that we first of all prioritise walking, then cycling, then public transport and then private cars. And so it means that we try to build the city in a way that it's very walkable and cyclable and the public transport is good. So I think that those are the incentives that that it's harder to go to and then if you add to that high parking fees, then the incentive for me is to, and then if it's easy also.

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75 Like one maybe also good example of how to use public transport is ticketing. We have a stupid system where we have to download an app and pay for (…) I mean, I have a monthly pass, but like if you don't then you pay for each thing with like mobile pay or something else. Whereas most cities already like London at least 10 years ago or more changed into this thing where you just show your debit card and it also collects all of your travels in a month and then bills you in the end and looks for the cheapest option. And I think that for example, if I'm in a different city like I was visiting a friend in Dunbar, I like a 2 hours away from here and they have that system. So running to a tram because we were in a hurry is not a problem, because I just have to show my card and then if I was in Helsinki, would first have to download an app to prove my identity where I'm living and then get a payment system there. So I mean, I would have just opted out of the system.

76	So I think it's when the digital system enables a very easy thing, but then the structure behind it, which is like how good that public transport is, is needed. But then the ticketing can be the last hurdle if it makes it too difficult for you to do something, and I feel like if it's too much hassle then you might opt out of that.
77	So I think that those can also be like nudging even if they are not meant. They are just meant as a ticketing system. It can be a good nudging because it's so easy to use and you don't have to do anything extra.
78	**P1** Yeah, you're right. Absolutely.
79	In my research I came across several mechanisms and simplicity in the way you navigate public services was one of the most obvious kinds of nudges, like it's something as simple people will not be hesitant to opt for it. So yeah.
80	**P2** And I remember Helsinki was one of the first places to have, like, a digital routing system. It was done by the university and (…) kind of like that you just put an address and they told you how to get there. And that, of course changed a lot.
81	And that's the same in (…) I was in Seoul, Korea couple of month ago and imagine like not understanding the language of the city, not knowing like one place from another. But I can just put like "I want to go from my hotel to this museum" and it gives me the whole route and it gives me the payment system and everything else. So it's just such an easy system. If that didn't exist, I would probably would have taken a taxi. But, but it's nice to use the system that you can because you just have your own phone. So I think those are extremely important.
82	**P1** Was that an app like Google Maps or something?
83	**P2** Yeah, I mean just any Google Maps or anything at that they had, they had their own too. And I realised there that Google Maps gave me public transport but not walking. But then, like the Apple maps gave me walking. So that was kind of like first I was just like,

OK, I can't walk.I won't find my way if I'm walking and I want it to walk, but then I tried Apple Maps and that was working so that was really nice.

84 So, but just to yeah, again to not have to have a special app for that.

85 But the things that you already have on your phone is really easy and then you actually can like navigate and do things, you know, city.

86 **P1**
One of the other most effective nudges that I've come across is social comparison. When you like, we all have this tendency to conform to the social norms and standards, and so these techniques have been proven successful in trying to nudge people towards following the same standard. For example, if you get in your electricity bill a smiley which says okay, your consumption has been below average as opposed to a sad face saying it has been more than the average. So that has been proven to be effective as well.

87 What are your thoughts?

88 **P2**
Really like they have studies that that works? Really? I wouldn't have thought.

89 **P1**
Yeah. Do you think this sort of nudge can also be useful and if so, in what sectors?

90 **P2**
I can't on the top of my mind now think of social comparison, but I think of social control which is like for example in Germany they are so strict with recycling and the neighbours are checking on each other that you don't put your trash into the wrong bin or anything like that. So then I think that that works really well because it's kind of like I don't want to be the person who's not doing this, but comparison I don't know.

91 I mean, I remember we once were thinking about like doing a sort of gaming app for activating people so that it would like compare you to your peers or something. Like if you walk the steps up or you took the public transport instead of something you would like to see how you comparing to others? But I mean we never did it.

92 I don't have any data. Then again, I'm sure that it works for something but and maybe if it has the like a gaming aspect that you kind of like also it gets more exciting than just see like because I can't imagine that if my neighbourhood is using the stairs more than me, I mean, that's not gonna make me walk the stairs. That doesn't have an effect on me that someone else is doing something, I can do it for myself or my health or something, but it doesn't matter to me whether my neighbors are walking so.

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93 **P1**

What about if you get maybe your water bill and then it says that 80% of the people in your neighborhood use less water on an average, do you think that would have something some impact?

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94 **P2**

Maybe, maybe, maybe something like that makes you think like, “what am I doing?”. But that's also based on, not so much like “am I worse than others?”, but more like knowledge that “OK if others are okay with that much so what is it that I'm doing?” and again If it would be linked also to my water bill, that would probably make me think more like “okay so if everyone else can lower the bill by this many percent, maybe I should think about it as well.”

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95 But like recycling here is working quite well because there's an ease of use. I live on the 5th floor and if I walk down, I have 8 different containers. It's possible for me to do that, but like my kids were living in Amsterdam and they said that there it's like one big container and if you want to recycle you have to look in a map and walk maybe a kilometer. Who's gonna do that? I mean, again, it's more about the ease.

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96 But even in something like this you get to system design of like do you have the space at home to keep all those different things? How do you manage that? Does it become convenient for you to do? So again, I think that uneasiness of use or easiness of adapting to something is very important.

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97 **P1**

Okay. So what sectors do you think can most benefit from nudging approaches? Since you mentioned that for a city like Helsinki, a large part of the things are just controlled by the city and so it's easier for you. What sectors do you think have more scope for nudging approaches so that citizens behaviour can be impacted for a change?

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98 **P2**

I've been thinking about this sometimes and I haven't ever really heard of super good nudging projects. I mean the most simple but supposedly very effective one is a kind of funny one where they used like in men's bathrooms in urinals, something like a target or, you know, butterflies or that men would aim at that instead of all over the place. So that makes sense to me that it's such a simple thing but then someone else will say that it works also in like rental housing like big rental companies, they send reminder of the bill a day before it's being paid and that seems to higher the percentage of people paying in time.

99 But yeah, I have heard of so many nudging projects, but I always remain a little bit skeptical about the motivation, like if it if it's only linked to something like social comparison.

100 I mean, another funny like I have an Apple Watch and I think it's so stupid. It tells me like you have to stand up now and then when I stand up, it says “great work!” and it just mostly makes me laugh. But I know that like people want to get their 10,000 steps and things like that and you get a congratulation, you get you, I mean mine is like it has those rings that now you've done this and this and this. Sometimes you do get into those things like “ohh my God my yellow ring is not done today.”

101 So I do understand that there's something about that, but, but I think again you have to have that motivation before like I want to be in good shape. I want to exercise and then that digital thing can help you to remember to do those things.

102 But uh yeah, I don't know how well that works with like Climate issues. I mean, Finland has so many like different organizations that have been doing these ‘Test your habits and change them’ sorts of tests and like pledges. I pledge to take shorter showers, but I'm always like yeah, maybe for the next 2 days but then like even if I would get a reminder everyday like “remember that your shower has to be only 2 minutes” and I'm there and it's warm and nice. I mean it's just like I think that they're like, unless I can see the motivation that's driving me there and then the nudging is just helping me keep that happy though something then then I can see the point.

103 **P1**

And one of my last questions would be considering the unique circumstances of Helsinki and the wider region in the Nordic areas in general, what potential challenges

or barriers do you foresee in implementing these matches? Also, considering the social, economic and cultural factors and geographic circumstances.

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104 **P2**

Well, actually, first I'm going to say something. There's an app here called Rescue, a rescue club and it's basically selling like surplus food in restaurants or supermarkets for a lot lower prices at the like end of business day or something like that. And it's become very popular and you get it much cheaper. Also, because it's a digital tool and you can check you know, your favorite places or places nearby. And then I've heard that you know, supermarkets give these like they put like a big bag of things in a plastic bag and then they sell it for 10 euro's or something and sort of surprise bag and those go in like one minute. I think that that's a good nudging way.

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105 Also, because it's kind of like there the food that would have otherwise would have been wasted is now not wasted the company or the supermarket makes some money out of it and people get food for a lot less and it really needed that digital tool because otherwise it wouldn't work, you owunldn’t know where to ask for that.

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106 So I would assume that that's a good kind of nudging, also in the exactly right way, because it's between the producers and the customers, whereas from the City side, again like what we do is more structural changes. So when it comes, for example, to food, uh, we've changed the school food system so that at least one day a week is just vegetarian food and everyday there's a vegetarian option.

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107 All city events, there's like over 2000 a year, cannot anymore offer any meat or dairy. So of course, that can nudge you in a way. You see that you can have a very nice buffet at a very nice place without any meat and only locally sourced fish and no dairy and things like that. So that can be a good example for you to learn and we are doing the things that we as a city can do, but at the same time we cannot change people's eating habits because we don't have the power to, you know, influence agriculture or something; EU or the nation state could, change like you know how much support is going to the farming sector and that's all; like cows and milk and things like that. So we also feel like, uh, just having, for example, a campaign about eat more vegetables, eat less meat, will have very little impact on people's minds. And I don't think that it matters whether it's a digital tool or whether it's a poster somewhere. But forcing people in a way to do those things can change things.

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108 It's like so many places in Europe, having the past couple of years changed like conference food to completely vegetarian and things like that. And I think that's having a change, but even there you have to be careful that the food is good because if that's your first time eating like vegetarian food and you get something horrible, then that's nudging you in the exactly wrong direction.

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109 So you need to be careful with that. I remember the first conference I went to that only had vegetarian food. I thought like, “Wow, this is possible. There's like 2000 people here and no meat and no fish.” And now it's just become an everyday thing. So, but that's again like changing kind of like a bigger structural or systemic thing that then makes others (…) maybe that's nudging one system towards another; like if Helsinki does that, then you see that enough times, maybe that nudges another city because it becomes more normal.

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110 But again, it's more on what we as a city can do on a big scale instead of like trying to get to each individual. Like, “hey, why don't you change from milk to oat milk?” I mean, think about that change. Who's drinking normal milk anymore? It's like almost non-existent here anymore because everyone is into oat or almond or something else. Now every cafe or other place (...), but I don't know, that doesn't feel like nudging in a way. It just feels like the fashion trend just changed and I don't think that anyone's anymore thinking about like which is better for you. I mean, oat milk isn't very light, and so there's also people who are starting to think like, I'm getting quite a lot of fat from old milk instead of like, you know, skim milk or something like that. So it can be balanced.

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111 So our thinking is more like we tried to change the big picture and by that we are maybe nudging people towards new habits.

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112 **P1**

Yeah, I think that also the right approach, like my personal opinion, I feel like a lot of times individuals, they, they make a lot of fuss about changing their lifestyles. But the real change in often just come from more structural decisions. I got some insights from your specific situations in Helsinki that might not be there in other interviews.

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113 And so before we end, I think it was a really productive interview with you. I would like to thank you again for your time.

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114 And do you have any other recommendations for this research?

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115 **P2**

I know that there's a lot of stuff being done. I was working with the UN habitat for a while on a project where they had quite a few different nudging apps that they were using in different cities for whatever things.

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116 So that you can find all that information, but if you want to look into this thing about the Mobility, I really am a bit doubtful about the results. I think that they got quite a few users actually for that, but it got a lot of publicity because it was kind of like we are not seeing people with some benefits to change from this or that.

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117 And I know that they are now sort of continuing with that with another thing where they work more with companies and have some sort of incentives for people to use shared cars or something instead of their own cars and things like that.

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118 But again, I don't know if that's working, then Turku, they got money from the pilot program of the Mission 100 climate neutral cities. They wanted to have like a real time emission showing in the city. So, at least for us, it takes months to get the actual emission data. So I don't know if it's possible to have real time emission data, but I'm also very doubtful that even if you see like 225,000 kilotons today and then tomorrow you see down by 2 like how does that change your behaviours like that?

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119 I'm not convinced about that, that that is changing anything but, but you can also talk to them like where are they with that then?

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120 **P1**

Do you have a contact person for that Turku city that I can approach.

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121 **P2**

Yeah, I can look it up.

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122 **P1**

OK, okay then. Thank you so much. I say all the best to you for the initiatives that you are having and thank you for being part of this call.

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123 **P2**

Thank you.

7.4.3 Antwerp

1	Antwerp, 25 March 2024
2	Interview Text
3	**P1** Can you briefly describe your role as a city administrator and share how intersects with the effort and goals to reduce emissions in the city of Antwerp?
4	**P2** I'm [P2] and I work for 10 years now or even 12 years for the city of Antwerp. My role is that I write Climate plans, specifically on mitigation. I do some modelling and that's why we decided a few years ago [that] we should have reduction of 50 till 55%.
5	When they are approved, then I work on some projects that are listed in the plan and that can be very (…) it varies sometimes. Few years ago, I worked on nudging; that's why I said yes.
6	Uh, these days I'm working more on the food strategy. Based on the Climate plan, we also decided to develop a food strategy.
7	And what else? I look after the reporting. So, we report on a yearly basis to the Covenant of Majors and I'm the one who is doing the reporting. So involved strategically, then on some projects and then I keep track of the indicators and report them to Europe.
8	**P1** So can you share what initiatives or strategies that you have implemented or considered to address the emissions issue?
9	**P2** You meaning general?
10	**P1** Yeah, some initiatives or strategies that you are working on for this matter?

11 P2

12 Basically, as we are a city, it comes down to the buildings and to Mobility. And of course, to usage of renewable energy. On buildings there it's to develop local strategies in line with decisions of Flanders that come from Europe to ensure that people in Antwerp renovate their houses, use renewable energy.

13 Mobility. That's done by a different department; there I am not so involved, but here the strategy is the same. You want to reduce [the emissions] and shift to electricity. Avoid, use less, try to use more shared cars and one more project, [we're] pretty proud of what we did is [about] solar and the big roofs. Normally, say every house has a roof, but it's more interesting from a mitigation perspective to have a lot of solar on the big roofs, and there we designed specific solution; cocreated with a lot of people and it's going live in in June.

14 That was one of the things we did, but it's really always the same and if you would interview people from city administrations in Europe, you're going to have the same answer. Buildings. Mobility.

15 Because we are focusing on scope 1 and 2. If we would have said its scope 3 as well, then you would have a different approach. But it's simply, here it's, the responsibility of countries, then it comes down to responsibility of, in our case the region, and then it comes down to cities. But the logic behind scope 1 and Scope 2 is always there.

16 That's why we put so much emphasis on reducing the energy and greening the energy.

17 But that's the easy question, huh?

18 **P1**
I would ask, just to see if we are on the same page about Digital Nudging. Are you familiar with the concept, and if so, could you please provide a brief explanation from your side, what do you make of Digital Nudging?

19 **P2**
Well. The invitation or the mail you sent to Antwerp triggered me because of nudging. I think when it started to work for Antwerp, I was lucky to read the book of Kahneman,

	‘Thinking, fast and slow’. After that, I think I read about all you can read from Sunstein; and then we did a few projects in Antwerp on nudging. They went quite well.
20	But I have not developed anything specific on a more digital level. Um, we had many years ago one project in Antwerp where we really tried to nudge, using Digital Nudges, as you would refer it. It was a project 6 million [euros] coming from Europe. Subsidised by Europe. But the results were mixed and it simply had to do with (...) It was in a new district; buildings were built; people arrived, but the total amount of participants to all the experiments was simply too low to have decent conclusions. It was the problem.
21	But on the personal level, I'm a believer in it. Um, but I'm not sure that many cities in Flanders are using it.
22	**P1** So Digital Nudging is basically the principles of nudging, applied in the UI and UX design of the various services that are offered by the city. To put it simply, right?
23	What are some of the ways in which your city digitally interacts with the citizens? In other words, what are the services or entitlements that are offered by the city of Antwerp, for which citizens use the Internet or electronic devices?
24	**P2** Ohh, that's in general?
25	**P1** Hmm like for what services is there a scope for Digital Nudging?
26	**P2** Ah, that's a tough one. That's a tough question. But I can definitely see your point.
27	A lot of requests that the citizen has to make in Antwerp is simply online. As you design the form, yes, you could start to influence people. Um, but we have not looked into it. What could it mean from a climate perspective?
28	Now the request that are being made. Say you want to do renovation on your house and then you have to, depending on the changes you want to make, you have to request a permission. That software is built by Flanders and is not built by the city. It is simply all

municipalities, all local municipalities in Flanders will use it. It is being developed by Flanders itself. And we simply cannot interfere.

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29 Even if you would say that there is a majority to say, “we must influence this”, this is pure down on the level of Flanders. So, in the ways to interact with the citizens, there is a potential. But we have not looked into it. We have not asked ourselves, what are the touch points, but they are simply, I mean I'm pretty sure that colleagues in other departments or other strategic department have an overview of all the touch points a citizen has with Antwerp. I'm not having this so I can only answer from a renovation perspective, that will be more Flanders. With my colleagues at the(…) because we have what we call the Eco House, that simply is a House where citizens in Antwerp can go to and get support on renovation, energy usage, everything. Every question you could ask, every question that has linked to climate, you can take up this question and go to the Eco house and they will explain it.

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30 On their websites, yes, it's a lot about greening, of course, but it's not (…) it's more storytelling. It is not that in simple interaction “I want to do this” that there is a clear nudge.

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31 The way I understand nudging, working with the defaults, the whole architecture behind it, I think my colleagues these days, if you would take the website [“Antwerp for Climate”], then you will see it's a lot of information. There is some storytelling on it of stories that went well, but of course. If you take the theory of nudging. And you take Sunstein and all those, then I'm not sure that you will find any nudge there.

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32 A few years ago, we even experimented with (…) one of the problems is, in Antwerp there are a lot of poor people that are being helped and we learned that even sending a letter to them by mail. Classic, classic letter and envelope that has come by the city. People in poverty are not willing to open the envelope immediately because they are simply scared that there will be again bad news.

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33 So, we experimented with the layout, experimented with texts to see how can we best communicate with them, and we learned that, yes, if we frame it like this, there is a good chance that the envelope gets open and that people at the end will read the letter and then call Antwerp. So, we did those experiments, but I'm afraid that if you would now open [“Antwerp for Climate”], you would not notice it.

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34 A better example is Gent. We make a distinction between Gent and Antwerp from a communication perspective. In Gent, they would call it effective communication. We really want to change the behaviour of the person was reading it. In Antwerp, we give information, but more in neutral way. I hope this gives some perspective of your question.

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35 It's a very interesting question because you really triggered me on what kind of touch points do we have as a city digitally and can we do there's something? A small nudge. I have to look into it. Yep.

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36 **P1**

So if you read the book Thaler, they basically say that there is no neutral way of putting information.

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37 So, in a sense like basically I think you are trying to say that as of now, the city does not have any approach towards nudging in the UI and UX design of its services, right?

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38 **P2**

I think it's not, but that I should look in do some forms to answer it. But based on my experience I would say that yes, your conclusion is correct and Sunstein's book "Choosing not to choose", where he explains that yes, not choosing is choosing. There's always a default. Every person who writes the rules creates a default. Even if he wants to be neutral, the default is there.

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39 And then yes, glad that you will make your thesis on, "What if it would be simply green by default?"

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40 **P1**

Talking about the default nudge, can you think of ideas or are there any existing approaches to using the default now in the digital in digital as a digital notch that you can think of?

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41 **P2**

Locally, in Antwerp um, I don't think so. Well from a government perspective, no. But Sunstein has a paper on green defaults where he compares and describes a few experiments in Germany and Switzerland on the use of green energy, where the default type of energy being presented is the green one, and the consequences of it.

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42 Um, another example that he gives is of the printer. Yes, if the default is that you print on both sides, yes, everybody will print on both sides. Here it's even better. We hardly print them anymore. I don't even have a link to a printer on my computer.

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43 **P1**

What about Feedback nudges? That's also one of the nudges that is in studies proven to be very effective in most instances. Like getting real time energy usage indicators and things like that, getting Feedback about your consumption. Do you see that being effective in the emission reduction?

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44 **P2**

If you ask, can it be important? Then I would say yes and the answer is for me this yes.

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45 Are we, as a city working on it? No.

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46 Maybe the next legislation and the reason why this no is that you need to have digital meters. Else it's it makes no it's impossible. It makes no sense.

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47 Ohh, the roll out of digital meters in Flanders started with a delay, hopefully by 2030 households will have a digital meter. But these digital meters should be linked to some smart software that can understand the meter because the meter presents it neutral.

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48 Um, but yes, there are opportunities. We worked with an organization. I will mail you afterwards the person, because if he has time, that's a good one to interview. He worked together with Antwerp on developing a platform with nudges built in where you really can compare your energy usage with the average households in Antwerp or Flanders; there are few comparisons um. I'll get you that, I'll send it afterwards. Because it's one platform. I know it exists.

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49 I referred to earlier to the 6 million project we got from Europe. They built then a platform together with Antwerp, but it's not any longer being used as far as I'm informed.

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50 **P1**

What about the social comparison? When your performance say in energy is being compared to people in your neighbourhood, and maybe you are told that "ohh this month you were, say, 40% above the average" and do you think Digital Nudges like that can be useful?

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51 **P2**

They can be very, very useful. I'm 100% convinced of it.

52 When I arrived in Antwerp, one of the measures I described was simply the principle you just explained and I was told then that we are rolling out digital meters by 2020. Now it's 2030. But yes, it makes a lot of sense. Imagine we even discuss it further with the University of Leuven, because your mail address comes from Leuven, huh?

53 **P1**

Yeah, actually my program is a Mobility program. So right now, I'm in Muenster, but I studied one semester of my first semester in Leuven. So, it's like a joint degree, so.

54 **P2**

Ohh and what is the next destination?

55 **P1**

Yeah, this is my thesis, I was in Leuven, then I was here in Muenster. Then I was in Estonia, in Estonia, and now I'm back for my thesis.

56 **P2**

Ohh great program.

57 **P1**

Yeah. Yeah, it's very nice.

