ENERGEETIKATEADUSKOND
MÄEINSTITUUT
TEADUS- JA ARENDUSTEGEVUSE AASTAARUANNE 2013

1. Struktuur

Mäeinstituut, Department of Mining
Instituudi direktor Ingo Valgma

- Maavarade kaevandamise õppetool, Chair of Mining Engineering, Ingo Valgma
- Rakendusgeoloogia õppetool, Chair of Applied Geology, Mall Orru

2. Teadus- ja arendustegevuse (edaspidi T&A) iseloomustus

2.1 Struktuuriüksusesse kuuluvad uurimisgrupid (kõik uurimisgrupid näidatakse aruandes eraldi, järgides alltoodud ülesehitust).

Research group of mining technology and resources (leading researcher Ingo Valgma) is team of researchers, specialists and laboratory assistants (1 professor, 2 senior researcher, 5 specialists and 4 laboratory assistants). The group is continuation of previous 75 years study on mining related technologies and economical and resource studies on mineral resources.

Group has following research directions: monitoring technologies, analyzing mining economy, water survey, rock mechanical tests, mining survey and analyzing environmental impact factors. Today the main priority of research group is to develop aspects for sustainable mining conditions. Research group has several projects with public sector and companies. Group cooperates in several research projects and publishes publications, and manages large information network.

Research group has 1 national project (Sustainable and environmentally acceptable Oil shale mining). In total 2 master defending, 3 defending of bachelor theses and 15 project were completed in relation to the study. Main publications:

1. Väizene, V.; Valgma, I.; Iskül, R.; Kolats, M.; Nurme, M.; Karu, V. (2013). High selective oil shale mining. Oil Shale, 30(2S), 305 - 325.; 1.1.
2. Karu, V.; Valgma, I.; Kolats, M. (2013). Mine water as a potential source of energy from underground mined areas in Estonian oil shale deposit. Oil Shale, 30(2S), 336 - 362.; 1.1.
3. Pastarus, J.-R.; Systra, Y.; Valgma, I.; Kolotogina, L.; Anepaio, A.; Vannus, A.; Nurme, M. (2013). Surface mining technology in the zones of tectonic disturbances, Estonian oil shale deposit. Oil Shale, 30(2S), 326 - 335.; 1.1.
4. Valgma, I.; Väizene, V.; Kolats, M.; Saarnak, M. (2013). Technologies for Decreasing Mining Losses. Environmental and Climate Technologies, 11(1), 41 - 47.; 1.2.
5. Valgma, I.; Väizene, V.; Kolats, M.; Karu, V.; Pastarus, J.-R.; Rahe, T.; Iskül, R. (2013). Reduction of Oil Shale Losses. G. Noviks (Toim.). Environment. Technology. Resources (201 - 205). Rēzekne: Rezekne Augstskola Izdevnieciba; 3.2.

Research group of backfill technology and waste management (leading researcher: Jüri-Rivaldo Pastarus) is experienced research team with 1 professor, 3 PhD students, 1 MSc student and 3 senior researchers. Leading researcher has long experience in this investigation area. Research in this group is focused on the development of new mining technologies and utilization of waste rock aggregates and power plants oil shale ash as backfill materials in conditions of Estonian oil shale mines. Working up new paradigm for backfill technology is very important. Key research direction include determination of ash and waste rock properties,

elaboration of recommended parameters of waste, synthesis of mixture for backfilling, mechanical and physical parameters of mixture, backfill parameters of in situ conditions and feasible mining technology. Other research activities are concentrated on environmental protection and cost estimation problems. Group has today strong relations and cooperation with Estonian oil shale industry and good connections in several universities – Aalto University in Finland, Riga Technical University and Rezekne Higher Education Institution in Latvia. Also team has solid and annually growing number of high quality scientific publications.