58 **P2**

What we did with the guys in Leuven, but it never came to an experiment, only in workshops. Where we said, “OK, when we compare the energy level, will we compare with households in your neighbourhoods?” like this U.S. company is doing. Or is it better to refer to your peers? Say somebody loves football and is going to (…) every time he's following his favourite team and he's doing that with a lot of his friends. Would it make sense to compare them with his friends?

59 At the end, we turned down to uh, it's best that we simply compare with the comparable household. Now it's even in the Flanders Climate plan that they would develop a system that exactly is doing this. I will send you at least you get from me in some context, I saw

this morning that I have not mailed them, I do apologise. I will send you the link to the Flanders Climate plan because it took over.

60 It's a concept that was started in Antwerp. Does that make sense? So, we will do this, but I will send you the exact description from the Climate plan and I will also give you the name of the Antwerp company that worked on nudging.

61 So, Flanders said "yes, we believe in this", but I'm not sure where they are with it because there was a discussion there was days where it makes sense to put it on the invoice. But in Flanders nobody reads this final invoice, once a year, makes no sense. So, it should be much faster. Much more Feedback loops immediately.

62 **P1**

There's a lot of confusion among different countries. When I look at what is the extent to which the municipality has power to act on this issue. Like I was talking to someone in Helsinki and there the municipality has a lot of powers and therefore they decide to act on more structural issues rather than nudging people; can you give a general, like comment about how does it work with Flanders and Antwerp, who has the power to do what and where lies the greatest scope for the city of Antwerp, given the powers that they have to act on the issue of climate?

63 **P2**

If you go back to your example of simply comparing energy usage. If you link it to the invoice, say that you want to have regulation that says it has to be compared on the invoice and it's only invoice now. I've forgot it's on the invoice, but it's not as good as we would hope. But we do compare it.

64 This regulation is on a Belgian level. Belgium, Flanders and then City. That part is already Belgium because it's linked to invoicing. What we did with this organization, I simply cannot remember, is a voluntary system. It's a voluntary system where you as a citizen says "yes, I want to compare my energy with another". Yes, we can finance them, as we did. So, there were objections to it.

65 But could we say ohh it's mandatory? Never. So as long as this is voluntary, we can say it's very beneficial to have this kind of logic in place. And yes, every citizen in Antwerp can become a member of this group and compares. Yes, but we cannot say it is

mandatory and as soon as it comes more on a systemic level like we want do change invoices, then it's simply Belgium that has to decide and to change a few rules.

66 **P2**

So it's complicated and it's a very good remark because often it is said that cities will change the world, so to say. But if you look at it from more regulation perspective then a lot of what has to be done, simply on national level or regional level and not of City level.

67 **P1**

Do you think it's feasible for this thing to be harmonised on the EU level that cities are given more power to act on certain things?

68 They're doing a lot of pilots and in a lot of pilots, a lot of cities are coming up with a lot of learnings, but that's something that cannot be shared with some other city in which that City does not have the same power to take same kind of actions. So, do you think this is something that can be harmonised on the EU level so that cities can actually learn from each other?

69 **P2**

Europe is trying this out and if you would Google on Amsterdam and European pacts thing then you already have it.

70 It was when the Dutch were taking the chair of, I think it's Council of Europe. But what the Dutch did years ago, they said, “Well, we see that Europe is talking a lot and it's creating a lot of rules that the local level is not involved and from there the Amsterdam as a city lobbied and they institutionalised a way of working that Europe is now looking more at cities than before, and that was a really on writing the rules.

71 What's working rather well is simply as long as you simply want to distribute your knowledge, share your knowledge based on European projects. That works rather well. Ther are a lot of databases that you can consult and so on. But when it comes down to writing rules, their cities could be appreciating more. And what the initiative from Amsterdam tried to do was simply facilitate that.

72 Uh, in Antwerp we are member of EUROCITIES. So, there we have our contacts and we are part of ICLEI as well so there again we have our contacts, but the results will always have a margin to improve definitely.

73 But even on this topic, EUROCITIES is involved. It's a separate topic for EUROCITIES.

74 **P1**
As far as Antwerp is concerned, the city of Antwerp. What sectors do you think can benefit the most from Digital Nudging? Like, energy. What sectors do you think, given the powers that Antwerp has, can benefit the most?

75 **P2**
My answer is simply based on literature, but it's not based on real testing and based on literature. To my knowledge. It comes down to households. The energy consumption on the households.

76 And potentially, greening of the type of energy that's being used. With greening I simply refer to the green electricity and there has been a very, very good experiment in Leuven. It's called Leuven Shift. They put a lot of energy in convincing people to shift to green energy and brilliantly done. If you would look at the campaign and I think if you look for Leuven shift then then you have it. Absolutely brilliant.

77 Ohh but if you discussed afterwards with my colleagues from Leuven, the effort that was done was simply too much. So, if you could have a small nudge, on local level that's trying to ensure that your citizenship shift to a green electricity contract, it would make a tremendous difference.

78 I discussed that with the people from what we have in Flanders, the VREG. It's really the regulator of energy. If you look at VREG and then energy suppliers, you will have a whole overview of all suppliers. They compare it on prices, they compare on what they offer. What I asked was, put the default always Green that the first thing what the person sees is simply the green prices, but it was not (…), well we have discussed it, what was just, uh, one workshop and after that, they did not proceed.

79 **P2**
Um, but yes, the impact could be tremendous. So, for a citizen, if you ask, nudging

defaults yes, then I think, the impact is more of households, energy savings there and switching to green electricity.

80 Now, we wanted to do an experiment where I work. It's 2500 people are working in this building just before COVID. Since COVID a few hundreds and most of us work now at home. We did an experiment where we say temperature in Antwerp is 21 degrees. Now every degree makes 7% as an energy saving. We learned from an experiment that Sunstein described that if you lower with one degree Celsius, people will not complain 2 degrees difficult, 3 degrees, forget it. Everybody's complaining.

81 So, in our tests we start with a half degree, and we took track of all the complaints. And then we switched to one degree, one and a half degree and I'm not sure we went further than 1.5 degrees, but based on the complaints, based on what was possible, we said we lower with one degree. Immediately 7% savings.

82 Then came the war in Ukraine. And every household but also every Office immediately saved 12-15% on energy because they lowered the temperature with 3 degrees. So, with the nudges what I was trying to do, and the experiments I run was, when we came down to one and a half degree there were quite some complaints, but then you see that the whole context is changing a few years later because of the war, and then you notice what is actually possible.

83 So, I was a bit surprised and not really surprised, but based on the literature I knew, how far can I go? But then we didn't insist in the given context, but now these days the context is totally different and therefore the energy savings are huge.

84 **P1**
What challenges or barriers do you foresee in implementation of Digital Nudges for emission reduction?

85 **P2**
I think simply system wise, it's privacy. Do I want that a given software compares my data with other data on privacy? Do I want to share this data? That that could be a hurdle.

86 It is difficult sometimes to compare the right things. It's difficult to compare a household living in apartment, 3 people. Compared with, in Antwerp, um, a household, 3 children,

2 children, most in Antwerp, most of the households are think now it's the majorities are singles I believe there. So, there you could compare singles.

87 Um, so the barrier I think is to ensure that, from a privacy perspective, it is working. Ensure that a lot of people are joining your experiment. Better would be, much better would be, that by default the regulator says this will happen, so that is not on a voluntary basis, but simply mandated. But mandated in a way that there can never be any issue on privacy.

88 Because one of my other backgrounds is human rights. Human rights and privacy and Climate. And it's a different discussion, but it's interesting, sometimes I'm sitting in workshops like this on nudging and then I have sometimes in others where privacy is discussed and human rights and climate, and it's complicated simply from a privacy perspective and people in Flanders (…) That's the biggest hurdle, when you accept your digital meter, the default on communicating the data is off. So, when you accept, (it's now mandatory to have digital meter) but somewhere in the form, you have to indicate do you want to share the data? Yes or no. And a few years ago, when I was there and was more into these discussions, the default was a no. So, meaning, if it's a no, nobody will change it, though it's like the same with organ donations in Flanders is big, like in Belgium is big. It's simply because the minister years ago said by default it's yes. Every time you get your driving license permit, there's somewhere small checkbox that says "yes I donate", it's there, it's not somewhere else, it's simply there. So, privacy perspective? But it exists and it works well.

89 So, the power of the default, it's enormous, but you are simply not using it well enough. So yes, with Digital Nudges, as we are in a digital era, no papers. It's a very important study.

90 **P1**
Is there any additional insight or information that you would like to share which can be useful for this study? Or maybe any recommendations?

91 **P2**
Well, the thing is that I'm very glad you contacted me. Unfortunately, most of my knowledge is simply based on literature. A few years ago, yes, there was a working group in Flanders on nudging. So that's no longer the case. Those days there were

	discussions in Parliament, “Should Flanders have a behavioural insights team like UK has?”
92	In the end, Flanders has no behavioural insights team like UK. For me personally, I think big mistake because there is a lot to gain. But I think it would be, for your paper, if you can describe some successful projects in local cities. I don't care if it seems Flanders, it's in the South, it's in France. It's Helsinki. It's all OK as long as readers know “it's working there, so why should we not?”
93	**P1** Thank you so much for your time. I will send you a consent form if you wish to get a copy of when this study is complete.
94	**P2** Yes. Yeah, I will.
95	**P1** Yeah, this is very useful. I got a lot of new ideas from the interaction with you, thank you again.
96	**P2** I'll send you the documents, the contacts today definitely today at the end of the working day. Nice to talk to you.
97	**P1** OK, have a nice day and all the best for your next appointment.

7.4.4 Heidelberg

1	Heidelberg, 26 March 2024
2	Interview Text

3 **P1**

Can you briefly describe your role as a city administrator and tell me how it intersects with the efforts and goals to reduce emissions within the city of Heidelberg?

4 **P2**

So the city of Heidelberg has one of the first climate protection concepts in Germany, which was passed by the Council in 1992, and since then, several climate protection and energy demand strategies were developed for the city and the city administration. And during the same time in the 90s, the city administration introduced or installed an Environmental Protection Office, which has been since then, expanded very much.

5 And now we have more than 50 employees in the department in the in the Office of Environmental Protection and Climate and Energy. But some of them are also working the in-grade supervision and adaptation and clean air. But we also have since 2 years again, a Deputy mayor, especially for climate protection, mobility and waste.

6 So, all Climate related offices of the city have been combined in under one deputy mayor and I'm in the Office of Environmental Protection, Trade Supervision and Energy, and in this section energy and climate protection. And I'm personally, I'm a geographer, and since 2012 I'm working in the office here. And in my first years I was responsible for a federal project which was called “Master Plan 100% Climate protection”, which is from the Federal Ministry of Environment Protection funded project, was a project where municipalities, which are already very advanced in climate protection gather together in order to find and develop strategies and measures to become Climate neutral in 2050, which is what's the goal in 2012.

7 But now since the 1.5 degree goal is very likely not to be reached, we have to accelerate our measures and strategies, and therefore Climate neutrality to also (…) like the German federal and the state of Baden Wurttemberg have new Climate protection target years. The Germany 2045 and the land of State of Baden Wurttemberg 2040 and Heidelberg 2040, the latest, but the since we are a mission City, we do our best to become Climate, or at least a GHG neutral until 2030.

8 And our section is responsible for the strategies and also for the municipal buildings because the municipality should be Climate neutral by 2030 and the main sources for Climate relevant gas emissions are buildings.

9 My engineer colleagues are responsible for the for the technical part like heat planning the renewable energy, energy efficiency in municipal buildings and we all coordinate also; stakeholders and all relevant actors within the city which are important in order find efficient strategies for Climate Neutral Heidelberg in 2030 and 2040, the latest.

10 So, it's basically a management position which I have.

11 **P1**
Can you tell me a bit about how the administrative structure works in Germany between the municipality, the state of Baden Wurttemberg and the federal government?

12 Because in different countries, cities have different powers that they can use to put push for their climate neutrality targets. So can you give me an overview of how it works for you?

13 **P2**
Yes.

14 Germany has 16 States and Heidelberg is located in the state of Baden Wurttemberg. And you have a federal laws, state laws. Baden Wurttemberg has a very advanced climate change adaptation law.

15 And as soon as we have a law, we have to fulfill several obligations. And the governmental level, which passes the law, has to give you then money in order for you to fulfill what what they want you to do.

16 So for example, the state of Baden Wurttemberg already in 2021 or 22 had brought up the law that large cities have to have a heat plan, a local heat plan by the end of 2023. So for example, in this, you have the law and the municipality has to fulfill what the law says. They get funding from the state and then they fulfill their duty.

17 Now it's a federal law now since this year. So other cities in Germany, depending on the size, have to implement a district heat a plan until certain years. So, the connection between the different levels are task which are mandatory or obligatory. So if they are a duty you have to be financed by the state. If it's not a duty, you have to finance by yourself. So right now, most of the climate change and climate adaptation the measures we implement in Heidelberg, we have to finance by ourselves because it's our choice.

18 You know, this is why cities which have a little more money than poorer cities are have been able over years already to implement or develop climate protection and climate change adaptation strategies. This is why Heidelberg is so advanced, because it's part of our sustainable development goals.

19 **P1**
And when you say that you are aiming to become climate neutral by 2030 as a municipality and you commit to the EU mission, what does it mean?

20 What is the scope of activities that you want to aim for climate neutrality?

21 **P2**
We have during the last 20 years regularly [maintained] Co 2 inventories and they show very, very good, where the the main sources of Co 2 emissions are located. So what we do, because we have to accelerate, you know, the difference between 20 years ago is we do Climate protection somehow. We have to lower energy demand, expand renewable energies and replace Fossil fuels somehow.

22 But the difference now in comparison to 20 years ago is that the goal is now zero and not somehow, reduce it to zero! So you really need to see and to analyze where are, on your territory, the main sources of energy. Of energy use and the CO2 emissions. So we isolated a few big points where we have to concentrate our focus on measures.

23 So one is heat supplies. So we have to reduce the energy demand for heating which is possible through retrofit buildings so they don't need so much energy, heat energy and replace the heat supply with renewable energies, which is in Heidelberg mainly district heating or heat pumps. So we should get away from oil heating, gas heating and coal, of course.

24 And the other thing is (…) The other column (…) you have the heat, then you have the energy demand. You can also reduce the energy demand by using different bulbs, switching off lights, use more energy efficient technologies and to replace the production of energy through renewable energy production like solar energy or wind energy mainly. Or we also have the water power plants. So, that’s the second column.

25 The 3rd column is the whole Mobility part. Reduce the energy demand in energy and fuel demand in the in the mobility sector, which means replacing (…) you always have

these 3 approaches in Mobility planning (…) I don't know if you know that you have these 3 strategies/approaches.

26 One is, reduce the demand of itineraries of driven kilometres.

27 The second is that the leftover demand should be transformed to environmentally friendly modes of mobility, with public transport or by cycling.

28 And the one which is left, for example, call Mobility should be replaced by environmentally friendly propulsion, for example. So, this whole this whole Mobility part or the transformation of the bus and tram fleet towards environment friendly population technology like H2 or e-mobility buses.

29 So that's the Mobility part and those are the 3 large columns, heat, energy and Mobility. So that's what we focus on in order to really achieve large success in a reduction of CO2 emissions.

30 **P1**
What initiatives or strategies have you implemented or are planning to implement to realise these goals?

31 **P2**
What are already mentioned in the in the heat sector is our heat planning. So together with our municipal utility, we have a strategy to reduce or (...) We are in a lucky position in Heidelberg that we already have 50% of the territory in Heidelberg supplied by district heating and we want to increase that to 70% by 2040, which needs large investments on expanding the grid and replacing the district heat production sources into renewable energies production sources like water heat plan or we have a large heat storage so you if you have too much heat, we have a large tank where you have water in it and it stores the heat, which can be released to the grid when it's needed. So it's large infrastructure investments through our municipal utility.

32 So the other strategy in the energy column like I explained before is the expansion of solar energy production in the whole city. So we have, for example, funding programs for private house owners or large roof owners like enterprises, farmers and for association like sports halls, you know, so expanding the solar energy production and

we are also obliged to (…) but that's the duty of the state or the federal and state duty (…) to build wind turbines, for example.

33 And in the Mobility column we are right now in in the in the process of developing our Office's climate neutral Mobility plan and that very much like I said before, focuses on measures to make public transport and cycling more attractive, like optimising the cycle lane grid in the city. Or speed cycle lanes which connect cities and also to improve the whole public transport system like the ticketing system. Optimise the ticketing system, make it cheaper, or optimising the schedule of buses and trams or improve the Mobility points. You know where tram and bus come together or tram, bus and bike lanes come together to develop a more sufficient itinerary change.

34 Just to make using public transport easier and more attractive for example. The most Mobility emissions in Heidelberg come from commuting in and commuting out of the city, so especially the inner city traffic is very much dominated by cycling and public transport, but the car emissions, which are the most problematic emissions, are caused by commuters

35 **P1**
If we move on to the main focus of this research, which would be Digital Nudges, are you familiar with the concept of digital images, and if so, can you provide a brief understanding from your perspective?

36 **P2**
Only what I know about digital address is that what I was looking up as I received your email, in order to see if this interview is something interesting for us, so I'm not really familiar with Digital Nudges.

37 **P1**
So I would just give a brief overview.

38 Nudges are basically choice architecture. Everyday citizens come across various choices. If I'm today sitting in Munster and I can see that there are no bike lanes then I would probably not bike as much as opposed to a city which has a lot of bike lanes. That's like the architecture of the city is nudging me towards following certain choices.

39 Another example could be in Belgium they have made organ donations mandatory but not mandatory in the sense like everyone has to do it. So unless in your driving license

permit, there's someone in the form there is some somewhere written that I, uh, I hope for organ donation and it's by default. Yes. So people typically don't opt out of these things.

40 So nudges is basically choice architecture and in a digital in the digital realm when you design forms for your City services for example, um, you mentioned that this district heating so in, for example your heating contract that you sign with the city the default option that you get, if that is green energy which maybe slightly more expensive. But if that's the default and there are like 2 or 3 other options which are maybe less carbon friendly, environment friendly, then studies have shown that people and to stick with the default option that is provided. So that's an example of Digital Nudging. If that's, if that's happens on the online medium.

41 **P2**

As a private house owner, if I have the option when I am looking for contract for energy supply at the for example at the municipal utility and they offer me an Ecostron (?) and other things and I have this Ecostron as one option that's Digital Nudging.

42 **P1**

Digital Nudging is basically yeah, the way you present the choices in the user interface of your digital interaction with citizens, for example. And if you design the form in such a way that (…) you see there are a lot of psychological mechanisms, you know, like availability and anchoring, that when you see something, an option, you compare every other option in relation to the first option that you see or in form, if they have 5 options, people tend to look at the first option.

43 So how you structure these choices can perhaps have, without any this incentive per se, because people are always free to make their choices. But the way you structure these forms and these websites can also bring about certain I desired impact. So that's what digital matching is all about.

44 **P2**

OK, I understand.

45 **P1**

So I would ask you, what are the ways in which your City digitally interacts with

citizens? In other words, for which services or entitlements offered by Heidelberg, the municipality do citizens use Internet or electronic devices?

46 **P2**
Everything. So we have a whole citizen service, all the services for citizens are digital right now. So the regular things like passport and the way the whole waste schedule or if you if you book waste cans or the whole service you know is online.

47 We also have offices, but it mostly digital. We have district parking, so if you have an apartment somewhere and you have a car and you don't have a private parking lot and you want to leave your car in the Open Street area, you have to pay for that. So that you and you get a card and a district park allowance.

48 I would say things like that. It's all digital.

49 **P1**
And does the City follow any nudging approaches in designing of the user interface of those online service portals or digital environments?

50 **P2**
As far as I know, no. But we have, in our office for public relation. We have a social media section. I did not ask them ahead of our of our phone call, but maybe they have some of those approaches. I don't know, but I can find out.

51 **P1**
OK, maybe we can discuss some of the specific nudges that that fall into the category of Digital Nudges or nudges in general.

52 What are your thoughts on using Feedbacks as a mechanism to let people know, for example, um real time, energy consumption, alerts or Feedbacks about the behaviour of the consumers?

53 How do you think that can use be useful?

54 **P2**
But what do you mean Feedback?

55 **P1**
So for example maybe. Feedback could be like, you get a Feedback that your energy

consumption for when you get in your bill online it tells you that your energy consumption for this month has been 20% above the average or something like that or maybe like a meter that tells you how your energy consumption is rising or something like that.

56 **P2**

Ohh, that's good. Of course, you have the people you steer somehow the behaviour of the customer.

57 **P1**

Does the city have the required capacity to extract such data so that citizens, maybe through some app or something, get to know that?

58 **P2**

Not for the whole city, only for our municipal buildings. Maybe schools and the administrative buildings, but the municipal utility which supplies their customers within the city, they will may be able to do so.

59 **P1**

What do you think of a social comparison nudge? In a lot of studies, they find that when people have some information of what other people are doing and what other people's consumption pattern is like, then they tend to change their behaviour in accordance with the norm. Social norms. So do you think this kind of nudging can be incorporated in any of these services?

60 For example, when you get to know that your energy consumption is way higher than the average, then a lot of people tend to lower their consumption because they know they can save money and live in a less energy intensive way.

61 **P2**

I think it's sounds good. Also, what I right now I think is on waste too.

62 Since you live in Germany, we have separate waste system and the not recyclable waste is much more expensive and this is something you could give Feedback on each household from one year to the other. If they don't, you see it in your bill, actually.

63 But if you have an extra information like a chart or something, people see immediately that they lowered the number of waste bins in comparison with the year before, so this

would be helpful I think. But the energy consumption we could only do this on our…we as a municipality on our municipal buildings and all the other things need to be done by the municipal utility.

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64 **P1**

Um, what areas or sectors do you think have the capacity to apply these Digital Nudges to change consumption behaviour?

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65 **P2**

The capacity nobody has a capacity. You mean a personal resource? Time resource or the what?

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66 **P1**

Which sectors do you think are ready for such kind of Digital Nudging mechanisms to reduce emissions? Do they have that kind of a link to with the consumers where they can push for such nudging.

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67 **P2**

Hmm, like I said, waste would be a section or a strategy field and energy consumption in the city by the municipal utility and in the administration buildings and another, I think about the whole Mobility sector. But there the monitoring is very difficult in mobility sector.

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68 **P1**

What challenges of barriers do you foresee in application of such Digital Nudging mechanisms for emission reduction?

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69 **P2**

Like you said, to show a change in behaviour or energy consumption, you need the data to show that and I think that's one of the largest barriers that you have to have the data to show someone that their energy consumption raised or their costs on Mobility raised in comparison to the year before, or if it is lowered to motivate to follow that path. I think the data would be one of the most important obstacles I would suggest or I assume.

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70 **P1**

Do you see any ethical or privacy concerns associated with the use of Digital Nudges in this context?

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71 **P2**

Of course, of course.

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72 That's the data, the data availability or the data, the data collection and the data availability. The availability is also question of data security. I would say probably.

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73 **P1**

Okay, do you have any additional insights and or before that, uh, do you see how these challenges about data availability and what you mentioned can be mitigated?

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74 **P2**

I'm thinking so many, so many thoughts in my head. Uh, if I'm for example, talking about consumption like food and clothes and things.

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75 You can use apps for example, but apps I only use by a certain generation, so a generation which is not familiar (…) for example if you have a fitness track or um a calorie counter, you have to know how to use such applications and also you need to be motivated to collect your daily data, for example, you can collect your daily data on consumption on Mobility. You know you have apps like that, but um, to motivate people to use it and have people, which are able to use it because of their technical, technological skills, you only reach a certain part of society, but basically, it's possible, I think.

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76 For example, many cities make competitions, you know? They have like a certain period of time where they have people compete. For example, we have the Stadtradlen in Baden Wurttemberg. I don't know if other countries states have that too Stadtradlen, you know, Stadtradlen?

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77 It's a competition in the state of Baden Wurttemberg from the Ministry of Mobility I think. And cities can take part in this competition. Sign up for collecting kilometers which replace car kilometres by bike kilometers, and then you have you like Heidelberg takes part in the competition for one month, let's say May and then doing this 4 weeks in May, different groups within the city like a church or Sports Club or a team of city of Heidelberg, they can sign up in this competition and each Member of this group takes rides in the app which how many kilometres they replaced car kilometres by bike kilometers, that competitions, and the can be monitored, things like that work.

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78 And that’s actually an idea of the Digital Nudging, you can look that up in the Internet, it's in German, but anyway I hope you know little German since you live in Muenster.

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79 And you also have the Co 2 competition. You know that households try to reduce waste and reduce the meat consumption or have a one month vegan diet or whatever. Things like that may work.

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80 **P1**

Do you have any other insights or recommendations for this research?

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81 **P2**

We have also E teams (energy teams) in schools and since we monitor schools, which are municipal buildings. So we have a monitoring, controlling energy controlling system and E teams are (…)

They are not called E teams anymore, they are called BNE teams, which means sustainable energy teams in schools. This is voluntarily groups in schools are trained to teach their school colleagues how to reduce the energy demand in the classroom, for example, so that they should not leave the window open when they want to have cold air or how they have to lower their heater when they open the window or when they leave the room or for the weekend and then they get the money. The benefit they save and energy they get for their class cashier.

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82 That's another another idea which we already practice since years.

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83 We have one more interesting project which is called, um, sustainable management of small and medium sized enterprises. That’s the project, which is already running over 10 years. Every year, small or medium enterprises can apply for an energy consultation and then they have a complete check of their energy and other waste and depends if it's a bakery or it's a large company. They have a complete check of their energy components and then they are trained how to reduce it or they are they are advised for example to replace in the bakery, the oven or for example, if it's a company which has lots of cars, the car drivers are trained, how to reduce by driving methods or techniques how to reduce the energy demand or the fuel demand of their cars.

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84 **P1**

Thank you for those ideas.

85	**P2** So what I'm going to do is I'm going to ask my colleagues from the social media team if they know Digital Nudging or if they use it already or if they are intending to implement it in the future.
86	I'm very interested in that.
87	**P1** Thank you so much for your time.
88	It was a it was very fruitful conversation for me, and all the best for your work and keep up the good work.
89	**P2** So if you have any questions, just just let me know, then I try to help out.
90	So thank you very much.
91	**P2** Bye bye.

7.4.5 Tartu

1	Tartu, 26 March 2024
2	Interview Text
3	**P1** So my first question to you would be if you can briefly describe your role as a city administrator and share how it intersects with the effort and goals to reduce emissions in your city.
4	**P2** Uh, I'm the Climate specialist in the Department of Urban Design. And it is my job to oversee the climate mitigation and Climate adoption policies, update them whenever

	needed, and also to report on our emissions and other indicators that we have regarding climate mitigation and climate adaptation.
5	But I also manage quite a few implementation projects as well. Mainly my effort goes into renovation of privately owned apartment buildings, but also private buildings. But then there's some climate adaption actions as well. Uh, piloting some nature-based solutions and also working on our organizations; city government as an organization, not the city itself, but the organization and its climate impact and mobility action plan. And that's roughly my work.
6	**P1** Okay um, can you tell me what kind of initiatives or strategies have you implemented or are considering to implement for addressing the problem of greenhouse gases and encourage emission reduction?
7	**P2** We have our climate action plan and it's energy efficiency and climate action plan and it gathers itself as mitigation actions, but also and adaption actions.
8	Then there's a cycling promotion action plan. We are going to implement or start developing our sustainable urban mobility action plan.
9	And then there's obviously stuff like our current city development plan for 2040 which we are also going to align with the UN Sustainability Goals SDG.
10	So I think those are the bigger ones, they might be some smaller ones as well, but they are not so much official documents as they are maybe internal guidance documents or so.
11	**P1** Um, are you familiar with the concept of Digital Nudges?
12	**P2** The what?
13	**P1** Digital Nudges, yeah.

14 **P2**

No, I don't think so.

15 **P1**

OK, so basically. It's combining a lot of insights from behavioural economics and psychology, and they're scholars who have come up with this idea that basically, uh for make a lot of choices and the the architecture around us affects the kind of choices that we end up making.

16 So what they are trying to say is that there are no neutral ways of presenting choices to people. For example, if you go in a cafeteria at the university, the layout of the cafeteria can often nudge you towards taking specific meals. In some studies for example, uh, it is found that in supermarkets, the things that are placed at the eye level are the ones that are more likely to be picked up even if like they are a similar priced options or from another brands in the lower rungs on the shelves.

17 **P2**

Yeah, I absolutely agree. The city and the city environment is totally the same.

18 **P1**

And the same thing when you do it in a digital context through the design of the UI or UX Design of services or portals or web forms, that would constitute Digital Nudging.

19 So, my question would be, uh, can you tell me what are the ways in which your City digitally interacts with citizens? In other words, what are the services or entitlements offered by the city for which citizens have to use Internet or an electronic device?

20 **P2**

I'm not sure I'm the right person to answer it, but we do have our quite a number of services. I think there's some education services, mainly where our digital services started, I think. I think it started with how to get a kindergarten or school position for your child.

21 So there was a system where you we did a (…) I think it's a digital system where you identify with Estonian ID and then you register your kid or yourself or whatever and then the system has expanded and expanded into a number of different services where

by now we (…) if there is any applications from citizens or from Institutions or businesses or Companies then they have to come through this portal.

22 Yeah, I think our latest service that I also have been using is a portal where you can rent all of the city government's rooms that are publicly available. So let's say there are sporting facilities in schools or classes, seminar rooms in schools that are that are available after hours for the public. So that is where you can use our services digitally. But also we are right now creating a service for Public businesses or let's say cafeterias that want to expand their services to the Street. Street cafes. So they're going to apply for the area on the street that they want to use and it's going to be connected from the national ID, the company's national ID and also our GIS information systems, so that a company can draw on a map what type of or how large area they want to use on specific streets and then apply for the permit to use it. And then according to their application a monthly fee will be also calculated and the invoices sent out to them.

23 So there's a number of things I think we use like actual services that we provide that people need to apply to.

24 **P1**
And do you follow any kind of nudging approach like we talked about earlier towards the design of these service portals or the forms, the application forms?

25 **P2**
I'm not sure about that, I'm not into that high of a detail there and so I can say, but I'm not sure.

26 **P1**
OK.

27 Given what we talked about, the nudges, there are a few specific nudges that have been proven to be very useful in in a lot of studies, one of them is providing default options.

28 So for example in a form where you have to choose your energy provider, sometimes in certain places they have multiple options, maybe one green energy option which is slightly more expensive and another regular option or it has been found that since certain areas they by default offer the Green option as like ticked as opposed to the other one. And in in those areas, it's more likely that people will just stick with the green option.

29 So and another example could be in organ donations that a lot of countries make it a opt in by default, where if you want to opt out of further organ donation schemes then you have to specifically tell them. Do you feel like Default Rules like this can be applied um in your line of work to encourage more emission reduction?

---

30 **P2**

Not digital ones, I don't think so. Not at the moment at least, because if I describe like, where the city's emissions come from, there's a scope 1 and 2. Then they're mostly from energy obviously, and how people move about in the city and the city government itself has very little influence on where the energy comes from, what sources it comes from or how people consume it.

---

31 We have very vague influence on that. It's mostly things that can be changed and influenced on a national level. What we can do mostly is, um, focus on the city government's or the municipal institutions impact, but also Mobility in the city and this is something like nudging, basically, or the city environment.

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32 So very Simply put, there needs to be bike lanes in the city for people to be able to cycle. And that the cycling storage has to be closer to the building than parking. Also parking to um major public buildings or services should not be closer than bus stations, for example.

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33 That is something that we can influence and it is my view that there is a so much that needs to be done on physical level. That needs to go, let's say, hand in hand with the digital services and Digital Nudging. Um, but the digital services and nudging, they can't be substituted for the actual physical space that we live in. Although there might sometimes be people thinking that we should do everything digitally. All this influencing behaviour.

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34 **P1**

Another kind of nudge that that research has pointed out can be useful, is social comparison, which is basically letting people know how is their behaviour comparing to other people, maybe in their neighborhood or other people in their friend circle. Because they have found that people are more likely to move towards the social norm and change their behaviour accordingly. So do you think that is something which can be, digitally be conveyed to the people?

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35 **P2**

It could be, but then it would need to be in a very specific place where the thing can influence the people. Let's say, do you know about Tartu's participatory budgeting?

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36 **P1**

And I'm not sure.

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37 **P2**

It's basically that, we have a portion of the city's budget that is allocated for public ideas to implement so that there's like this whole 9 month process of gathering ideas, then working through them and the doable ideas will be put on public, basically voting. And then the 2 most popular ideas will be implemented throughout the next budget year.

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38 So let's say we want to communicate to people, then one of the best places to do it is in public space, where maybe in specific areas where people move and then when they see these ideas and it's in urban environment, ideas for urban environment, then it's a good place to interact with people.

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39 Or for example if you want to do behaviour change in in sorting waste, then if there's the instructions on how to sort waste, if the instructions are in your mailbox, then they don't work there. The instructions need to be where you do your sorting of waste or under your sink or something like that.

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40 So coming back to your question, Digital Nudging can definitely help, but then it has to be very specific in a very specific good place. But with social comparison also, so it has to be in a place where people actually make the decision. If it's like a background information, like somebody's having a lunch and then they scroll in a telephone and it says maybe that average Estonian does this and this, then it's not something that maybe they register or even just scroll past, but when this information is in, uh, in another form then or in a in a specific place where you want people to do something then then it helps.

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41 For example, maybe I do this sometimes. It's when I need my colleagues to answer me a survey, then I usually invite them, send out big circular email like please do this and this and then I add in the last sentence that on average it has been known to take less than 30 seconds to fill out this survey. So you kind of like kind of like influence already, like it's not going to take long. Others have done it and they have been really successful.

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42 **P1**

Yeah, I think that that that's a valid example.

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43 In my research on this topic, I came across the various kinds of nudges, like some nudges, they prime people towards a decision making before they are making those decisions.

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44 Some nudges are there during the decision making process, as you talked about.

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45 There are also nudges that, after the decision has been made give a Feedback to people like basically when you receive your bill for energy and then in that instance with the bill, if it tells you that your energy consumption has been 20% above average or that you can make this much savings if you switch to some other kind of (…) like on the basis of their consumption pattern if they change something maybe a bit. So do you think like these Feedback nudges can also be useful given your experience?

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46 **P2**

Umm. Personally I don't know, but can you give me an example of what type of nudging primes somebody to do a the decision, on top of your head?

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47 **P1**

So priming would be also something like goal setting, where you advertise that something like they have these vegan Thursdays for example, where they prime people to don't not eat meat on Thursdays. And so some people follow it. Some people don't, but that's like before they're making that decision you are priming people or setting a goal for them. There could be an example.

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48 **P2**

All right.

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49 Well, I think I can remember some examples from let's say some, um, ride sharing applications that when you finish your ride or there's a thank you for choosing an environmentally friendly mode of transportation. You saved 0.2 kilograms of Co 2 by choosing this option.

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50 But I don't think I'm the right person to say if this type of Feedback is for this specific example is an influence on me or somebody.

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51 **P1**

In your own experience, do you think that makes any difference to how you would next time make a decision? If you have this information that you can potentially save 0.2 kilograms of Co 2.

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52 **P2**

Um, well, I think I don't know. Maybe it does, but I work in this field, have been working for years, so I know that for example if I use a ride share, it's not the number or the impact, it doesn't really mean anything unless it's like an additional activity that I do. But if I know that I have actually replaced something I that I usually used to do, then I can like be proud of this type of Feedback. But let's say, but I still like have a private car and I maintain and do all of the stuff and ride around a lot in it, then doing an additional ride in some ride sharing app isn't like an environmentally friendly action. If I know like 99% of my impact anyway comes from a comparable thing, but that is that is me.

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53 I'm not that partial or impartial to evaluate this type the stuff.

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54 **P1**

Given the social, economic and geographical situation of Tartu and Estonia in general, what kind of challenges or enablers do you see in using usage of digital managing by cities?

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55 **P2**

Ohh I still think that there's so much more to do than just Digital Nudging. Digital Nudging has to go hand in hand with all the other actions, whether it's like actual investments, the redesign of urban structures. Also, other communication actions and then when you have the possibility or it's easy for people to do the sustainable decision, then this nudging is something that can do the final 5 to 10% of the effort, but usually the 90% of the effort is I think maybe done somewhere else.

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56 Ohh, when I look at it on municipal level at least.

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57 **P1**

Yeah, I think that's a very crucial insight that a lot of times gets missed because even places where they are successful nudging pilots, there may be like other factors regarding to the existing infrastructure that enables that. And do you have any other additional insight or recommendations for this research?

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58 **P2**

Ohh let me think. I don't know.

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59 Uh, I don't have good examples like positive examples, but I do know that, for example, in Tartu city we have the bike share system and we also have our bus lines, so our public transportation is basically buses and public bikes, and to be honest, I haven't used the bike share for quite some time, but I think the user interface and the way to join the bike share and the user interface is not the best experience. It's not the easiest thing to do on comparison.

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60 For example, there is the bolt app in in Estonia and in Europe which combines quite a few different services in one place, and it's difficult for us to compete with them. But also, let's say our bus lines, our bus network in Tartu has been updated like 5 years ago, so it's pretty up to date and can provide a very good service for our people.

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61 But if people would like to try out the bus, or if we do a campaign like, please try a bus, then it turns out it's very difficult for people to, who have never ridden a bus, to actually buy a ticket or get the bus card and add some money on it, or buy a monthly pass. And it is difficult and also be we have provided or created an opportunity that you can swipe in the bus with your bank card; just do a swipe payment and you'll get an hour ticket. But most of the people don't even know that. So it's very difficult.

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62 So the buses are really good and people know that buses are good for the environment, but there's the small gap in between on how do I get on a bus and how do I pay for my fare? And do I have to go into some website and talk to city government and copy some bank accounts? Where do I even get the red card from?

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63 So I think that is something that if it were much easier than it is at the moment, then I think we would have more, more bus riders anyway.

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64 **P1**

I think when you talked about the Bolt app, one of the examples of Digital Nudges could be that if by default if you open that app or Uber for that matter and the first option that you have is an electric or uh more renewable or environmentally friendly option so that could be an example.

65	My last question to you would be, do you see any ethical or privacy concerns associated with Digital Nudges?
66	**P2** Um, I think like Amazon or Netflix service, then the payment system, they are kind of like Digital Nudging, aren't they like, “We give you a free month in the beginning, but to get this 3 months you have to give us your bank details and we are first of all, counting on the fact that maybe you like our service but on number 2, we think that maybe you will forget to cancel our service so it doesn't automatically cancel and you have to cancel it yourself.”
67	So that is I think it's like a Gray area of ethics. Like, is it really ethical to um to count on people, to forget to cancel your service and let's say people don't use the service for 2 months, but they have paid for it and the service provider knows that “quite a big part of our clients don't actually use our service, but they pay for the opportunity to maybe open up the app.”
68	**P1** Yeah, I think that's a right example. Also, that's a lot what nudging is about, the inertia that people have for changing something that already exists.
69	Do you have any other questions or other any additional insights before we conclude this interview?
70	**P2** Umm, no.
71	**P1** Alright then. Thank you.
72	But it was a very fruitful and insightful talk for me.
73	Thank you for the time.

7.4.6 Leuven

1	Leuven, 04 April 2024
2	Interview Text
3	**P1** So my first question would be, can you briefly describe your role as a city administrator and tell me how it intersects with efforts and goals to reduce emissions in your city?
4	**P2** Yeah. OK, so I am a policy advisor on smart-cities. So for Smart City Leuven I do (…) yeah I start projects and work around policy in regards to the use of innovative and connected technology in the public space. So we focus on installing and implementing big data, real time data, IoT, among others in the public space of a city. Meaning, I don't work on projects that revolve around things that happen in City Hall. So classical eGov and things like that is not what I do.
5	So we focus on the management of the public domain, for instance, air quality indicators for greening of the city, water management, parking management and all those kinds of things that are happening in the public space. And so the public space of a of a city which is a for a large part governed by the local administration.
6	**P1** And can you tell me about some of the initiatives or strategies that you your team has implemented or are considering to address emission reduction?
7	**P2** Yeah. So we are specifically focusing on the reduction of emissions and it's called mitigation, I think, yeah. Um, I am not very much um, a busy working on projects, but on the other part adaptation part we are focusing on greening the city, deep paving, bluing the city.
8	Also trying to (...) we have a river that runs through the city which is paved over and trying to open that. And so in that perspective, we have a few European research projects running that are focusing on how can we implement re-greening and deep pavement in the best possible manner. We have a life packed project. We have a horizon 2020 project

called Just Nature. We have a horizon 2020 project called VARSITIES which focuses on the same concept of the adaptation and there from the smart city perspective that I work in we do monitoring. So we use sensors to I'm to check the local Climate, so temperature.

9 We also focus on air quality and we also focus on reduction of noise and also focus on water infiltration. So from my part of the job, so we implemented sensor networks, one of the networks we were we implemented together with the KU Leuven, the University in which you partly follow the master.

10 So it's called Leuven Cool. It's a citizen science project which we at 120 places in the city public space and also gardens, measure temperature and so we have a research team of PhDs in the university that are using the data to refine a model on the coverage of soil and the impact it has on the urban heat island effect. So this is to be clear, not focused on the reduction of emissions, but is focused on the Climate adaptive part.

11 Yeah, but also taking into account that if you Green the city and if we do more, if we plant more trees and stuff, we will change the Mobility and we will also contribute to the lowering of emissions in the city.

12 So that's one part we use all this data to monitor the impacts of these measures. And then we have one of the 100 climate neutral and smart cities of the European Commission. I don't know if you know the program?

13 **P1**
(nods)

14 **P2**
You know. OK. Yeah, great. So and there we focus of course on reduction of emissions. So and there we have a project (...) we are trying to implement a digital twin on this Climate adaptive measures and nature-based solutions to be able to prioritise and implement more efficiently the degree, the greening and the pavement of our city.

15 And that's also European project that we are doing and this is one of the lighthouse projects there and there we will need a lot of data coming from local data sources to run all the models to see what the best impact would be to plant the tree or plant 50 trees or just do it somewhere. So in some places do it another place and stuff like that.

16 So, um, I think that's the most important part on the Climate and durability and sustainability approach because we do a lot of other projects also but not directly related to sustainability.

17 **P1**
OK, um, uh, coming to the main topic of the interview, are you familiar with the concept of Digital Nudges?

18 **P2**
I am familiar with the concept of nudges itself. Um, so that I'm familiar with that. The concept of digital, not just I'm not really familiar with, I can, but I can imagine what it means.

19 But maybe you can explain me that I that I have the same idea as the same definition as you have.

20 **P1**
Yeah.

21 So it's basically the same I idea that we have with Nudges applied in a digital context with the UI and the UX of digital environments being tailored or constructed in certain way that people are not towards a certain choice. So choice architecture in a digital environment. So I guess, uh, that's familiar to you, right, okay?

22 **P2**
Yeah, yeah, yeah, that's familiar to me, old school marketing and make the button Green. Don't make the bottom blue stuff like that.

23 **P1**
Okay.

24 **P2**
Ohh Anshul, your connection is lagging. Yeah, because I didn't hear you anymore.

25 **P1**
I can hear you very well. Can hear me?

26	**P2** Yeah, maybe I'll put off my camera. That would be easier.
27	OK, yeah.
28	**P1** Yeah, possibly. I will do the same then that's easier.
29	**P2** Yeah, okay great.
30	**P1** OK, so my next question would be what are the ways in which your city digitally interacts with citizens? In other words, for which services or entitlements offered by the city do citizens use the Internet or electronic devices?
31	**P2** Yeah. Wait I'll quickly look up some numbers (…) Wait a second up (…) And then I can give you some numbers (...) Alright, so yeah, we so we enter, we interact on different ways with our citizens.
32	So um, there is no wrong way to connect with us, so we're not focusing mainly on digital or focusing on digital and personal. So people can pause by City Hall or can try or can do everything online. And where I was looking for the numbers, but I'm not immediately finding them (…) no, I can't immediately find them.
33	So we have different ways of communicating, but of course the Internet takes up a whole part of the of our contact and communication with um, with our citizens, of course. So they can do it in real life in City Hall. There are also places, specific places in the city where they can have ask questions also, which are more like neighbourhood friendly or neighborhood based.
34	And then of course we have a responsive mobile website where you can contact or ask for services and stuff like that. That is done run digitally, yeah.
35	**P1** Okay basically the idea to ask that question was to know where are the potential contact

points, digital contact points where an approach to approach of digital nothing can be applied.