Research group has 1 grant (Backfilling and waste management in Estonian oil shale industry). In total 2 master defending, 2 defending of bachelor theses and 5 project were completed in relation to the study. Main publications:

1. Valgma, I.; Kolats, M.; Anepaio, A.; Väizene, V.; Saarnak, M.; Pastarus, J-R. (2013). Backfilling technologies for Estonian oil shale mines. Agioutantis, Z. (Toim.). Proceedings of the 6th International Conference on Sustainable Development in the Minerals Industry (SDIMI 2013) (374 - 378). Milos island, Greece: Heliotopos; 3.2.
2. Pastarus, J.-R.; Šommet, J.; Valgma, I.; Väizene, V.; Karu, V. (2013). Paste fills technology in condition of Estonian oil shale mine. v. Asone (Toim.). Environment. Technology. Resources (182 - 185). Rezekne: Rēzeknes Augstskola; 3.2.
3. Pastarus, J-R.; Sõstra, Ü.; Valgma, I.; Väizene, V.; Väli, E.; Tohver, T.; Šommet, J. (2013). Prospects for application of waste rock aggregates as filling material in Estonian underground mines. International Oil Shale Symposium Tallinn, Estonia, 10.-13.06.2013 (35 - 36). Tallinn: Enefit; 5.2.
4. Valgma, I.; Väizene, V.; Kolats, M.; Saarnak, M. (2013). Technologies for Decreasing Mining Losses. Environmental and Climate Technologies, 11(1), 41 - 47. 1.2.
5. Karu, V.; Rahe, T.; Saarnak, M.; Lüütre, E.; Nurme, M.; Valgma, I. (2013). Selective crushing methods for oil shale mining with crushing buckets in Estonia. International Oil Shale Symposium Tallinn, Estonia, 10.-13.06.2013. Enefit, 2013. 5.2.

Research group of Peat Science is motivated and dynamic team of researchers and engineers (2 associate professors, 1 senior researcher, 4 PhD and 4 MSc).
It has deep knowledge and long experience on peat science. Good records of scientific publications (over 12 annually published research papers and 5 of them are published in peer- reviewed scientific journals index 1.1).
Research in the Peat Science Group is focused on: development of analysis methodology of technical indicators of peat, and relationship between these indicators, peat properties of use, 2) biochemical composition of peat, and its usage in balneology, 3) Effect of draining of peat fields on technical characteristics and quality of peat and on water system in harvested and surrounding areas in natural state, 4) Possibilities of oil shale mining under the mires of Estonian oil shale deposit.
Group has today relations with Estonian Peat Society, International Peat Society (IPS), Minnesota University , USA, University Laval, Quebec, Canada, Polish Academy of Sciences, University of Latvia, Dneprovetrovsk University, Ukraine and etc.
Research group participates actively in international conferences, were they have presented the scientific reports in IPS, IUGS (International Geological Society) congresses and other conferences.

In total 1 defending of bachelor theses and 3 project were completed in relation to the study. Main publications:

1. Triisberg, T; Karofeld, E; Liira, J; Orru, M; Ramst, R; Paal, J. (2013). Microtopography and the properties of residual peat are convenient indicators for restoration planning of abandoned extracted peatlands. Restoration Ecology, 1 - 9.; 1.1.
2. Orru, M.; Väizene, V.; Pastarus, J.-R.; Sõstra, Y.; Valgma, I. (2013). Possibilities of oil shale mining under the Selisoo mire of the Estonia oil shale deposit. Environmental Earth Sciences, 1 - 11.; 1.1.

3. Orru, M.; Milvek, H.; Anepaio, A.; Vendla, S.; Valgma, I. (2013). Possibilities for mitigating negative effects of noise and dust caused by extraction of sand, gravel and peat. Agioutantis, Z. (Toim.). Proceedings of the 6th International Conference on Sustainable Development in the Minerals Industry (SDIMI 2013) (577 - 580). Milos island, Greece: Heliotopos; 3.2.
4. Orru, M.; Milvek, H.; Väizene, V. (2013). Chemical properties of peat with balneological potential in Estonia. In: The 5th International Conference on Medical Geology: The 5th International Conference on Medical Geology And 2nd Symposium on Advances in Geospatial Technologies for Health, 25-29 August 2013, Hilton Crystal City Hotel, Arlington, Virginia, USA. (Toim.) The International Medical Geology Association. Arlington, Virginia, USA: Springer, 2013, 41 - 41. 3.1.
5. Valgma, I.; Väizene, V.; Orru, M.; Vendla, S.; Ljaš, J.; Pensa, M.; Anepaio, A.; Karu, V. (2013). Poster of Oil shale mining influence to the environment in Estonia. In: International Oil Shale Symposium Tallinn, Estonia, 10.-13.06.2013: International Oil Shale Symposium Tallinn, Estonia, 10.-13.06.2013. Tallinn: Enefit, 2013, 1. 5.2.