36 Do you know if the city already follows any Digital Nudging approach towards the UI or UX design of services, portals or digital environments as such?

37 **P2**
I don't think so that we do digital much, but I do believe is that we try to, so we try to implement service design in our design of wire frames and our UX&UI.

38 So I think that the basic concepts are already taken into account. Um, but the real influencing or nudging of people on digital way, I cannot recall any project that focuses on that. Yeah, no.

39 **P1**
And is there any other specific Digital Nudging project that you can think of which is currently being used?

40 **P2**
Well, we had a project on nudging, but it is not exactly Digital Nudging. So but if you want to know more about that you, I should rather focus bring you towards our communications department, who are in control of all the contact points with the citizens, so maybe that's better, but I don't know if they would call it Digital Nudging. I don't think so.

41 **P1**
Um, let's talk about some specific kinds of nudges. So one of the most one of the most successful nudging techniques has been the use of Default Rules.

42 Um, so can you think of how defaults can be used in the design of digital portals or online forms which would be useful for emission reduction?

43 **P2**
I know that they are now trying to group, so we have a lot of primes and subsidies that are being that are being given towards people that want to cut emissions and live in a sustainable way, and they are now trying to group them also digitally.

44	So meaning that you can have that you that you for instance when you apply for one of the subsidies that you can get on a could get a like in like the like the Amazon you are interested in products you bought a product like this you should you could be interested in products like this. I thought that they were trying to implement that also, so the bundling of all these kinds of subsidies and primes that you could get, you apply for; to not have them scattered everywhere around the website and the web portal, but the to have them grouped.
45	Yeah, but specifically focused on cutting emissions, Digital Nudging. Well, yeah, that should be mainly focused on those primes and subsidies.
46	**P1** Hmm, so basically by default, offering certain subsidies or certain ways of payment, is that what you mean?
47	**P2** Yeah.
48	I'll have a look. Wait a second. Maybe I can find something here.
49	This is a small (…) if you put on your camera again (…) Can I share something here?
50	OK, so uh, here you see this one? (shares on screen: www.hierdringthetdoor.be)
51	So this is the city website. This is a very strict design. We can't like play with buttons or stuff like that, so the strict styling. So this is about the paving and greening the city.
52	So we are, that's what I was talking about. So how can you do it yourself? So and then we gathered all the different things that you can ask primes and subsidies for. And then also we implemented the “you're not alone, we're also doing it” so in this what are we doing? how are we showing the way? You're not alone. We are also doing it and then of course, OK, why is it important?
53	Ohh ohh well and so if you would go like this like you say prime for greening your facade of your of your house and then we would [tell] what you have to do, which stuff do you need, and then you can ask the subsidy prime. So this prime and then I can start my flow and then I enter and then of course we are entering this is a I think it's in in Germany almost the same so we have a different layer of government. So this

authentication system that you see here that is a is a federal and a Flemish system. So we are not designing those things ourselves. We are reusing the building blocks that are already there by a higher government, and then you can start the flow.

54 **P2**
So this is really easy via an app. This is via a identity card and a smart chip that is in the identity card or you can have a specific app that you have installed for other authentication authorization.

55 So, to say that we have a big impact on the flow and the UI is somewhat difficult because we use building blocks that are not ours.

56 So we can change like colours and themes, but you can't really like change the whole digital setup and stuff like that. So that's an example I can give you.

57 **P1**
OK, um, there's another very popular Digital Nudging technique which is social comparison, where people's performance and indicators are compared with others, maybe in their neighborhood or the city average. And that has been also proven to be very effective.

58 How do you think that can be used for emission reduction? Can you think of something?

59 **P2**
I'm definitely sure it can be used. And yeah, I'll show you with that. OK, I'm going to show you again. (shares on screen: www.participatie.leuven.be)

60 I can send you the links if you want so I'll show you this. This is an online platform that we have for participation. It's called “Leuven, maak het mee!”, so it's called Leuven, We make it together. You see, it's like almost 9000, more than 8000 users.

61 So we do projects in that these are digital web project and in this for instance, we asked people so which places in the city would be interesting to Green to depave and to Green and there you could see all the people that were participating. You could see all the different steps that we had and all the ideas that people come up with and they could upvote it down vote it and stuff like that. And so it was a kind of an of an inspiration also for them. And so I'm going to see a here this jury selection. So they had a lot of, I

think about 180 ideas. So a lot of ideas everywhere in Leuven, so people could watch that they could read it.

62 And that's something that is similar to, but if we would really do project, which we would compare one neighborhood with another neighborhood it sounds really good, but you have to really keep in mind that the city government is there for all people and we are not here to judge other people or to compare people or to say this street is better than the other street and something we have to be very careful for.

63 So I don't know if we do that kind of project in which we do really social comparison, but this is a but this is an example of how we, yeah, we have this is maybe not strictly Digital Nudging but um but it has a digital impact and yeah. When people look at each other's projects and stuff like that, so we can we do a lot with that also.

64 So that's, that's another example I think, yeah.

65 **P1**
And do you have any idea about the Feedback nudges where people are given certain Feedback about say, their energy usage and that kind of nudges them towards a certain behaviour?

66 **P2**
Can you be more specific? Because that's a really broad, yeah.

67 **P1**
So often in certain areas, what they are using, for example, is, that they give certain Feedback about whether your energy consumption is above or below average, or is it within recommended limit and it can be maybe with a smiley or like a sad face.

68 And sometimes that nudges people towards thinking whether they can cut down on the end.

69 **P2**
No, we have no project like that. No, no, no, no.

70 **P1**
Can you think of like if this kind of approach can also be useful in emission reduction?

71 **P2**

I don't know, for me it's more gimmick than something that is really part of a larger thing.

72 Also, the problem is that you would have to have control over the data to see how people would compare, because if people would really start to be using it, then you have to deliver them with correct information and not only just like a like gamification. We have a (…) wait a second I will see if I can find it. So you know "Mijn TuinLab"? It's my garden laboratory. It's a project also of KUL. I'll put it in the chat. So it is a I'll share it with you. Well, I think I'll be sharing it now. (shares on screen: www.mijntuinlab.be)

73 **P1**

Yeah, I can see the website.

74 **P2**

So yeah, so it's a citizen science approach in which you register your garden so we can see all the gardens in our neighborhood. So have a look. Woof takes a long time to adjust.

75 So and then people like given so if like 44,000 gardens that are mapped people can give information about which plants are growing there and stuff like that and they can also search for advantages of implementing certain(…) So it's a project of KUL and they also do kinds of like these, like these small little, nudges in which they use a lot of people and that do things and then you can you can benchmark your garden with other gardens. This could be really should be really interesting I think for you, I don't know if you heard about it?

76 **P1**

Yeah, I didn't know about this before.

77 **P2**

This is really an interesting thing I think so.

78 Look, you can also calculate your garden score and then you can look at the all the different you see all the different scores towards it. So they use a lot of nudging techniques in the setting up of the platform, which is really interesting for you to have

a look and I happen to know the professor at KU Leuven who is working on the nudging parts. Do you want me to send the information? His contact information.

79 **P1**

And yeah, that would be nice. I would go through the links that you sent and like if there's something that can really be directly put into the research and uh results, then I think interview would be nice so.

80 **P2**

So I'll stop the sharing and I'll put his name. So he works for the institute that is also, um, doing a partly your master. Then it's called Peter and he's working on my garden lab.

81 **P1**

I think I think I've heard of him when I was there.

82 **P2**

Well, and I also work together with Peter on our nudging project. So I know if it would be interesting for you to hear about, but it has nothing to do with the reduction of emissions. So I don't know if it's relevant for you.

83 **P1**

My next question to you would be, considering your expertise, which sectors or areas do you think can benefit most within the city from implementation of Digital Nudges as far as emission reduction is concerned, can you provide examples for emission reduction? Yeah.

84 **P2**

For emission reductions, well for emission reductions, it's really clear.

85 So it's our department of sustainability that is responsible for the reduction of the emissions. They have a Climate City contract which they work together with an independent organization called Leuven 2030 and they together with a lot of other partners in Leuven are trying to implement a plan to make us a net zero in 2030. So this is not only a thing for the city because most of the reductions that we can diminish the most things that we can do is has nothing to do with the City.

86 Yeah, it has to do with the private property with transport and Mobility, with the isolation and energy efficiency of housing. So the city itself has not a direct impact on that. So we have to work together with a lot of other players like the university, like homeowners and others. So that's pretty bigger than only looking at the city. This is a challenge that is not only there for the City, you know, would be impossible to, to expect that only government can make sure that the emissions are reduced. It's a thing that business, academics, private home owners, et cetera, all have to do together.

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87 So sustainability, our Department of Communication, of course could be that could be really interesting. Um, yeah, I know that there were talks about the concept of smart contracting so that you could do like really small micro contracts, like saying I'm going to de-pave my garden or stuff like that and that you could then benchmark it to other people in the neighborhood. But I don't think that the project ever got a grant. I don't think that they found the necessary finance to start it up.

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88 **P1**

Okay um, what challenges or barriers do you foresee in implementation of Digital Nudging for this matter, emission reduction?

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89 **P2**

Well, I don't think that you can only do it digitally. I think you have to change people behaviour and you don't change people behaviour by giving a smiley or not a smiley. For me, the Digital Nudging is like really a small part of something much bigger. So changing people's behaviour only by digital means is I think it's impossible because that's not the influence you have. It's not big enough, I think, for doing big things, huh?

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90 And so that's first. So it has to be part of a bigger approach that also has to change people's behaviour in real life and through the impact of media and role models and your social environment that has an impact on you. So it should be part of something of a larger approach. That's the first one.

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91 The second one is, is that government communication is tied in different rules and we use a lot of different digital building blocks coming from other governments, so we don't have a real we don't have a real good impact on our own digital flows. Did you see it when I showed you the, the, the, the prime that you could ask that we were switched towards the Flemish Government for authorization and authentication?

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92 **P1**

Uh huh.

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93 **P2**

So you can change that because it would be totally stupid if every city in itself would start building their own authentication engine. So we reuse one of Flanders of the higher government, but we don't have impact on the way they design their UX&UI. We can change some colours and themes, but that would be it.

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94 So that's a second big thing is if you're thinking about governmental services and things like that, that you have a lot of rules and a lot of already existing building blocks that are not owned by the city itself. So it would be a real big challenge to change that. It would be really interesting. It can be done, but that said, I think that's the challenge also.

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95 Yeah and third is, I think that a lot of the decisions that people have to make to cut emissions and to live in a more sustainable way are not tied to choices they make in during a digital journey. So you can help with nudges and small changes, but I think that the, the, the bigger picture is about the choices that you make in your life. What you buy in the supermarket and the way you transport yourself and stuff like that.

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96 So I don't know. And nudging can definitely be a part of it, but I wouldn't, put all my money on that horse, I would put money on different horses also.

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97 **P1**

Yeah, I agree with you cannot be in a silo approach. And yeah, do you see any ethical or privacy concerns associated with the use of Digital Nudges in this context?

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98 **P2**

The first thing that you said like from the default choices, now you have to watch out with the default choices that you have GDPR regulation that states that people have to be free to make their own decisions, that they can give informed consent.

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99 So putting stuff in default and making choices for them, I would not know if it would hold up against the sometimes very strict GDPR regulations that you know I am sure you are aware of the GDPR in most European countries I suppose. So that would be that, that would be a first thing.

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100 So I think that that's yeah, there is a lot of there is a lot of regulation and legislation in Europe that is focusing on the this informed consent principle. So like making people by default choosing some options over others, I don't know I'm not an expert, but maybe that could, could bring some problems.

101 **P1**

Is there any other additional information or insights that you would like to share about emission reduction or did the use of Digital Nudges?

102 **P2**

Well, I think that emission reduction is such a big, big, big, big, big subject cause it's about isolating your house. It's about the way how you heat your house. It's about how you bring freshness in your house during summer. It's about Mobility. It's about the way we build houses. It's about how you govern your, so it's a really big and it would be much more concrete for me if you could give me some a few examples in which you could do this Digital Nudging, like for instance making people choose a green energy supplier for instance of provider.

103 So that would make it much easier for me, and I think for readers of your of your of your thesis to have a clear grasp on, on what did this exactly because the concept of the emission reduction is such is so big you can see it's in a lot of governments are really struggling with it because it it's about the way we live. So yeah, I will try to focus on, on, on some parts of it, for instance making durable and sustainable mobility decisions for instance, and how you could use nudging in that would be would be clear for me than to say how can we cut emissions by Digital Nudging.

104 For me, it's really very theoretical and not practical at this moment.

105 **P1**

I think I think that's a valid criticism, because unless we basically narrow down on one particular sector, I think it's very difficult to generalize.

106 **P2**

I'm really having trouble to answer your questions because it's very vague for me. If you would have another approach, like for instance, how can we digitally nudge people towards a sustainable choice in mode of transport, for instance then it would be much

clearer for me also to point out some of the interesting projects and stuff like, because now it's really big, big, big.

107 Yeah, to make it implementable, should be a bit more focused on and I don't think you should be worried about making a choice. So like it's all about it's all about transport modes. It's all about construction, and it's all about energy supply to the housing and I think these are the 3 main contributors to the to the emission at this at this moment. And then food, of course. So it could be an interesting also how can we digitally nudge people to make healthy food decisions?

108 So and then you go into an all different ball game like how can you make sure that people choose local ingredients instead of ingredients from other parts of the world that are flown in? Or how can we make sure that they for instance try to recycle as much as they can or don't have leftovers in the fridge and stuff like that makes it a lot more comprehensible?

109 **P1**
I think in there has been a pattern in in the interviews that I've done so far is that of the interviewees, they do concede that at present there is no Digital Nudging approaches in uh and that they know of in any of the services.

110 **P2**
Actually there is a lot but maybe your question is too vague. If you would focus, for instance, on how to make sustainable transport and mobility choices, I'm sure that you can find some of the projects that are really focusing on the, so maybe there are, but it's very difficult for me to find because the, the emissions thing is so big.

111 It's such a (...) it seems like such an unsolvable problem. So yeah, yeah, yeah, I know that that there is a lot of apps, a lot of apps in the app stores that are focusing on the reuse of food, making local ingredient choices. For instance, like focusing on when are certain vegetables are produced here and harvested here and stuff like that, like. I can't imagine that they are not focusing on a good UIUX experience in promoting their healthy choices. So stuff like that should be available, I think.

112 **P1**
Thank you so much for, especially for the criticism. I think it really helps me because it's just a master thesis and I don't have too much time to go deep into things, but I think

especially in the section about further research, there could be really interesting recommendations that can come, especially from the insights that you give.

113 Do you have any final thoughts before we conclude this interview?

114 **P2**

Ohh yeah, what I just mentioned that was maybe you should have a look at the pie chart of what is responsible for the emissions. And I think that you can will easily see some really focused things like mobility, energy and house and stuff like that. And then focus on that to find some projects. And I think that maybe it would be a lot easier for you to find some relevant things.

115 And then the last thing that I know, but this is from a some time ago my previous job where I worked is that if you're looking for good Digital Nudging and digital UI/UX solutions, I think, but it's a long time ago, I think gov.uk is the way to go. So they did like a whole styling guide to UI/UX for all government agencies in the UK and they have like a like a kind of a UX principal guide book, but it's from a it's from some time ago and I always thought that they were (…) I'm going to take a look at (…) how was it called again (…) The Gov.UK design system.

116 I'll put the link into the chats and so they have like a whole style guides and this is really like focused on governmental communication between a really strong focus on this good look and feel, the easiness, a good digital experience and it comes it comes really close to the concept of also nudging people because with the good UX and UI you can really like guide people. So maybe that's interesting to see, but I'm not working in that field anymore so but I remember from like 8 years ago something that they were really like the that like the Bible of governmental design of digital experiences.

117 Well, all right. So, Anshul, a lot of success with your work. You have a good thesis and some good exams, OK?

7.4.7 Stockholm

1	Stockholm, 10 April 2024
2	Interview Text
3	**P1** Can you briefly tell me about your role as a city administrator and how it intersects with efforts and goals to reduce emissions within Stockholm?
4	**P2** Yeah. So I work at the at the City executive office within the City of Stockholm, where I'm a strategist. I work mainly on the climate actions and our target to reach a Climate positive Stockholm 2030.
5	And ohh yeah, I can also just mention that we are like (…) the City Executive Office is like the headquarter of the municipality. So we are about 3 people working on climate actions. Uh, so it's like the strategic level and all the rest (…) I mean, my colleagues at the Environment Department and the track-Traffic Department and so on throughout the city is those that actually doing a lot of work.
6	So we are just a small group of people working at the City's executive office them and I'm working with mainly the mission within the European Union for climate neutrality and yeah, coordinating the city towards the goal.
7	**P1** Ok. What initiatives or strategies have you implemented or are considering to implement to address the issues of carbon emissions?
8	**P2** We've worked, so the city of Stockholm adopted the first climate action plan back in 98, so it's been a long work of emission reduction for…yeah, I would say maybe even longer time than the 90s.
9	So from the beginning it was more of understanding the system, the system measuring like the emission emissions and see what's most important. And during the 80's and 90s it was the district heating and the electricity production that was the most relevant to work on, and also retro-refitting of buildings and so on.

10 For now, the district heating system, for example, is almost emission fossil free. Ohh, so now it's more of working with the transport sector and also reducing plastics within the area.

11 **P2**
So yeah, and was that an answer to your question? No, not really. Or was it?

12 **P1**
Ohh okay, I think yeah.

13 Is it right to assume that the mobility sector and the waste management sector are the biggest contributors of greenhouse gases in your city?

14 **P2**
Yeah.

15 So the transport sector is the responsible for like 40%, 50% if we add working machines, such as the construction machines. So it is really the most important direct emissions to work on.

16 And then we are using waste incinerations and yeah, burning the waste and use it for the district heating and uh, about 25% of our emissions connects to the fossil plastics. So yeah, that means reducing plastic in society. I mean, we can work with sorting. So now for example, we are building a large scale sorting facility that can sort out plastics, metal and food waste. But still, since the market for recycling of plastics is not that very well-functioning. So yeah, we need to work more on reducing the plastics in society. And for the municipality, its maybe not the core work, but that's connected to our emissions really much.

17 **P1**
And what about the heating at people's houses? Is it usually a green or renewable source of energy that are being used by default?

18 **P2**
Yeah, about 80% of all the buildings in Stockholm is connected to district heating and the district heating is based on waste incineration and bio fuels. So it's just that very small amount of fossil fuel during the coldest winter days.

19 **P1**

And I'm coming to the main topic of this interview. Are you familiar with the concept of nudges or Digital Nudges, and if so, can you just give us a small explanation of your understanding?

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20 **P2**

Um, I'm familiar with Nudging. But I'm not sure if I'm familiar with the Digital Nudging, so we can start with the nudging concept. So I understand it as a way of like trying people to make changes without like (…) yeah, make changes in a more sustainable way without really making a choice.

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21 So for example, like you can have like opt in opt out where people don't have to choose or you can use smaller plates at the buffet for people who don't eat. Ohh yeah, so to reduce the food waste for example.

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22 **P1**

So basically, Digital Nudging, if you apply the principles of nudging in the digital environments in the user interface design, or the design of your website, your online forms things like that.

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23 So that would be a good example of how Digital Nudging works. Basically the same thing in digital environments, yeah.

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24 So I would ask you like what are what are the ways in which your City digitally interacts with the citizens? In other words, what are the services or entitlements for which citizens use the Internet or electronic devices?

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25 **P2**

Connecting to the city services or? Yeah.

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26 So now you're moving out of my expert field. I guess a little bit. So you have to bear with me.

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27 Ah, but a we are (...) So, I mean the citizens use the Stockholm website for municipal services like applying for building permits or queuing up for childcare and for NGOs, that applies for support or money in some way, for example. So it's like more of like e-services for the citizens.

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28 Ohh and otherwise it it's mainly connected to information I guess. Ohh so connecting to the Climate actions is more (…) It's more of information rather than services maybe.

29 **P1**
So you use website to give information to the citizens on how to what kind of actions to take?

30 **P2**
Yeah. But I would say it's a bit traditional way of working and traditional way of sending information rather than trying to use the Internet or web services in other ways.

31 **P1**
But does your city follow any kind of nudging approach to the design of these user interfaces, or of services or portals for online service communication with citizens?

32 **P2**
I don't know.

33 **P1**
I mean there there's not a known protocol like that, right? Like you haven't, you haven't decided as a as a city that you will follow this approach of nudging?

34 **P2**
I don't think so, but I'm not sure if like people working with the website if they're, but I don't think so.

35 **P1**
OK, so as far as Digital Nudging is concerned, according to literature there is 3 main domains in which it can be applicable.

36 First is structuring of the choice environments. For example, making something default in the online form from which you have to opt out if you do not want it.

37 Second, there is presentation of non-personal or contextual information. For example, if you are filling a form, then you have multiple choices, then maybe in the bracket it can say that 80% of the people go for the green option so that you are nudging people into following what everyone is doing.

38 And then there is the 3rd which is the presentation of personal information. For example, giving a Feedback on your energy consumption along with the electronic bill that you get and telling you about where you can cut down, or if it's more than the average. Or things like that.

39 So the first one. Defaults, they have been proven to be very effective in a lot of studies. Most of the studies show that through restructuring of choice architecture of online forms or portals, citizen can be nudged towards more sustainable decision.

40 What are your thoughts on making greener choices the default option when it comes to providing these services by the city?

41 **P2**
I think it's the like kind of correct way of working because when we're thinking that everybody needs to change their individual behaviour, it's like everybody needs to change and we need to inform.

42 But if you use the opt in opt out concepts, it's more or less that you have the possibility to opt out if you want to. So that it's kind of the informed way of uh, of changing something. If you want so you can do it, but the city can choose the most sustainable and then if you want to change you can do it so.

43 And I was thinking that it is municipal companies that is responsible for the waste and for the district heating, but we don't have any municipal energy company so that it's something that is, um, different from other cities in Sweden at least that have their own energy company.

44 Uh, but I know, for example, that we have a quite large scale pilot project in, in an area where they tried to inform the citizens with an app based on their waste management about it. That is something, and I think that they are actually using some kind of nudging. So when you presented I realised that that I think that could be one example of what they do, because there is some way of like “you are better than your neighbors or this building is better than the neighbor building or things like that”, some kind of nudging.

45 **P1**
Can you think of some way in which the default nudge can be used for promoting more sustainable mobility and transport?

46 **P2**

I mean, it could be when you're booking (…) it could be when you're booking some kind of travelling. So now you need to like know by yourself, which is the most sustainable way of travel?

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47 Like in Google Maps? Sometimes like when you're looking for the best way to move from A to B, sometimes you can find an E scooter and they say that's faster than the public transport. And you could have something like that maybe about Mobility [emissions] if you could have something that highlights timing, how long time things take? I guess.

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48 **P1**

Do you think it would be possible for the City or maybe some other level of government, to kind of have a guideline for the ride sharing apps or something like Ola or Uber? It's so that by default they give the greener option if like the green fuel electric car would be the default and the citizens can choose because a lot of people they just call the first thing that's available.

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49 So do you think it’s possible?

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50 **P2**

But maybe that's not for the city to create, because I don't know what kind of app it should be like or because all the apps that Stockholm has created is now like closing down because of they're not good enough. So it's better to use market apps rather than in municipal apps, so maybe it should be (…) I mean, for example, when you are choosing in ecommerce flights options, sometimes it's like you can you can pick this one and it's fossil free and it's the same price as the regular ones. Or you could I mean, you could have the first, the first one is the fossil free transport.

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51 So, and I mean that's relevant, but I'm not sure that's something for the City organization to create rather than we can embrace it.

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52 **P1**

How does it work in Sweden with the powers of municipality? What is the division of power between the central government and the city, and maybe the regional?

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53 **P2**

So the municipal level in in Sweden is responsible for schools, elderly care, the welfare

social welfare. But not hospitals, that's on the regional level, hospitals and emergency care.

54 Uh, and the public transport is also on the regional level.

55 The municipal level is responsible for planning, so we have an urban planning monopoly, which makes that we are responsible for all the building permits and the planning of and I think that's quite unique in a European context, I'm not sure if it's like that somewhere else, maybe in Denmark or somewhere in the Nordic countries, but that's so, so the municipal level has quite large responsibilities in Sweden rather than, yeah, compared to Germany, I guess where it's more the regional level that that creates much more.

56 Ohh, and the national government is responsible for (…) Or yeah, I can also say that the income tax is also a municipal um responsibility. So about 2/3 of the income tax is for the municipality and 1/3 is for the regional level.

57 So the national level is more responsible for laws and policies.

58 **P1**
Given the specific circumstances of Sweden and the Nordic countries, which sectors do you think would be best for the municipal level, for the cities that have committed themselves to Climate neutrality, to look, look into when they try to identify ideas for Digital Nudging to incorporate in their City plans?

59 **P2**
I think I would say that it's relevant to think about the easiest subjects. Always, like energy bills and also I mean, on the smart city concept was mainly on like can we show if people are using energy or water and kind of resources and maybe waste management is something like that as well but I would say that's the easiest way.

60 Yeah, but maybe it's also (…) I'm thinking now because when energy is expensive, it's also relevant (…) so for example, when the energy is expensive, I can now look at the prices in my phone to see like should I start the washing machine in the middle of the night rather than during peak times? So I think that people are more or less interested in not just based on like if it's important or not.

61 So like 10 years ago, I know we had some project with digital screens in people's entrance halls where they had a Penguin on ice and if you spent a lot of energy the Penguin was sad. I mean it's like a digital animal in your entrance and I'm not sure if people like changing the behaviour based on the Penguin. Uh, but if it's like more expensive, people kind of start to react.

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62 So it's yeah, I think that can be relevant to think of if you want to.

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63 **P1**
I think that's a very perfect example of Digital Nudging, that Penguin on the ice.

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64 It's a visual you can directly connect it to your (…) It is it like connected to the digital meters that people's houses or how do they?

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65 **P2**
Yeah, it was. But this was just like an example of…When people started to talk about, like, how can we, how can we inform people so that they can be more aware energy consumption and like how can we make them care about the penguins.

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66 But the result was that most people didn't care, they care for like some days and then it was just the screen. So I guess that's my reflection that if it's expensive, people started to actually change the behaviour.

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67 **P1**
So maybe if they can get some Feedback which shows how much money they are saving, if they are not doing it, maybe like something like they take a benchmark of how much is their average over the last 2 years and then on the basis of that, if there's some kind of Feedback that shows ohh you are on track to save this much this month. Something like that might work?

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68 **P2**
Yeah.

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69 **P1**
What are the challenges or barriers that you foresee in implementation of Digital Nudges for emission reduction?

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70 **P2**

I think one challenge is to actually find ways of actually changing those emissions that actually may change, like those that we were talking about Mobility, for example, like how can we create nudging that actually change how people travel? And trying to reach out to those that not only our interest by themselves or not, always take the bike or. Ohh so yeah, I think that's the main thing.

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71 **P1**

Do you see any privacy or ethical concerns attached with this idea of Digital Nudging?

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72 **P2**

Uh, yeah, I think as long as you kind of use data and say that you (…) I think that you're always need to be aware of the ethical as long as you want to connect, connect data or show (…) I mean, if we want to show like you are better than someone else. OK, so who is the other ones like? Is it a large group enough to not know exactly who is exemplified?

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73 **P1**

Are there any additional informations or insights that you would like to share regarding this whole topic?

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74 **P2**

Um, no, I don't think so. I realised that that that we should work more on Digital Nudging.

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75 **P1**

Do you have any recommendations for further research for this research?

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76 **P2**

Ohh for someone else to talk to or for.

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77 **P1**

Do you have any recommendations for how I should approach this research? What kind of things should I look more into that would be more fruitful for the city administration to get?

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78 **P2**

I think it could be relevant to think of those like energy, those things that was relevant some years ago within the Smart city concept, but never kind of (…) it was so much

	focus on like screens and showing people like inform people and I know there was some kind of lamp that whether Warrior turned red if they use a lot of consumption for example, or a lot of energy.
79	Ah, but that's more like a prototype. I mean, it's interesting to see what actually makes change, but it actually works? Or is it just a smart thing?
80	**P1** Right. Thank you so much for your time. I think it was very like to the point discussion and it was a pleasure talking to you about Digital Nudges and how things work in Stockholm. Do you have any questions for me before we conclude?
81	**P2** Ohh no, I'm and I think it's I'm if you have any other questions or if you just want to add something so feel free to contact me or yeah and I'm just happy to see the result because it is interesting, interesting.
82	**P1** Thank you so much.

7.4.8 Kranj

1	Kranj, 15 April 2024
2	Interview Transcript
3	P1
4	Okay so a my first question, can you briefly describe your role as city administrators and tell me how it intersects with the efforts and goals to reduce emissions within the city of Kranj?
5	P2

6	So as we introduce ourselves, we are the Office for Development and the smart Community where we cover also these Climate transition or Green transition, reporting directly to the mayor because the mayor had a vision to actually go into this mission.
7	And we really want to become and we have quite a I mean quite good chances and we believe we can make it by 2030 because the whole concept that is there we like on one hand on the other hand the paperwork that we did so far in the last year and a half. So the whole research on the Co 2 burden that we need to neutralise as well as the digital tools that we developed in the meantime, the last 3 years make us quite, I would say powerful in order to achieve this goal by 2030.
8	If you have any sub question just feel free to ask but otherwise we have also the let's say the documents that are there and part of that can be also shared with you because we have the tonnage we have the investment that needs to be there. So we don't just, you know, talk by heart, but we need to somehow neutralise 113,000 tonnes by 2030.
9	That means also in the money wise we need a bit more than 1/3 of a billion of euro, so €366,000,000 of investment that need to be done by all the stakeholders for the City or the municipality or the city budget as such, approximately €100,000,000 by 2030 and we are talking about the municipality of approximately €100,000,000 of the yearly budget at the time being. So for this year, next year, yearly budget.
10	P1
11	What are the biggest sectors that cause emissions in your city?
12	P2
13	I know that my heart, they know them too, but traffic for short.
14	P3
15	Waste management and traffic are pretty much, equal contributors to that.
16	P2
17	In Pareto, let's 5 to 6 areas tackled will bring the results in the Pareto effect 80% of the of the goal will be actually successfully tackled with it.

18	P4
19	Yeah, we don't have any heavy industry over here in Kranj, even though most, most bigger cities do. So this was one of the surprises for outsiders. So, when we turned in the document, they were asking us how come there's no industry or bigger industry included in our documents, but we don't have it.
20	Actually we have one company that's included in the trading of the coupons.
21	P2
22	We have a big, we have the biggest, let's say American investment here in Slovenia. So it's a tire company, one of the most important ones for the Goodyear company.
23	I used to work there also for 13 years, so I know that it was a lot of good job done already before, but not because of the of the of the mission as such, but because of the cost on one hand and from of the of the customer. So customers want to have Green tyre as much as possible. So in this respect, a lot of investment was done there also again a big I would think 8,000,000 tires are produced yearly in this area. But as [P4] pointed out, they are in the system of the coupon markets, European and Global coupon market.
24	So all the negative effects that they have, actually they need to neutralise with the coupons that they need to buy on the market. Since part of that is always given on a yearly basis by the authorities, but this fixed amount is decreasing every year, so the rest needs to be actually bought on the market and this is becoming more and more expensive from year to year.
25	So from this respect, I mean it's a bigger, I would say the it's better in the investment for you if you actually invest into the BIT. So best alternative technologies in the industry is such that is at the end of the day, more interesting from the PR perspective and from the brand perspective. And it's also less costly compared to the costs of the coupons that are really going up big time.
26	So in this respect, you are better off and for us, I mean, there's no big chimney there. So no direct pollution. The only bigger problem is of course the energy that is used there 24/7 and part of the smell which is there because of the production as such. But that area is always a bit tricky, but no big car would say chimney of negative effects, not only Co

	2 but some other. Yeah, that's all facts and everything that some neighbouring municipalities around Kranj have.
27	P3
28	So yeah, and regarding the traffic, we need to take into account also the airport.
29	P4
30	Yeah, our national airport is closer to our city than the capital. So we had to take it into account as well. Although it's not in our municipality and because of the closeness and also we have a one of the 2 state highways, the crossroads that goes through our city. So this is something that we had to take into account as well.
31	P2
32	According to the methodology, yeah, it is a bit stupid, but nevertheless it has a direct effect, of course. But you know there's an International Airport here. Half of the flights go to our emissions, let's say. But yeah, then it's different kind of thing, so we need to neutralise that to some extent. But again, Slovenian International Airport is like something local in India, believe me.
33	So it's not such a big deal, but for the number of habitats that we have, of course it's quite a burden. Yeah.
34	P4
35	So the transport, yeah, accounts to about 30%.
36	P1
37	Okay and does that include the emissions from the flights itself or the operations of the airport?
38	P4
39	Yes, not operation but the flights.
40	P2

41	I mean the operation of the airport because we have the discussion with the with the local management, there it's really small. So it does not have a major effect, but the flights are the biggest ones.
42	So though when we discuss with them if they know how many of the data are there because we want to do the double checking, they don't have these direct information. So it's their carriers that do have and then it's of course if you want to talk with them, you need to talk with the headquarters.
43	So it's indeed a bit of a challenge.
44	But the future is in the hydrogen for the flights of such like in the, let's say, overseas ships, these heavy ships, for example, what the Maersk have now in Denmark, what we discussed Maersk now ordered today, they have 2 vessels, big vessels already in the sea and the 29 others are really already ordered, they are changing the fuel from these problematic fuel into not hydrogen, but mostly on metal as it seems. So they will actually cover that by that.
45	P4
46	And also the building sector. So it's a little over 20% as well. Um, most of our multi apartment buildings have already been retrofitted, but the individual houses, this is where the potentials also lies for the improvements.
47	P2
48	The statistics here is pretty much the same like it is in Europe. So 80% of buildings are not at all insulated or they are not enough insulated. It's not just the problem of Slovenia, it's the challenge for the whole Europe and the best energy is the one that you don't even use. So we strive for that, the retrofit should happen as soon as possible.
49	And then it's a question how to motivate people to put the, you know, money out of their pocket and invest into their installation. So unfortunately, here Putin is the best advertisement for that, you know, because having a high price of the energy meaning the gas directly needs, I mean forces you or motivates you to some extension to the investment into the installation. That must not have been in the past because the energy was too cheap.

50	P1
51	And as a City, what kind of projects or initiatives have you implemented or are considering to implement to address these emissions?
52	P3
53	Mostly from 5 sectors. Ohh and there is like 6 measures of each sector.
54	P2
55	So in paper that needs 153 pages of action plans for the next 7 years. Now it just depends how deeply you would like to go, but the booklet itself is like 2200 pages total.
56	P3
57	Like for the traffic (…)
58	P4
59	As [P1] already pointed out, the 6 main measures account to 80% of decrease of the emissions.
60	P3
61	Ohh yeah, regarding Mobility, the first one is like one car per household. So yeah, that's the main measure. But we know that…
62	P2
63	That's quite a declaration of the war by the mayor, I would say. So it's not the really scientific expression, but when the mayor said so, ok, people did not have rights around, but at the end of the day, I believe he will focus on that. So for us that means really like 40% of total car pool in the city of Kranj will have to vanish by 2030. So that's quite a challenge.
64	P3

65	Yeah, and solar electricity production of course. There is also, as [P1] mentioned already, hydroelectricity. As we know, we need to upgrade our electric grid, but it's not our job.
66	P2
67	The hands of the governmental. So the central government, let's say pushes and this is where we would like to happen much faster. They will finally start to think about it, because otherwise we will have a big problem. But we are dependent on the national distribution electricity system
68	P3
69	And of course the main and the most important is the investments in district heating around the city.
70	P4
71	We are also looking into building a new district heating options. So actually using the energy that's left from the industry and turning it into the heating system.
72	P1
73	So we're talking about the second life of this energy that is there here, especially the Goodyear plant is the one that is running 24/7, 340 days a year.
74	And being there and also in the industry alike in my previous life if I can say so, there's normally 90% of dead heat that can be reused again because otherwise it's just, you know, evaporates from the facility and according to the science behind and the experts that are connected to that half of that extra which is there can be always captured to one extent.
75	So we are talking about pessimistically, a realistic scenario. I mean the optimistic one could be even 75% and in some of that cases we talk about millions of Euros that can be really captured and the idea is to have it of course as additional financial motivation for those companies that will not only see the possibility but were also willing to do that. But on the other hand, much less or lower much lower invoices, monthly invoices for the households that use this kind of an energy.

76	P1
77	So this research, as you know, it focuses on a lot on changing the behavioral consumption patterns of citizens. Considering what you've explained so far, do you think it even makes sense for a city like you to focus on changing citizens behaviour?
78	Or do you think making structural changes is more important and more than enough to bring about the change that's required?
79	P3
80	Definitely both. We know that each person counts, each citizen counts. We need to move them in the right direction. That's why we developed the City Smart city platform and the Smart City card, which I will show you before my boss will (shows Kranj smart city card).
81	P2
82	This kind of card does not exist in Europe. Believe me. So it's really a breakthrough thing and it's up and running. And it's all about people.
83	I mean, I like the question. So this kind of research, especially the outcome we are really looking forward to also what you will come up with. So you are on a good way to really do some changes, because at the end of the day it's about people. It's not about the technology can buy all kinds of technologies if you want, but it's really people. So if we can move people into the right direction, this is the whole the whole idea.
84	And we know that we have some stubborn people, some tomatoes around, right, who do not believe in the future, but the it's like with kids at home. You know, if you do, if you push them to do something, they will at the end of the they will do it, but they will not do it in a in a happy way. If they change the habit in a way that they think that this is their idea, or they will change the world with that, that's the best thing. And this is one of the things where we see.
85	One car per household is a declaration of war to the citizens, but on the other hand, if you really provide the bypasses, then it's going to fly, and this is one of the things.

86	And today, you know, people, especially younger people, they make gamification a lot, loyalty system and these kind of things. We believe if it works for the private sector, you can always work also for the public sector.
87	But it's a bit of this Big Brother effect always. People do not trust the government. People do not trust the cities. They do trust Google. They do trust Facebook, but not to the local or your government, right? So the perception needs to be changed and this is we can read some stuff with goodies. Goody bags and these kind of things.
88	P1
89	Are you familiar with the concept of Digital Nudges, and if so, can you just briefly provide an overview of your understanding?
90	P2
91	I'm aware of the concept because we need some of that research also (...) So it's really when we are introducing the 5G technology in Switzerland with Swisscom, that was the whole idea. So it's really, you know, pushing, pushing people to some extent is not a good thing. It's good to really have a pull effect and in this respect this was the whole idea why we as the city of Kranj started, already it's like 3 or 4 years ago the whole concept of the Digital Transformation City.
92	So not just the digitalization that is obvious and it's there, no matter whether you like it or not, but the digital transformation of including, of course, of people on our side as the city, as people who offer some possibilities to the customers and for us the customers are the citizens and the other way around when people try to, I mean when they do take advantage of the digital tools that are there in order to change the behaviour. And this is also, like [P2] pointed out already the card.
93	So first of all, it's our digital platform. When we have the data lake, big data lake with all the small data lakes sneaking in to get all kind of the all kind of data in, in order to have the information out of it and then do the inform decisions based on these data and of course information.
94	But when we had that we there was one thing that was missing, of course within the whole idea, and that was the citizen. So we need to have a secure one on one relationship with the citizen and this is why when we came to the idea to issue the, the digital or

smart city card that needs to be really on the top security level, you know you are in Europe now you know how the GDPR issues can be very nightmare area. So we covered that.

95 So when we had the big public tender regarding this card, the main idea was supposed to have somebody (…) I mean whoever is going to offer us the solution they need to have the certification of the Bank of Slovenia, namely the Bank of European Union, so Frankfurt, so all the national, so the all the commercial banks in not only Slovenia but in European Union were eligible to apply. And some of the fintechs that had they had this kind of certificate. So after 2 years of negotiation, you know and providing seeking for the right solution, there was Slovenia's biggest bank chosen together with Visa because we said we need to have Visa, MasterCard, American Express, kind of a solution that is going to be useful all over the world.

96 So whoever comes, even you when you will for sure come to Slovenia and meet us, you have a prepaid card that is going to be for the next 5 years. The visa card standard and then the rest of the money that stays in the cart or on the card. You will be able to spend in Muesnter, in Tallinn, in Belgium or at home in India. So that was the whole idea, to be fair.

97 But on the other, to have really this one to one data with the citizen, not only the citizen, also to the foreigners or all kind of tourists, Slovenian tourists, foreign tourists coming to Slovenia and when you have this kind of digital infrastructure, then you can who do the whole game behind, the nudging.

98 So really changing the behaviour of the people in a way that you actually provide the positive things, so kind of a gamification, and for us including I mean for us, the whole idea about reaching 2030 goal is really to include first of all different stakeholders at the time being.

99 So 60-70 different companies and stakeholders institutes and the others. But that's just the first step. When we discuss with the European Commission, for us, it's very clear that if you don't include the citizens, so our customers in, this is not going to be the war that is won and in this respect, for sure, we want to include all citizens, even thinking of some yearly, let's say, payment of our citizens into this, I would say consortium budget or whatever.

100 So we know that if somebody hits you on your, on your pocket, right, then you feel it. And in this respect, we believe that if people will be providing, we will be able and will be willing to provide some funds on a yearly basis. We can talk about now, 10 years, 20 years, 50 years, a year as a contribution to carbon charity of the city, because then you share the pain. So that's the way how we understand or at least me and some of that we will for sure be reading your thesis right. What are going to be the nudges for the future?

101 P1

102 Yeah, it's also a lot about the, the kind user interface or UX design that cities used in their digital web portals or web forms. And I was also interested in asking what are the kind of services that you offer as a city to your citizens, for which citizens have to use or maybe have the option to use an online service. So maybe you should can also shed light on that?

103 P2

104 But a lot of services can be reached online already and maybe I can share. I can open our digital platform if you're interested in that, you will see.

105 But the whole idea about the card for example, is also that we have a for example, going to the theatre. For example, if you go by car okay, you can buy a parking lot for one or 2 cars for the next 3 hours by card to and you will not get any special discount or any bonuses, right? But if you come with a with a public transport to a threatre, or if you even walk or for example go around, then you will get some discounts on, let's say the price of the tickets, let's say for the theater as well as the maybe for example dinner after the theater event in the nearby restaurant with a certain discount.

106 So having this gamification model to really, since you came by foot, you can even drink a bit and you go back home without getting tickets for the for the driving drunk, for example or something like that. Because sometimes what we see now today when we discuss with the Director of the theatre people normally come by car and in this respect, they need to go home by car. So that's also one of the reasons why they vanish out of the theater immediately.

107 The second biggest problem that we have is also the nightmare timetables of the public buses, because if public buses stopped, you know, running after 10:00 o'clock, then

	when you finish with your theater show at 10:00 o'clock, then you are pretty much either walking or you have to go by car. So in this respect, again, they cannot do the upgraded products for the clients there.
108	And then one of the areas, for example what the mayor is very much into is the public swimming pool that we have, it's an Olympic swimming pool which is quite cheap nowadays and he thinks about of course increasing the prices now because of the high cost of the prices of the energy and then having the advantages for the locals, so for the citizens of Kranj in a way that if you go there and you actually pay with the smart city card of Kranj, where you can see also the smart identification number.
109	But when you have this kind of thing, then for the citizens of Kranj, this is going to be still the old price or half of the price compared to the others. So in this respect, you know you can play a lot with these kind of services products and these kind of things. But what it's important then you of course include it into the (...) (shares webpage https://pametni.kranj.si/home/feed)
110	P2
111	Are you asking us what services we or the citizens, can order through our online website or?
112	P1
113	Basically my the idea of asking that question is that once you tell once you discuss what kind of services are offered online, then we can move to the subject matter of this thesis, which is how can ohh how can you incorporate Digital Nudges into offering those services so that you can encourage pro environmental behaviour.
114	P2
115	I mean, first of all define what is online offering, you know, because what we do now, we have the card, we have the, the platform let's say we'll just show you the what we actually do. Then of course what we do, and we had just had a meeting now with the guys.

116 So what we need? You see my smart Kranj platform, right? It's accessible via the Google app and iOS apps. So these are platform for all kind of events and traffic information and all kind of things that we have.

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117 But what is important, let's say for us now because we are included the Smart Kranj as such is the payment effect. So this card is up and running for the last 3 weeks. What you see, we have these my locations, my waste, my vehicles and here is going to be also the payment activity.

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118 So what we do now is, just in this year because it's part of the of the of the European project, that we are also applying now is to have the let's say the marketplace of all the public services that will be an offered via this platform because today you have the library that offers their things also online, you know, but only within their pillar and then you have the theater that offers that in their respective system only then we have also some of the services that are rendered through the City municipality authority for example. We don't have the connected the connected system yet although now with the smart card as well as the smart city platform this is going to be possible.

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119 For the sake of your thesis it's easier said than done not because of the technology. But because of the people behind, because you can just imagine some of those guys who are in charge of those services within their respective organization that they have the natural counter effect that they don't want to have this kind of a, ‘somebody else told me what I need to do’.

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120 And it’s going to be a bit of a challenge for us all, but we are getting there. So the end effect should be all the public services within one, let's say City platform as well as the one City card.It will be always possible that you can pay any kind of your services within Kranj, with your card, or in cash, but if you're going to use your card or cash only, you're not going to get the discounts that are going to be given to you if you use the smart city card.

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121 And it's not the idea that we push somebody somewhere, but it's just we encourage people there because in some cases it's also possible that you should not prohibit something. But the idea can always be that you just don't enable it, which is pretty much the same thing, but you don't say it's prohibited. No, it's just not enabled. And City gas always do that right?

122	So currently we have a lot of that already done via online as you say, but not on one not only for example, not what one point of shop this is what we would like to because it's not only then the city of Kranj, it's also other 17 different municipalities from our region. So the smart city card as well as the platform should not be only for our city, which is like 60,000 people, but for the whole region, which is 10% of the country. And this is a future wannabe because our mayor is also the President of the of the Regional Council, and this can happen next 2 to 3 years latest.
123	And then you have, you know, the marketplace, which is big, you have a big platform which is there and then you want to have this big number effect like, not like Facebook, but Facebook and other platforms are always interesting only because of the high numbers on demand side as well as on the supply side. If you are missing the supply side, you have a problem. If you're missing the demand side, you have a problem. So really getting there, but then at the end of the day, it's all about people.
124	Again, if people do not trust the government, so the City platform, which is a governmental one, local governmental one, then we cannot win the war right. In this respect, we want to get them there proactively as volunteers and having something back out of it.
125	If that answers your question.
126	P1
127	Yeah, I am really impressed by the whole approach of having the card and the dashboard. I think this is has not prominently come up in any of the other City interviews that I've done so far. So and like the way you present a lot of information that the that the citizens can access about the traffic and upcoming events, I think they're in also lies some kind of potential for applying Digital Nudges, some of the (…)
128	P2
129	I mean, first of all, you need to be always transparent. As said here you see for example you have a traffic information, then you have upcoming events where we are already now doing some push notifications. So if I'm interested in to particular sport and in particular cultural events, I'm getting the push notification on a daily basis like 7 days

in advance and then the last day 2 times where I can also do the reservation and pay the sum of the tickets already.

130 There you have let's say air quality which is, so now we are in Green. It's a nice weather in Slovenia. I can always go there, so we have different let's say points where we measure the data.

131 For example, here is Planina, part of the city that is not green, but it's yellow already, but yellow is still OK, right? It's not a big problem and you can always go into the PM 10 effects and all the numbers on one hand for the past and we are also using the AI for the forecasting for the next 24 hours and 48 hours. A lot of things still needs to be done, but they do at the end of the day, you have to start somewhere and we already have this platform as well as the digital or smart city card up and running.

132 Of course, it's not as interesting as we would like to have, but according to our, let's say far plan, you know plan by 2030 a lot of things can be done. But of course, a lot of stakeholders need to actually cooperate positively in a way and just see a lot of possibilities, not only the fears that are behind.

133 P3

134 And the smart city platform is also the application, so you can download it from the Google, and that’s how you can get notifications immediately.

135 P2

136 You can upload it from your Google app or iOS app and you can play around. You hit in Slovenia in other languages and we have like on a weekly basis, we are adding up more and more stuff because it's a lot of data behind already. We just don't have a throughput of all of the stuff as long as it's not confirmed by the mayor.

137 But the idea is that the mayor in the morning when he opens, the computer he has a dashboard and he sees how many some of the key KPIs it can be up to 10 he wants or 20 and he can really follow certain stuff what he likes to.

138 But on the other hand, we as citizens, can follow our own KPIs, for example. So that's the idea. To have a live data updated on with the latest, the latest solutions and having

this kind of platforms is also enabling 2 way communication with your citizens on a daily basis.

139 You can have a referendum every day, for example.

140 P1

141 And what percentage of the city population is using the app? Do you have any idea about that?

142 P2

143 Ohh so we are open to that. So we did not do any big advertisement for the app yet because we wanted to wait for the City cards because the data platform is available already one year and we did a lot of friends and family research and after so usage the smart city card is up and running since the Valentine's Day this year. So 14th of February, but it was for the friends and family.

144 Officially, it was launched to each and every person of the of the city on the first day of spring. So 21st of March. Quite a lot of people downloaded already because you have to go through the KYC. So now your customer on the top level like the banks. So we have quite a few already, but masses are coming, you know. So in this respect, in the percentage wise we can say just 1% yet, but we just started with the project and we believe so the scope of the project sees 10,000 usage users. So it's 1/5 or 1/6 of the population in the next 2 years' time, but it can be much more. So we will see now how quickly we are going to also go with original project.

145 So with the card and the digital platform within the region. Again we have a lot of people going against the card because they don't believe it's going to be the positive effect. We have some of the people that, of course, it is actually eroding their business model and they do all kinds of things to actually stop it. But this for us, we know that this is just the right the right approach. So if they are shouting then I mean if they are really speaking up and against it that we know that we went into the right direction with that.

146 So we have currently 5 different other cards, but you know one card for the library, one for the cultural part, one for the swimming pool and so on. It's also we're going to get

rid of those cards in a let's say midterm and then getting only one card, first of all less costs for other cards.

147 Plus, the second thing is everything goes into the one data platform and that's important thing.

148 Plus, it's according to the standards, very secure. If you lose the card you can get virtual card immediately. For online payments, you can always have these virtual cards like N 26 and Revolut. Our card can do that and at the end of the day you have all kind of data and data is the new oil that we know. We need to have anonymous data and we want to have really informative based decisions for the City because otherwise we are driving a car in the fog right?

149 P3

150 And it's free for all the citizens.

151 P2

152 Very important. Yeah, free of charge. The city of Kranj pays the fees for the citizens and what is very, very important, so there are no transaction fees of visa for these payments with the card. So it's not those 3.5 to 5%, it's zero transaction fees that was negotiated during the whole negotiation part and it's to some extent also all logical, because for us it was a no-brainer. So far, with our local cards that we have, there is no fee, so people would not like to pay extra fee for something. And for us, this gross and net effect is important because a lot of money is lost in the transactions of the fees and the banking fees to some extent are quite of a challenge.

153 The future is in blockchain for sure, so no fees of debt except of this minimal fees of mining. But that's another story yet. And we are very much into that also, we as the city we issued NFTs so non-fungible tokens as the first municipality here around for financing one of the projects that were not able to be financed through the city budget which was quite an innovative approach but very good crowdfunding to the to the local area and we have let's say some of those projects that are possible to be financed that's alongside the fact that we have the first Bitcoin monument in the world in Kranj. So that's one of the triggers because Bitstamp cryptocurrency exchange was born in Kranj and it's still the biggest European crypto exchange currency system.

154	P1
155	I must say, I'm really impressed. Considering the size it's, I think it's the smallest city that I'm interviewing. But like the amount of initiatives and it's much more cohesive. The way you, it seems that you're operating.
156	P2
157	Welcome to the club. But nevertheless, that's why we are quite Olympic. And I said we feel very Olympic and this is, I mean, having a bit smaller City can give us more agile possibilities. Again, our mayor is very much into these innovations and we are a team of crazy people that normally we say go big or go home. This is the name of the game and so far so good. So welcome to Kranj.
158	P1
159	Can you tell me something about how the administration of Slovenia works, what kind of powers do you have as a municipality and on the regional and a national federal level, what kind of things that you have to rely on the other levels for?
160	P2
161	[P5] can do the official answer. I can give you the straightforward answer, but nevertheless yeah, a bit of the politically correct answer.
162	P5
163	No comments.
164	P2
165	No, no.
166	(The interviewees joke around)
167	P2

168 [P3] used to study like you do also abroad for a couple of years in Sweden and the other so for us it's always good and we have the team that was always either big in sport or also living abroad and then you see the big picture where the world is moving right.

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169 But unfortunately, the government of Slovenia does not follow our pace for the digital transformation area, for example, when we were discussing that we want to introduce the digital, let's say platform and of course you don't want to reinvent the wheel, right?

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170 So we went to the government in 2020 before we went out with our public tender for the big digital platform and we asked them if there's something going on or if there's something is prepared, not to do double funding. They said “no, no, we don't even know what you're talking about. But nevertheless, if you do some good stuff, then just tell us that it's going to be there. Maybe we'll adopt the rules to your case”, and most likely our platform could be the platform of Slovenia on the long run.

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171 The City of Ljubljana is the capital city of Slovenia, actually negotiated with the same provider and they signed the contract with them last year. So we have our platform already up and running.

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172 Ljubljana signed the deal in November last year, so they will probably have the pretty much the same platform like we do, but 2 years after us, for much more money but that's another point. We get a lot of good stuff for relatively low price because it's open innovation platform. We always say open innovation. They learn from us. We learn from them. But we cannot afford high tech products for high price

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173 So normally they offer us that for low price, but then they can’t usually you know, accept that to the others.

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174 So that was one of the things and everything happened like [P5] pointed out, but she did not want to talk to you at that time. She figured out that it's a good thing. We had a digital transformation strategy for the city of Kranj ready in 2020. That was valid for the last 3 years or 2020 to 2023 and we are now upgrading it. Let's put this way in face lifting by 2030. According to the also the 2030 Mission strategy and our active role in the mission.

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175 Whereas the Republic of Slovenia adopted the digital strategy or digital transformation strategy for the country by 2030 last year, so as late as last year, so according to that, the government is like 3 years behind us, officially, at least.

176 Our mayor is also the President of Ice Hockey, Federation of Slovenia, and he knows that, you know everything is possible. So in sport, a lot of things are possible in this respect. He gives us a lot of, you know, support in that and mistakes are allowed. This is a big thing and there's quite a few of us that are coming from business that is not so typical in Slovenia. So having some people from business coming to the public sector, shaking the public sector to some extent, showing that everything is possible, that that, that's a big advantage in the city of Kranj is the 3rd biggest city is just not really big enough, not small enough, but big enough to change some of the things.

177 And regarding that we, we got also two awards last year on the state level on the country level for the digital platform as well as the dynamic purchasing system for the public schools because you want to have the public schools, kindergartens and some other stakeholders get this everyday warm lunch or break time, they get it from the local sourcing. So we have a goods from local farmers, not from ingredients coming from the other half of the world. And normally the purchasing was always a problem. We get that up and running now in a way that even small farmers can actually apply if they miss the price yesterday they can still apply today and again and they can succeed with their offer and not to wait for the next 5 years like it used to be in the past. So in this respect we got that award. So for the last 2 years on the floor in Barcelona on the word Smart City Congress in Barcelona in November every year, that just proves that we are on the right track.

178 Plus there is this joint Research Center report for this I would say digital platform Smart project that we got, I don't know whether you came across with, but since you're doing the research, it would be nice to have it because it's a lot of research done on the JRC level as well as the Gartner effect. I will show you the page there and share it with you for the sake of research, if you would like to have it, you see the page right? (shares JRC Publication Repository Page)

179 So benchmark the role of the public sector location intelligence in Smart spaces. Here is the official report of 100 pages of June 2022 that was done on a European level and here the city of Kranj was actually recognised. You have also the QR code and the Smart spaces benchmark Report here as one of the 5 cities. How smart cities in European

	Union should be done? so besides tallinn, where you also study there is Helsinki of Finland. You have Rotterdam of the Netherlands and you have Guimaraes from Portugal and Kranj, Slovenia, so maybe getting a bit deeper into that can also be quite handy for your nudges, because this is the whole idea behind and this report includes also a lot of technical solutions quite of a deep dive into the technology and technologies.
180	If you're interested in that, you are not just on the on the surface order helicopter view as such, right. And I'm actually yeah, giving you this also in the chat you have the link to that report. And you have also our digital strategy. I believe you don't have it published in English one, but we are going to publish it, but nevertheless you can always translate it through Google translator and the others.
181	But I'm not sure if it's published. I know it's insensitive, but [P5] will checked out if it's published. If it's published, she will also give you the link that you will see because we have. That's also good to point out. It's not that we are smart guys or not, but we have the City Strategic Council for the digital transformation and the green transition that is led by our mayor so he's the president and we have to our vice presidents, the first Vice President is [name of the VP], that is our local citizen, so our customer, but she's the Nobel Peace Prize laureate from 2007 together with Al Gore in that area. So she's a really renowned thematologist of Slovenia, speaking at all over the world, and she's also one of the key resources for having quiet of a high pace and motivation to go towards the carbon neutrality by 2030.
182	Because the challenge of the city of Kranj is that we are not only 15 minute city, we are like 5 minutes City. We are very Green, you know already and Slovenia such is one of the greenest countries in the world. Ohh, but nevertheless, even due to that fact we can do some a lot of positive stuff and this is let's say one of the things where we are very much into.
183	P1
184	So thank you for that information. I had a lot more questions prepared but and but like for the lack of time I think I would want not be able to finish them.
185	P2

186	You if you need some of the answers, we have a few more minutes. So just feel free if you have, but that's just your call.
187	P1
188	Um, yeah, so quickly I think for 2 important things I would like to get your view.
189	One is that so as far as Digital Nudges are concerned, a lot of research has shown showed that for structuring digital choice environments using Default Rules has been very effective.
190	Uh, So what are your views on using things like making Green choices the default option wherever citizens have to make a choice? For example, when they decide to go for energy provider and in the in the form that you prefer, there are choices for using a green source of energy or a regular.
191	So what are your thoughts on using Green choices as the default option?
192	P2
193	Quite a hard question, but for sure let's say it's a (…) First of all, what is green? That's one thing.
194	People are more and more aware of it and Green as such, it can be always just a fad. You know, just the buzzword, but we believe this is going to be the new reality. I mean the future reality.
195	And as long as there is no direct price differentiation between green and not Green, then it's a question, for example, very direct example in Slovenia nowadays is using green in a way of using the carpool right? There's more and more electrical cars being sold in Slovenia, but not so much from the private persons. If they are, they are the ones that are very Green. Savvy, right?
196	But from the business perspective, it is a direct influence and it's a big difference because if you use, if you buy as a company business car that is also used for the private purposes to the managers, then you don't pay any so called Bonita, so the bonification.
197	So let's say for me when I was the CEO in the previous company, I had like a BMW 5 series that cost like €80,000 and €80,000 according to our legislation or more tax rules

in Slovenia and it's pretty much the same in European Union. You pay like one point, so it's 1% of debt value of all the value on a monthly basis as a bonification. But if I use it for my private purposes also, so that the company also pays the fuel for me for my private driving, then it's 1.85. So it's almost like 2% of the current price or the book price of the company car is perceived as something that is a value added for you.

198 So 2% of €80,000, it can be €1600 of artificial salary, additional salary for you that the state of the Slovenia for example, give takeaway first of all 22.1% of the taxes of that plus this 50% of the text deduction because you are in the highest. So out of this €1600, when I was the CEO there, I paid additionally €1000 monthly additional text to the country.

199 But the current car was not mine at the end of the stuff, so that means every month. So I pay €12,000 every year for a car that was not mine for the sake that I you also used it. If you now buy electric car, this bonification is zero. So now it's gross to net, so I get a car, the company pays it to me, but I don't pay anything to the government anymore for using that car.

200 So I have the new brand 5 Series I5 which is €100,000. Pay zero from my pocket to using it and this is why you have so many good cars now in Slovenia, so it's a direct effect of the text authorities that they allowed this kind of cars for zero taxation. So it's like this stick effect. Again, it can be a carrot effect, but here is more sticks and there's no stick if you use this kind of cars, which is good.

201 And let's say we know a lot of practices in, for example, in the Czech Republic as well as Poland and Germany, where this text, the car industry is very big. They have also low taxation on these kind of activities, but other countries have bigger taxation. So in our case of the city of Kranj, every time that you will have some green solutions having either less cost so lower price or getting some additional points to using it in order to gamify a bit, the whole idea will definitely change the habits of the people, at least to the people who understand the whole concept, or who want to scream and save some other things for people who have a lot of money, they don't care me they would like to have Porsche, not electrical though there's there. But Porsche on gasoline because they can afford it. They can show off and so on. The Paris new quota, so paying €60,000 of additional taxation for new car, if you buy a car that is above 187 grams per kilometer, she's first of January this year. I mean, if you have money, then just pay it, right? Plus

	you pay €32 per hour in the city center of Paris for each and every hour for parking, if you can afford it, then you can do it.
202	I mean, because stupidity does not have an end effect, right?
203	P1
204	And so when this gamification approach to encouraging PEB is concerned what kind of challenges or barriers do you foresee as a city administrator in implementing these solutions?
205	P2
206	Maybe you can answer, but for me it was always that if the infrastructure is not there then you cannot implement it. So we saw it up front immediately. So if there is no digital platform as well as digital card, then you don't have the tools behind. These are just the infrastructure.
207	And it is like in the city you do a new road and then it depends if it's going to be empty. Is it going just the bicycles that are going to use it or you will go also with tracks, cars and all the others. So this is just the infrastructure for us, but if you want to do any kind of gamification and the loyalty system, if you do it via the Excel spreadsheets or via emails, it's not going to fly. So it has to be real time data up front on your app and this is what we now established.
208	So we knew that we could not just talk about it. You need to have the infrastructure behind. Is it easy? No. But is it achievable? Hell yes! Because you have the whole idea of, you know, Google Apps and all those guys that are doing that.
209	Why a Amazon is so successful or why, for example, Facebook is successful? Because they had the technology at the right time and people use it, but normally you know people of course are scared at the beginning, but when you see that it's something, there is a win, win situation. They will do it.
210	It's just that. But of course this data security, the GDPR is going to be the bottleneck either the GDPR because European Union is very conscious of it and it's good, but it's always a question if it's going to be the killer of the new technologies. So in our respect,

	it's just whether Asia is going to be more successful compared to European Union because we are so, so stubborn and some of the areas.
211	But on the other hand, you know, digital can do a lot of things in a positive way, that's where I see the biggest challenges.
212	P3
213	It just that as a city, we need to be the ambassadors for the citizens to follow so.
214	P4
215	And also different carrots are gonna build different kinds of people.
216	So I think we'll just need to try different measures in all the sectors that we are trying to lower the emissions.
217	P3
218	We're also like establishing the mass application. The first municipality in Slovenia.
219	So yeah, together with the Research Institute, we are working on that.
220	P2
221	Kranj is not only a mission City, we are also a pilot city and we are a twin city.
222	What does that mean? [P3 and P4] will tell you and I will just send you the link to our Slovenian language digital strategy, but you can translate.
223	P4
224	You already know about the missions, right, 112 cities in the climate neutral European mission and then one of the first measures within this mission was a call for pilot cities and we apply together with Ljubljana and Velenje and our project or the pilot was accepted.
225	We also have the 2 research institutions helping us, supporting the three cities. So as [P3] already said, one of the 2 main objectives within our city is to set up a mass application for some Mobility and also the optimization of the public transport.

226	We’ll send you a link.
227	So it's a 2 year project, we’re one year into the project already so some of the results have already been, idk no presented but built.
228	And we're also a Twin Cities, so Eilet which is an Israeli City applied to follow the progress of our pilot. So we have like, I don't know meetings every 2 or 3 months and they will try to kind of apply the solutions that we are gonna see through within this project into their city as well. So yeah, it's mission pilot and twins City all in one.
229	P3
230	And we are 10 people working on everything.
231	P2
232	But it's a hell of a people, you know, we have different all kind of sports, so it really is all disciplines.
233	P1
234	Yeah, that's really commendable. And thank you for the like the comprehensive overview of what you are doing at there. And I must say that I'm looking forward to visiting Kranj soon and seeing for myself like how these changes are happening because they like the thing the way you explain it's much ahead of the average Mission City as well.
235	So yeah, before we wrap up, do you have any additional insight or recommendations for me for the research?
236	P2
237	As I said, I mean pointed out those links that you have in the chat, right?
238	You check those out. Otherwise if you will need something or whatever in the due course, just let us know.
239	P2

240 But you can, I would say you can find out a lot about Kranj from the, let's say sources that are available online.

241 P2

242 For example, there's also this Smart Mlaka project that I said it's covered in the research of Joint Research Center because you know that's really the scientific research and deep dive, but it's actually scrutinised with the top researchers in Europe. But Smart Mlaka Project was actually the whole back, I mean the beginning of everything. So there is a nice video on there that you will know in let's say in in one minute and a half and you can go through it it's on YouTube.

243 This is where the whole the whole idea of this matching concept got attention at the European Commission and that's why we were in invited into this research, and that's then the final report that was issued in June 2022. So a lot of that is there. Ohh but otherwise, yeah, being Commission City being a pilot City and ours at the twin city with the city of Eilat of Israel give you the right proof that you had the war zones such literally almost right.

244 Ohh but yeah, having fun is always more important thing. But I have maybe just a question before we will finish for you. How many cities are you going to cover in your research? Because you have these interviews, as far as I understand is this the only methodology you have in your research for the PhD.

245 P1

246 So it's not a PhD, it's a master thesis and because of that the time frame is also not big enough that I can cover a lot of cities.

247 I think Kranj is my 7th City that I've interviewing and in total I plan to do at least 10 and on the basis of like what I'm noticing that like everyone is telling me something that's different. So in the end I hope to get a pool of good practices, first of all, uh.

248 Secondly, through the literature I have identified the kind of nudges and say, psychological effects that have been working quite well. So and we didn't get time to dwell deeper into that, but so I'm also collecting viewpoints from different city administrators on how they plan to apply those kinds of nudges.

249	So that we talked about defaults. There is also Feedback and social comparison nudges, so based on that, uh, I'm also gonna going to discuss how they have been applied or what are the challenges in applying them as far as encouraging pro environment behaviour is concerned.
250	And I'm also going to discuss the challenges and barriers in in implementing this approach. For a lot of cities, it has been simply challenging because of the kind of and administrative structure that they find themselves in. For example, in a country like Belgium, a lot of things are done on the regional level and or the federal level.
251	So cities often complain that they don't have any power to act in a lot of these matters, so that will also be one component of how I will structure my findings.
252	P2
253	Because, OK, regarding the last one, we are better off because we don't have the regionals, the regions as such.
254	So regional offices are not here, but the government is focused more on other things. So we are here better off, but the problem is that we don't get enough sourcing or financing of all those things because we get a lot of that from the European Union but less from the government.
255	And this is something that on the long run we look we would like to have more otherwise we depend solely on our own financing and it's always limited plus bureaucracy is big. So whenever we do these kind of things, the biggest challenge is internal bureaucracy, you know, and that's the biggest difference between doing things rightly compared to doing the right things, which is the whole name of the game.
256	P1
257	Yep.
258	P2
259	And if I if I understand you correctly, so you're dealing only the mission cities, so you will have 10 of the mission cities in your research group, right?

260	P1
261	Yeah, correct.
262	P2
263	Okay, can you just name a few? Because we are a bit, you know, interested.
264	P1
265	Yeah, so, so I I've already, I've already done Helsinki, Antwerp ,Leuven, Heidelberg, then there were a couple that I'm forgetting. And I plan to do Stockholm also and Malmo in in the future, yeah.
266	P2
267	So first league, that's good. That's important.
268	Nice, great research and you can really have a lot of insights into that. Perfect.
269	Are you planning to stay in Europe or you go back home?
270	P1
271	Yeah, ideally after this master thesis, I would like to find a job and I'm I very well plan to stay in Europe. I think I really like the like the infrastructure and the way cities are designed here, which is much less chaotic as compared to India.
272	So I think that's at least one thing that I really need, yeah.
273	P2
274	No, but the reason I asking is because when we were in 2 years ago in Barcelona and we know, OK, now India's officially the biggest country in the world, I mean population wise plus the Smart India project that Prime Minister actually went Mr Modi is really big thing because with what we saw, what we come on, what we saw in Barcelona.
275	You know, you did this in a way. In what 2015?
276	No, but when we there years ago, expert of the name, we win the European University discussing the Smart city in diverse India already implemented billions of euro of those

	projects and this is where I really was astonished because they wanted to turn it around. And it's really about the leadership despite the fact that it's quite a lot of chaos in India that we know. But on the other hand, you have the key things that can be done from that perspective and technology can really help you. But of course, at the end with if you have just smart people, otherwise you finished up in the thermosti people which is another not the game.
277	We have a local joke, but nevertheless you know, OK, superb.
278	P1
279	Again, do you have anything to add before we conclude?
280	P2,3 4, 5
281	Well, welcome to Kranj.
282	As we said, it's hard to find it because we are a small city, but when you find it, you love it, right?
283	And if you need anything else, you just contact us.
284	Looking forward to your thesis, right? Because it's going to be an interesting one.
285	We need to send you the document. We will. Thank you.
286	P1
287	Goodbye.
288	P2, 3, 4, 5
289	Bye.
290	Links shared on Chat
291	https://publications.jrc.ec.europa.eu/repository/handle/JRC128862
292	https://ec.europa.eu/commission/presscorner/detail/en/IP_22_2591

293	https://www.youtube.com/watch?v=HbclFfj9lkw
294	https://netzerocities.eu/slovenias-pilot-activity-up-scale-urban-pioneers-systemic-change-amid-liveable-environments/

7.4.9 Malmo

1	Malmo, 26 April 2024
2	Interview Text
3	P1
4	Okay so can you briefly describe your role and tell us what you're doing?
5	P2
6	Yes. Yeah, well, my name is [P2], and I work as a process leader for Climate transition Malmo and Climate transition Malmo is process transforming the city to meet our climate goals. So very shortly, so I work on a very (…) on a level, that's quite overview of how we connect up to the national level, EU level and how we can see the broader picture of everything we do in the city, so we have a lot of specialists working for us in different areas.
7	And so I'm working with connecting the whole what we do as Climate transition for the city.
8	P1
9	Can you tell me about what initiatives or strategies is your city implementing or considering to implement for addressing the problem of climate emissions?
10	P2
11	Ohh yes, I can, but there's so many. But in a (…) to get an overview we have 7 areas that we work with in. So we have a divided our climate actions into 7 groups.

12	So it is heating where we work a lot with the CCS technology and we have a district heating in moment. So it's CCS and also getting the plastic out of the district heating system. So the heating is one.
13	Our energy system is one of the main groups of climate action; making sure we have enough energy and that it's fossil free.
14	And then we have circular economy as one area. Where we look at how we can help the city and all the actors in the city to be more circular.
15	And then we have consumption where we have more, so if the circle economy have more of the focus on the producers and the consumption part has more on the consumers and the inhabitants in Malmo and to reach the long term UN goals of fair consumption for everyone and a sustainable one.
16	Then we have Mobility as one of our targets and where we have to transform our Mobility system in the city to become climate smart.
17	And then we have our own organization as a municipality. We're quite large city. We have almost 30,000 people working for the city. We reach a lot of people through schools and health institutions and so on, and we want to be a leader in transitioning our own organization.
18	So those are the our main groups. So I have to say I think that I said at all of them, heating, energy system, mobility and consumption, circular economy and our own organization, net zero organization, yeah.
19	P1
20	And what are the biggest emitting sectors out of those?
21	P2
22	It is the heating and transport, are the biggest ones.
23	Yeah, because we have a large district heating facility here in Malmo and it's run on waste. And I think they are 93% fossil fuel free, but since it's quite a large city, there are also heating some other smaller cities that are connected to Malmo. The carbon

	emissions are quite big, so even though there are 93% fossil free, it's still the biggest emitter. Yeah.
24	And then of course, looking at scope 3 of the emissions, if, if we look at that so then because Mobility and heating is within our geographic boundaries but if we look at scope 3 and the consumption, then it's food and air travel.
25	P1
26	Can you tell me how this whole scope framework works? Scope 123 very briefly.
27	P2
28	Very briefly (chuckles). Well, it's the UN.
29	Where of (…) like how we divide the climate emissions when we look at different (…) how you (…) when you look at statistic and when you do look at different statistics.
30	So scope one is all the emissions that come from Malmo as a geographical area. All the traffic's that happens here. The heating plant that is here and so on.
31	Scope 2 is then we also have the (…) then you include emissions from energy you import to your geographical area.
32	P1
33	Is [P3] also part of the this call? Because I can see that she's waiting in the lobby.
34	P2
35	I think it was only me that I was going to go.
36	Yeah, you can let her in.
37	P2
38	Hi, [P3].
39	P1

40	Hello.
41	P3
42	Hi. Sorry, sorry just some technical problems. Now I'm here.
43	Sorry for being late. I was at the conference and then people didn't stop that talking to me.
44	P2
45	So we have, yeah, we have started the interview, and if you're on the run, listen in and it just fill in when you think you should.
46	P3
47	Yes, fits.
48	P2
49	[P1] was asking me about the differences between this scope 123. And I was just briefly taking that, so.
50	So we had gone through 1 and 2 and so 3 is emissions that come from the consumption.
51	So if we, Malmo city as a organization or if people in Malmo, if we let's say buy coffee, typical Swedish product that we use a lot, and the emissions from that comes from the transportation.
52	The bigger emissions that happened from transportation or production doesn't happen within Malmö as a geographical area, but it's caused by our consumption of it.
53	So its scope 3 is another way of looking at it.
54	P1
55	Okay, are you familiar with the concept of Digital Nudges, and if so, can you provide an understanding from your end?
56	P2

57	Uh, we, yes, we are, I would say and we use them for example during campaigns, but we also have some digital maps, for example, over Malmo, where we provide information and in that way nudge people to, for example, put up more solar panels or (…)
58	Is that the type of Digital Nudges you're looking for or is it something else?
59	P1
60	So the way I'm looking at it in my paper is it's basically the kind of choice architecture that happens in the physical realm
61	Say these organ donation opt in opt out forms.
62	And so when you use like online digital portals and forms web forms in them, if you try to nudge citizens into a into certain directions, like having default options for example, or say when you send your someone their electricity bill, if there is some kind of Feedback like ohh your energy consumption was 20% above the average for the neighborhood for example.
63	So, using psychological mechanisms to nudge people into pro-environment behaviour but in a digital way, so yeah.
64	P3
65	I would say that if you really look at nudging at its purest form we don't nudge because we don't own the infrastructure where we could nudge people.
66	We don't (…) I mean the city, but not our department. We are responsible for the infrastructure, so that would be a potential of nudging and I would say that the Streets and Parks Department did do some kind of nudging campaigns like 10 years ago. Definitely they did. Not maybe in the purest form, but they did try to change that.
67	And also I mean by putting up more bike lanes. I would say that that is nudging and making the bike lane a bigger part of the road, for instance, that I would definitely call a nudge.
68	And then maybe a little bit when it comes to the school food by presenting the vegetarian option. But when there I would also say that we do more than nudging because we only

	have vegetarian days. I think now might have changed a little bit, but couple of years ago there were like 3 vegetarian or vegan days, one fish and one meat chicken day. So I mean, that's not even nudging, that's beyond, but I do think some schools also present maybe the vegetarian option in the menu first for instance.
69	P2
70	So there's always, a lot of days are only vegetarian, and in the schools in Malmo, but in the ones where you have, you have always a vegetarian option, even though there's meat or fish as well. And then the vegetarian option is first in the menu, so you yeah, it's not their alternative. That's the first one when you read it.
71	P3
72	And I would also, yeah, we're going to come to electrical bills. We're not also responsible for that infrastructure, so I would say that we didn't actually (…) I think also that's why [P2] invited me because I don't work so much with the citizens anymore. But we did almost 10 years ago, we did a folder nudging and how you could implement that in um (…) so we like the topic and we like to use it more. But yeah, we don't own the infrastructure where the citizens make their choices.
73	I mean, for us it would be so good, for instance, to collaborate with the food store or (…) but it's difficult for us to do that kind of interventions.
74	P1
75	Do you control any kind of digital infrastructure for services being offered to citizens? And what kind of services are there that the city officers digitally?
76	P3
77	Yeah, but when it comes to environment, yeah, I will just start to say some and maybe we will, but for instance, of course, when you put your kid in a preschool, I mean that kind of infrastructure (…) the people can if they see something in the street that is not good today can just take a picture of it and use a QR code or something.
78	And so we use a lot of different digital tools, but none really focusing on sustainable consumption, I would say. No, I don't think so.

79	P2
80	We have a lot of information campaigns, but not really nudging.
81	P3
82	Hmm, no, of course there is a smart map. Uh, it's…
83	P2
84	Yeah, but I don't think that's available anymore.
85	P3
86	No, but I think it should.
87	P2
88	Party still exist? Yeah.
89	P3
90	Yeah, it's because of availability reasons.
91	P2
92	Well, we also have a map where you can see, yeah, the energy classing of your building compared to other buildings and that's not (…) we're not saying (…) we're not sending out to people like this is how yours worse or better than your neighbors. But it's a way of nudging when you both inform or we meet people who own the housing and showing the map doesn't say on a scale where you are and the potential of how you can transform your house.
93	So that's one type of nudging.
94	P3
95	Yeah, that's definitely nudging possibility.
96	I would say that's something that we own ourselves and that is like you say, it's, yeah.

97	P2
98	And we also have the same for solar panels where you can go into a map if this is something you look at. So that's the first thing you can see, you can go into your house depending on where your house is and the angle of the roof and so on, the potential of the energy that you can get out from.
99	So that's that type of some type of nudging it, at least that we provide in, in maps. So you can go in and you can search for your own house.
100	P1
101	So according to the literature that I've surveyed so far, there are 3 principal application domains for Digital Nudges.
102	The first one is when you structure the digital choice environment. Like I said, those forms where citizens have to make a certain choice, and then you nudge them towards a certain choice. For example, offering default options.
103	The second is when you present nonpersonal or contextual information that helps in making decision. Like social comparison, when you tell them that ohh 80% people have gone out to vote in the upcoming elections or something like that. So like when you compare them socially, it's likely that people conform to the social norms.
104	3rd is the is presentation of personal information. When you give them Feedbacks about their own consumption patterns or like for this often you need some kind of digital data collection infrastructure like digital meters that can collect consumption patterns of individual households.
105	P3
106	I mean that we do have, I mean in 2 ways really I can tell you more about the Climate compass where you could see at least your neighbourhood’s Climate impact and we also have collaborated with the app called Golo to create the Go local tool.
107	And so I guess we have a little bit of that also.
108	P1

109	What are your thoughts on using the default nudge and making greener choices as the default option in places where citizens have to make a decision when, for example, like you have uh, 2-3 choices in the kind of energy supplier and like theoretically, maybe in your city it's a slightly different, but say when the greener energy is slightly more expensive as opposed to the regular energy.
110	What are your thoughts on making that the default where citizens have to make a choice.
111	P3
112	I think it's really good, but we don't own that and even I mean we have an energy company, but they only, I mean own the pipes. Whatever not the pipes but you know what I mean?
113	And people will choose what kind of distributor they want. So, but I think it's good I mean I'm pro.
114	P2
115	No, same here. And we have a(…) [P3] was talking about what infrastructure we have and I don't think this is done by environmental reasons for the beginning, but we have the system of choosing schools.
116	We have a system that always put the kid in the closest school to you, so if you. So they would be able to walk or bike to school and then you can also ask for something else. But that's the that's the first option is always the closest.
117	P1
118	Yeah, I think that's a perfect example for that default option.
119	P2
120	And I guess that's more of other social reasons, like having your friends close and so on, but it also works very well towards the Mobility.
121	P1

122	A lot of other interviews that I talked to, they were very skeptical about the whole nudging approach for changing individuals behaviour, and they were more in favour of structural or systemic changes that could be bring about by the government.
123	How do you see it, do you think this has as big enough potential for making large impact in the city's climate footprint or do you see it as like just a very small thing that has that could be at best done along with all the other structural changes?
124	P3
125	I think for municipalities is difficult because if you see it with the climate compass, we know the biggest emission categories and that's for instance flying and we not at all in charge of that infrastructure. I mean, if you, if you look at all the other categories, I would say that that's the category we are farthest from trying to change the behaviour.
126	So I think I really like the nudging perspective because it just making the sustainable choice most accessible and easy, but for us, it's really difficult.
127	But for instance, in mobility? Yes, we do have possibilities. School food, we have possibilities, but there may be some other sectors as well, but in this a lot of sectors we don't have any possibility.
128	P2
129	And I think that I the skeptical side is that nudging does take (…) if you have a harder regulations, like this is something you have to do or you have a tax, then you have from them, at least according to yeah, theory, a faster change.
130	And we need we know we need to do the Climate transition quite fast, but as Emma said, in a lot of areas as a municipality we have no means of regulating air transport and we can't tax it, we can't do anything about it.
131	So I think we, we need to move fast, but in some areas nudging and information are the tools that we as a municipality can use. We don't have anything else, so we need to use everything in our toolbox to be able to reach our climate goals.
132	P3

133	I think waste separation for instance is also a good example of something we do. We have a municipal company, but they still municipally owned, so I think that there might also be a potential there or and I know that they for instance, there are, I don't know if you would call it nudging maybe, but I have seen really like funny ways somehow to sort your waste and how to even throw your waste in a in a waste container, for instance.
134	So yeah, there is also a potential I would definitely say.
135	P1
136	Yeah, that's something that came a lot in other interviews as well, where interviewees have mentioned and linked the waste segregation sector with a lot of social comparison nudges that they could see.
137	What are the some of the biggest barriers or challenges that you see when it comes to applying those Digital Nudges assuming that a city has the political will and the capacity, and the know how to apply in ages.
138	P2
139	I would say goes back to what [P3] was starting up with that we don't have the infrastructure where that we don't (…) Often when you use nudges, it's down to when the individual has to make a choice, and we as a municipality, we don't really work on that level so much more.
140	If it's like what day care do you want to go to, what school? And then we use it, but otherwise we more like, how do we build the system of transport? How do we build a system of waste management and not so much down to the individual level where it is, what should I eat today? Where should I go for my vacation and in that level we don't have that much interaction with the citizens and it's not something we sell to them or that they need us for.
141	So I would say it's more dependent on that we don't interact with the citizens on those levels so much.
142	P1
143	One of the other cities that I interviewed, they have this single system in which, like they have, the citizens have one card that is linked to all kinds of payments that they

	make and it is also their library, Mobility and all the services are offered through one card and that I thought was very useful and I think that allows them to have a lot of like data from citizens, and I'll also gives them citizens a dashboard to see everything that relates to their livelihood in the city. Do you have something like that citizen dashboard or something?
144	P2
145	No. Of course we study our city on all type of statistic we can, but it's not down to that individual level of their lifestyle, no.
146	P3
147	I don't know if that (…) I see problems with that also, I would say. I mean with that integration. But could you say which city this is?
148	P1
149	It's, uh, it's the city of Kranj in Slovenia. It's a very small city. I think 30, 40,000 people. Maybe that's why they are able to make it run it that efficiently, but yeah.
150	P3
151	I know, for instance, we have a bike system in Malmo where you could just be paying 25 Euros or now with the Swedish kronas maybe actually only €220 euros a year and you can just go as you want with that you pick it in one station and leave it in another.
152	And I know that there were discussions that it could be good to have your bus card in the same kind of system, but that never happened. There, I would say we have that in so about where people are biking, which are the most like common distance etc. And we have this, but I would say that we also have other data that we could get, but we haven't really looked at it in that way, I would say.
153	P1
154	Do you see any ethical or privacy concerns associated with the city using Digital Nudges as a means to change or guide citizen behaviour?
155	P3

156	I haven't given you a specific host, but yes, I mean you have to be really careful with that information and so on.
157	I don't know, what do you say, [P2]?
158	P2
159	No, I think the same. And I guess it has to be down to what do you do?
160	If you look at Climate, it involves almost all sectors in the municipality and some can be really problematic and some like putting the vegetarian option first on the menu. I don't see that as problematic when you reach the dining hall, you can choose and we don't register how you do it.
161	But of course, there's always a problem. Ethical problem went if we somehow keep that information in register. Yeah.
162	P1
163	The idea behind that is(…) so from the from the books that I've read, a lot of authors and researchers, they say that there is no neutral way of presenting a choice, no matter how you design architecture of a form or any choice environment, you are inevitably nudging citizens in certain direction.
164	And so this suggests that maybe it's better and they call it libertarian paternalism when citizens are made free to make choices. But the people who design these, like the architects of these choice environments, they make it clear that we are trying to (…) like we present the choices in a way that at least is good for something that's like environment, which is something they call is for the greater good for citizen as well.
165	But they always keep the keep the option of other choice open so that's where this whole idea comes from. Do you have any thoughts about that?
166	P3
167	No, I mean not that makes something whatever.

168	I mean, there are few things that are neutral when we do it. I mean if we continue to create (…) even if we do have a lot of bike lanes for instance. I think we're still also build a lot of car roads, so I guess then we are not neutral.
169	I mean, yeah, yeah, no, I agree with what you say.
170	P1
171	And do you have any other information or insights to share before we conclude this interview?
172	P2
173	I think if you were doing interviews and you mentioned Czechoslovakia, I think there it's important to remember that the States and the municipalities are organised very differently within Europe as well and some countries' municipalities have a lot to influence over or they can decide a lot on their own and other countries not.
174	And there is also a lot of, if you have energy company or if you don't have an energy company, so it's difficult to compare a city to another, I guess because we have so different roles in different countries.
175	P1
176	I think that's a very interesting insight that I actually missed asking you, how does it work in Sweden?
177	Like with the powers that you have as a municipality and on a regional and a federal level, can you tell us something about it?
178	P3
179	I think one, I don't know how it is another countries, but we have the monopoly of planning the city. For instance, I mean we decide on what should be built where.
180	So that's something important.
181	P2

182	If we look at a public transport, that's something we do on a regional level, not on the municipality level, so that's something we do in the district of Scania in Sweden, which is 33 municipalities that together have one system for public transportation. So we as a municipality of course collaborate with them; where in the city are the best ways to put the buses or trains or metro.
183	But the nudges they make, or the ticket systems, and in that, interaction with the citizens that could be a part of Nudging is more on the regional level. So it's not on the municipality level.
184	P3
185	And also I guess it could also differ a lot also in Sweden but for instance in cities (…) if you look at the organization we are almost like 30,000 employees working that include like teachers, people who work with elderly, also the office workers like us but also (…) But it's a lot of different departments, a lot of different roles. And I guess that's also a lot differs a lot.
186	When I say sometimes to other similar size municipalities that we have almost 30,000 employees, they are very curious to know more about.
187	But then yeah, waste I mean, like I said, that's our responsibility. It used to be more of a producer organization's responsibility, but now it's at the municipal again for all sorted waste and also residual waste and bio waste in Sweden, but in Malmo, it's handed in a separate like municipal company. So it's not, it's not within the department, so to say.
188	P2
189	But I would, I would say, the city (…) like one sign that the city wants to take more of a control over the system, we just 2 weeks ago had a decision that we should start an energy company again.
190	So you could maybe see some trends that city wants to take back some of the control that we may be in the 90s and the they all ideology there was then where more of the let's let the market control it and now maybe it's shifting a bit back.
191	It's difficult to say, but I think I could be it be fair to say that for Malmo at least.

192	P1
193	What you said also ties in with some what some of the other interviewees said when they said that there's a need to have a behavioural insights unit within city administrations that can look into these things and coordinate with the stakeholders for each sector and provide their expertise in cooperating these mechanisms for ohh, for the savings that can potentially come from such things.
194	Do you have any final thoughts, recommendations or questions maybe?
195	P2
196	I could just add one final thought that you are when you added like how we organise, how we interact with other actors that have a part in that could be a part of nudging.
197	We have something we call Climate contract where we do interact with other actors in the city, could be landlord or so, and that's our arena of like, how should we involve everyone be acting within Malmo to do this transition.
198	So we have created an arena for that. [P3].
199	P3
200	Yeah, I just thought also about the house. We have a publicly owned housing company, for instance, that maybe they do some nudges. Just for instance, I think actually they have done, but they are also Climate contract signatories.
201	So, for instance, that and then, but I will also like to add if you have a good recommendations after you're done with your study, please share. I think we could look more into what kind of nudges we could use in the future.
202	P2
203	Definitely.
204	P1
205	Yeah, sure.

206	Did I share a informed consent form with you?
207	P2
208	Maybe you did when we set up.
209	P1
210	Maybe we'll do it again as a follow up email.
211	There you can share the email on which you would like to receive a copy of the results of this thesis.
212	Or maybe the thesis itself, like I'll see how I can share if because I'm getting a lot of ideas from everywhere and maybe like make cities can learn from each other and might be good.
213	P2
214	Yes.
215	P1
216	So thank you so much for joining me and for your time.
217	P1
218	Uh, I wish you all the best for the work that you're doing and have a nice day.
219	P2
220	Thank you.
221	P2
222	The same to you.
223	P3
224	Thank you. Yeah.

7.4.10 Riga

1	Riga, 01 May 2024
2	Interview Text
3	P1
4	Okay so first question, can you briefly describe your role as a city administrator and tell me how it intersects with the Riga's efforts towards mitigating emissions?
5	P2
6	I represent Riga Energy Agency. Riga Energy Agency is the same as departments in the municipality.
7	That's it's just like a separate entity organised by law, so there a little bit more independence than simple departments. At the same time, like budget decisions, main decisions are approved by the City Council.
8	So I directly represent municipality and we have like a (?) which describes how the Riga agency functions and what the tasks are. And one of the main task is coordinating of the climate and energy activities. So therefore, everything related to the Climate goes through the Riga Energy Agency. So we are also developing the sustainable energy climate action plan. Now we are also the entity representing Riga City in the European Climate and Smart Cities mission towards the planning neutrality by 2030.
9	And so maybe it's not also so easy as we are like working horizontally, but so we are coordinating all the activities in the municipality. So it's very similar as in Western Europe or even Germany like Climate secretariats or something like that. But so we also have additional tasks or functions, not only coordinating Climate, but also some other things.
10	P1
11	OK. And can you tell me what are the biggest sectors that cause emissions for Riga?

12 P2

13 Yeah. So from that emission point, to view the biggest sectors, transportation, I think. It's very similar as in other countries. For us, it's quite a large challenge as transport vehicle amount increases, so it's not that only we need to reduce them but the amount of cars still are increasing. So therefore, this quite large challenge.

14 But also from the energy point of view. So the biggest energy consumer is buildings. So especially multi apartment buildings. So mostly they are heated with centralised heating and there are 40%, 42% in the last heating season renewables. So therefore, from the mission point of view, this is not as much but so these are 2 main challenges. Like multi apartment buildings as we need to renovate about 6000 buildings at least.

15 And of course for transportation on the one hand the larger challenge is as I mentioned the vehicle amount is increasing but also that the municipality I think don't have direct measures. Of course we can build infrastructure we can increase like public transportation and build the bicycle pathways and so on and so on. Then the same time each separate individual must make the decision to buy maybe electrical vehicle or to move by public transportation or by bicycle. So therefore, these measures usually are quite discussed in the media and so on and not very supported from the resident point of view.

16 P1

17 So when you say that we want to be climate neutral by 2030, what does it really mean when you talk about, say, the Mobility and the energy, heating sectors?

18 P2

19 So yeah, good question. So of course, I think that climate neutrality in general, I think in the word is used too much and so therefore also the residents usually don't connect the climate neutrality with energy efficiency, renewables, healthy living, sustainability and so on and so on.

20 For us, I will say 2 things. One is that in our sustainable energy climate action plan, which is in power, we see that the aim is to reduce emissions by 30% from 2019. So this is like almost yesterday and so that means that we really have to get down the emissions by 1/3 but for municipalities sector, where we pay for energy there, we mean

planet neutrality, we need to achieve 100% reduction and 80% is reduced or replaced with renewables and 20% can be compensated, absorbed and so on and so on.

21 So this is what is in power. However, in in Climate city contract in the European City Mission, uh. So we are a little bit increasing our aim and also changing the base here because most of the cities use 1990, which is quite old date. And so in the Climate City contract, Climate neutrality, we understand that the same principle that we need to reduce 80% of the missions and 20% we can absorb compensate or produce renewable somewhere else in the energy communities and so on and so on. So 80%, but to be honest from 1990 so still the aim is a bit bigger than it is in the sustainable energy climate action plan.

22 So from 1990 in Riga city the emissions have decreased by 62% until 2020. So partly because of the collapse of the Soviet Union. So we had some companies producing products only for Soviet Union and but today we have declared independence. So these companies didn't survive. So these were like governmental companies and when they were privatised, the people were not able to change the market because in Western Europe, new world, the products were much, much better. And so they just didn't survive.

23 So therefore also the industry decreased a little bit but also second reason why the emissions have been have decreased drastically is replacement of heavy fuel oil because in the 90s, so this was the main fuel source. Everything starting from industry, from centralised heating, heat and electricity produced with the heavy fuel oil and it was until 2000 it was replaced.

24 So now in Riga City or in Latvia in general, so we don't have coal, we don't have heavy fuel oil, most of the heat and electricity is produced 3 ways. One is a natural gas. We have large thermal power plants so we have bio (…) we are using local biomass for heating and also in smaller cogeneration plants and then electricity. Part of electricity is produced in 3 hydro-electric stations, so therefore the electricity is quite green in Latvia, and the electricity which is produced has quite low emission factor.

25 But to be honest, if you looking for example on Eurostat or somewhere about emission factors for electricity Latvia doesn't seem very green. But it's mainly because other

	countries purchase the green certificates, so we are producing quite green. But we are not paying more for that than other countries use this to compensate their emissions.
26	P1
27	How do you see the potential of changing consumer behaviour and behaviour of people for achieving of climate neutrality targets?
28	Do you think there is real potential in taking that approach or is the problem more about having structural and systemic changes?
29	P2
30	No, I think it’s structural and systematic changes because somehow in Latvia and Riga and I think also in other countries the feeling is that Climate neutrality as something bad, not bad but some kind of burden is quite large. And as I mentioned, they don't connect this with the practical gains.
31	And one politician’s article or interview about how climate change will cost a lot destroys everything what you have been like writing in 100 other articles or interviews, and therefore I think that it's also another countries’ common approach that you go together with some kind of support programs.
32	So from government or municipality together with the regulation that you need to do something in terms of regulation, but you have also support program in place. So I think that the support programs should be mandatory because if you just asked for residents to do something and it gives negative impact then we will not get anywhere.
33	But if you go together, I think it's rationally understandable, but of course not all people think rationally.
34	P1
35	Are you aware of the concept of Digital Nudges?
36	P2
37	I don't know the term isn't very known, so maybe I know it, but the Digital Nudges I think I first hear it first time. Maybe you can tell what it is?

38	P1
39	So basically, nudging itself is about choice architecture. They have been researches where scholars have basically proved that there is no neutral way of presenting choices to people and for example, if the way you order the menu of a cafeteria will have an effect of what people see first, and they often ended up taking that.
40	Similarly, if you compare people with their social circle or their neighbourhood, then you can try to influence them into following certain norms by giving certain standards or reference points by giving a Feedback of how their consumption patterns have been and telling them that maybe you have potential to save this much energy and your consumption has been more or less than the average.
41	You can kind of nudge people into following a certain kind of pro-environment behaviour, and if you do it from the digital realm through UI&UX design or by changing the web forms that people have to fill for applying for certain services, for example, then that is sort of Digital Nudging.
42	There are 3 application domains for the Digital Nudging. First is when you structure the choice environments by using something like a default option. As you might be aware of organ donation forms like in when people apply for driving license or something. Often there by default you're opted into the organ donation program and people just don't opt out that that much.
43	There is presentation of non-personal contextual decision making information. Like maybe before voting you get an SMS from the Election Commission that go out and vote, or have you decided to go out and vote and something like that. And so that kind of information or like 80% of the people have said that they will vote. So these kind of mechanisms psychologically nudge people into certain directions.
44	The 3rd one is presentation of personal information, like giving a Feedback of their consumption patterns, energy consumption maybe. Like on your car, sometimes you have this this thing that tells you that you know this eco, where you drive at speed.
45	So these things are fall in the domain of Digital Nudges. And what I am also looking at are green defaults, so if you have no neutral way of presenting information. And you present it in such a way that the greener options are made default so and people have all the right and the choice to choose another options. It's not like something is mandatory

	so that that's the kind of research that I'm doing, whether it has any potential to help cities that approach.
46	What are your thoughts on this? Yeah.
47	P2
48	So I think that on what you've said, I'd say it sounds very good. I think that we can maybe connect 3 things what we are doing to Digital Nudging.
49	So one is we're developing, will be ready very soon, this heat map of the buildings and Geo-location map, where the building's connected to the centralised heating, will have the possibility to see like red, yellow, green. Also, energy efficiency class. So basically the main idea is just to tell you, yeah, that you are as good as, as neighbor and so on. So that then this will be a lot of information to work further.
50	So, uh, then then also we are organising this one stop shop for more renovation program for building renovation. So there we also (…) and we go to this homeowner's meetings. We prepared the specific information for their building just to try to give them all information about their building. Also, compared to average like assumptions, costs and everything. That means that the residents vote on that like rationally and they have the information. But then also we are managing the ISO 50,000 standard for energy management in our buildings to repay for energy and so each month for schools kindergartens like technical directors, we send this information. How much they consumed? How much it was before? Last year? The other months? like electricity, water and how much they compare well, compared them to the similar sized buildings and also the percentile where they are, whether they cost more or less and then so we're trying, together with Ministry of Economy, to achieve regulation that for the building you don't need to vote for building renovation but against so as you mentioned opt out and it goes together that it is in Latvia it is said what energy efficiency class is OK and what is what is like not according to the normative acts. For those who are not according to the normative acts, the idea is that the maintenance company is able to go and renovate, that they just issue that after 3 months you will start to renovate the building and they have of course rights to vote against that, the default is to vote for.
51	And just to clarify, sorry, I always speaking quite a lot, but for me it's important to tell these details, so for us in Latvia the municipality owns like very small share of

	apartments. All apartments belongs to residents, so therefore if you have like 100 apartment buildings so at least 51% needs to vote for. So therefore it's like very, very hard actually to achieve a positive goal.
52	And with this option out we see that this is maybe something as you mentioned this Digital Nudging that that the main vote is vote for but if you want you can vote against.
53	Then another thing is that so from the air pollution point of view, so we have zoning in the city where evolution is higher. And so therefore, these zones we have prioritised and also know other city that, like sustainable solutions, have priority but centralised heating and heat pumps. It's first priority. You can install for example also other solutions like biomass or natural gas. But only then, if you can, give argumentation that other solutions are not technical feasible or they are life-cycle more expensive and we have a like a template calculation in place that they don't need to ask for like experts and so on. But yeah, but the main idea is that if you're install something like new heat source that you install what is like for the future, for the climate and environment and also for your economy. But to install something which is not approved. It was like air pollution particulate matter or fossil fuels like natural gas. Then it's like a little bit cocked that could go to do that. So yeah, sorry these I think what I can imagine or try to connect with Digital Nudging.
54	P1
55	Since you mentioned that people own the buildings and you have to take their consent in a building, so I was just wondering how is it that the city interacts with citizens? Do you have like a digital platform through which you reach citizen or is it more like through letters and manually, like how does it work?
56	P2
57	Ohh so I will write in the chat but I'm not sure whether this is in in English but if you go to into this homepage (Renove.lv), so there are under upper right corner. You are able to like digitally apply for the consultation for the first consultation, we use this currently, I think (?) or something like that. You've can find a better solution where you can, um, but you can apply for the online meeting or you can also write there that you want on site like the office or somewhere.

58	But then when you apply the online, a link to teams is sent to the building activist and also to the colleagues where then they can meet. And so we're trying to give this information to residents that “We are here. It's like free services from municipality. Just come, we will explain. So we'll work together, go through this one, stop shop steps.” But this is the first step, how we try to do that and I think it's quite nowadays also it's quite easy that you can just like push 3 buttons and write your address and what is your interest and you have a link in your email and you can then go further and to listen developing ways some innovation programs and so on.
59	So this is how we mainly are working to this residents, but to ask about the whole thing specifically like to how, how to confirm the vote.
60	Unfortunately, yes. So there is possibility to sign then the vote protocol with like e signature with digital signature. But in general. So yeah, unfortunately at the moment this is like mainly with the paper from the maintenance companies, like the building manager. And so we have been discussing with some kind of digital system, but so there are quite a lot of people who are like, elderly people and they're not using such kind of systems. And so yeah, so that's basically it from some kind of digitalization.
61	But just to clarify that the construction process itself, when you start to renovate the building, all the energy, that's typical inspection, also technical design. This is like the digital systems, so everything is like fine there and stuff. And this government system, they're also developing. The people are able to sign in there and vote for building renovation, but it's like not working yet.
62	P1
63	Does your city have like some kind of an integrated citizen dashboard much like what universities have these days, for every student where they can just have an online platform and they can see all their subjects and then whatever the teacher has uploaded and all the other things? Because I interviewed a few other cities and one of them has this is developing this kind of integrated digital system where each citizen can go on their dashboard and look if there's any update if like maybe you send a request for renovation or something for example. And they have also linked it with their own payment system, in which they have a card which they can use for just like any other

	visa or MasterCard. And they can use it to pay for any citizen service, Mobility library and so on.
64	So do you have something like that?
65	P2
66	Ohh no, not at the moment. So we have some separate like applications or separate programs or something like that. But yeah, that's something that we have been discussing. But in general, no, we don't have at the moment like one main platform where you can find everything.
67	So even in the social media last year, I think or 2 years ago and the municipality City Council members decided to also to inform separately. So that means that there's one account for, like, education, everything all the like events or everything related to the education, everything related to the development and real estate and so on.
68	So that it's concentrated information that you want to know about, like entertainment and something like that. So you can follow just one thing, but now the payment systems, so they are also separately (…) so for example for public transportation, so it's on public company, but they have their own like, e-system which is there. But this system (...) you can with this get a car ticket or personalised ticket.
69	You can also for example, or children can also pay for like lunch in the school or something like that. But you are not able to use it as a card, credit card or for other events somewhere. So yeah, that's true. It's more decentralised, it's not very centralised, yeah.
70	P1
71	So coming back to the Digital Nudging part. Uh, do you see any other avenues in which it can be applied to push citizens towards pro-environment behaviour?
72	P2
73	Ohh so I haven't thought about that at the moment, so I think definitely many parts even in the I think even in the public transportation or something with for example the

	bicycles. If you have some municipality, like both or subsidised bicycle rental company that you are able to, maybe to rent them for free or something.
74	I would need to think a little bit. Don't have anything like that in the pipeline or anything we have thought for the next 12 months.
75	P1
76	Do you see any challenges or concerns associated with such kind of approach when a city follows nudging towards a certain direction, even if it's for something good like pro-environment behaviour?
77	Do you see any challenges associated with this approach?
78	P2
79	Ohh is I think in general no, but it depends from the implementation how its implemented. But in general so of course I think that shouldn't be any more problems than it is with the transition to Climate internality or green energy in general. So this is I think just a good way how to do that that you slowly implement Digital Nudging as a default setting for everything with municipality needs to achieve. I think it's important that maybe that there are some transition period.
80	For example, if you know that it will be like this that you are changing some system from business as usual to a new approach, then that you have maybe some one year transition period where you can inform residents and so on. Then you reduce the risks of residents saying “I didn’t know” or “this is fast or slow” and so on and so you can mitigate the risks if is there are.
81	Thank you for the interview. It's this kind of approach to add it to the things through this prism or through this Digital Nudging. So it’ll also maybe help me in the in the future for can't think OK how we can do this that this is like as something normal. But I think that the most important thing where it should be, it's like municipality budget or budget planning or also development and planning in general. So, this is something very, very and I would say for maybe next 5 years maybe unrealistic because the city budget (…)

82	So everything depends on the budget and from the priorities, but the main decisions are still made by the politicians. So even if all departments are like in one boat still, but still it is hard to make for example climate neutrality or green transition as a default setting for a municipality budget for the projects for the next year, which will be financed in the municipality because the last decision of what gets how much is made by politicians and this is not as easy to change.
83	So therefore I think that the biggest problem would be politicians.
84	P1
85	But do you have the access to the data that is required for some of these ideas?
86	I mean, do you have like, digital meters that are able to give you the data of whoever is consuming how much energy in their household so that you can give them back to the consumers and show them how they can probably get better?
87	P2
88	So it depends, you know and data is like very, very wide meaning. So you're going to have like yearly data or 15 minute data. So it depends, but in general I would say yes, but there are some obstacles that for example from centralised heating or from utility companies providing energy, this data is available also for the municipality.
89	However, for example, for electricity it is not a like known for us because electricity consumption for each apartment. This is a privacy issue because if you know for the apartment how much they are spending so you can make conclusions of some kind of for the persons living there. But if it's for the whole building so these data are not privacy object. But they can have the service from the utility company. So they are providing such kind of service to the apartment owners or private house owners if they apply.
90	So I think that they need to pay a little bit something that (…) but then they can ask for them. But for municipality, so yeah, we don't know that. And we in municipality, of course, were also measuring or we have some cameras counting like cars on the main streets and so on and so on. But then the same time in transportation sector, it's very hard because you are not able to measure everything, you are not able to follow each car, what is the driven kilometers and so and so on. But the biggest issue for us at least in Riga City is that we are modelling the traffic and car transportation through stationary

	model. So that we don't have like the dynamic model which could like automatically receive the data from the measurements and then say “Ok, you have a maintenance in this street, so therefore everybody will go there.”
91	So this is not don't we have, we don't have this at the moment, but also we have like air pollution meters but not as many. But we have several projects where we are installing them more and more and I would say that if I would need to rate how good data we have from scale one to 10, I would say maybe 5-6, something like that.
92	P1
93	Yeah, I'm getting a sense that from all the other interviewees that I've also talked to, that before these solutions can be applied there.
94	It's better to force these to maybe focus on how to integrate the systems so that they can reach out to the citizens better and provide more relevant information. And like, yeah, that's something I think that there needs to be worked on.
95	P2
96	So yes, I agree. So I don't see the usefulness of one very good project and one data sector when everything else is like chaos or you don't have a system. Should be as you mentioned a systematic approach so that we need to have this database or data repository where all the data is stored?
97	How it's stored, how employees and residents can perceive them or visualise or what they can do with them and don't. So I think that it's very important and all of the things to start from scratch, from the beginning of the system. So therefore we are as an agency responsible for climate and energy. So we are not maybe developing at the moment some solutions about hydrogen or something like that because we have many homework still to do where ohh where we have potential which is like paying back now and where we need to assess our attention now and so on.
98	And I think it applies also for data, for the systematic transition so on.
99	P1

100	Do you have any other insights or recommendations for the research before we conclude?
101	P2
102	Ohh so it would be good if you can later on maybe when you finish send some main conclusions what you have discussed also in other interviews.
103	So it's interesting and also gives some insights in general how everybody is approaching but yes, I think that this Digital Nudging as mentioned is good approach how to work.
104	But of course, like with everything in life, you just need to evaluate or assess the risks and implement anything in specific sectors or specific things. So ohh, and that's it. I think that's important, but that's from our point of view, very important that everybody works together. So it's a challenge because we, as the agency or so we're working horizontally and it's most of the time spent on polititians and convincing somebody that they need to do that.
105	That's very important somehow to still at least influence our departments of municipality government or politicians to make them work together.
106	So I would say that the even if the Digital Nudging (…) you would for example say that "OK, I have solution how to reach Climate neutrality like systematically so implement this and after 5 years everything will be on track." But it's still not guaranteed that somebody will make the decisions, like politicians or something will implement.
107	So I think that that's also very important maybe to think into the research how to show the benefits or financial.
108	P1
109	Yeah. Thank you so much.
110	If you would like to get the results of the research, maybe I will also share you a form where you can also like it.
111	P2
112	OK.

113	P1
114	It has information about your rights as an, as an interviewee, and there's a section with where you can write which email address I can share them with you at.
115	Thank you so much for joining me. It was a very good exchange of ideas and I think what we talked about will be of good use in the analysis part of my research so.
116	P2