Research group of mining waste management in Department of Mining (leading researcher Veiko Karu) is team of researchers and specialists (1 professor, 2 senior researchers, 4 specialists). Research group is working closely with research group of mining survey and mining technology. Waste management research group is focused to trans-national network with regional networks as building blocks of effective multi-lateral cooperation in the field of mining waste management. The activities carried out on the regional and transnational level will secure better access to knowledge, state-of-the-art technologies and good practice to small and medium size enterprises active in the mineral waste management and prevention sector. Research activities address all the waste management challenges and opportunities which face the Baltic Sea region mining industry, which should be understood as extending to all forms of extraction of natural non-renewable resources. Research group has established research and development working pilot unit for reducing mining waste. Research group has good relations and cooperation with Estonian and European industrial companies and with European universities and research institutions. Research group manages Baltic Mining Waste Business Database (http://mi.ttu.ee/db/)

Research group has 1 international project (MIN-NOVATION. Mining and Mineral Processing Innovation Network). In total 1 master defending, 3 defending of bachelor theses and 5 project were completed in relation to the study. Main publications:

1. Valgma, I.; Karu, V. (2013). Baltic Mining Waste Management Business Database. M. Cała (Toim.). Mining Waste Management in the Baltic Sea Region. (15 - 18). Krakow: AGH University of Science and technology press; 3.2.
2. Valgma, I.; Karu, V. (2013). Mining and processing waste management in Estonia. M. Cała (Toim.). Mining Waste Management in the Baltic Sea Region (33 - 42). Krakow: AGH University of Science and technology press; 3.2.
3. Karu, V.; Valgma, I.; Rahe, T. (2013). Mining Waste Reduction Methods. Zakis, J. (Toim.). 13th International Symposium "Topical Problems in the Field of Electrical and Power Engineering", Doctoral Scholl of Energy and Geotechnology II, Pärnu, Estonia, 14-19.01.2013 (278 - 280). Tallinn: Elektrijam; 3.2.
4. Valgma, I.; Karu, V. (2013). Waste from oil shale mining. Marek Cała (Toim.). Mining Waste Management in the Baltic Sea Region (120 - 126). Krakow: AGH University of Science and technology press; 3.2.
5. Karu, V.; Rahe, T.; Närep, E.; Väizene, V.; de Costa, J. (2013). Abstract of Pilot unit for mining waste reduction methods. In: International Scientific Conference Environmental and Climate Technologies, Conference Proceedings: Environmental and Climate Technologies, Riga, 14-16.10.2013. Riga, Latvia: Riga Technical University, 2013, 7.; 5.2.

2.2 Loetelu struktuuriüksuse töötajate rahvusvahelistest tunnustustest.

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2.3 Loetelu struktuuriüksuse töötajatest, kes on välisakadeemiate või muude oluliste T&A- ga seotud välisorganisatsioonide liikmed.

Isik (ees- ja perekonnanimi)	**Nimetus** (organisatsioonide,komisjonide jm täisnimetus)	**Tegevus**	**Tase**
Enno Reinsalu	Maailma Mäeprofessorite Ühing	liige	Rahvusvaheline
Enno Reinsalu	Ajakirja Oil Shale toimetuskolleegium	liige	Rahvusvaheline
Ingo Valgma	Maailma Mäekongressi rahvusvaheline orgkomitee	liige	Rahvusvaheline
Ingo Valgma	Maailma Mäeprofessorite Ühing	liige	Rahvusvaheline
Ingo Valgma	Maailma Mäeprofessorite Ühingu liikmelisuse arendamise komitee	liige	Rahvusvaheline
Ingo Valgma	Ajakiri Oil Shale toimetus	liige	Rahvusvaheline
Ingo Valgma	Internnational converence on topical problems of power and geotehnologi	komitee liige	Rahvusvaheline
Ingo Valgma	RLEPT orgkommitee	liige	Rahvusvaheline
Ingo Valgma	International Oil Shale symposium	orgkommitee liige	Rahvusvaheline
Ingo Valgma	EUExcert Assotsatsioon	juhatuse liige	Rahvusvaheline
Ingo Valgma	WTC 2011 teaduskomitee	liige	Rahvusvaheline
Jüri-Rivaldo Pastarus	Maailma Mäeprofessorite Ühing	haridus kommitee liige	Rahvusvaheline
Jüri-Rivaldo Pastarus	World Business University Association (WBUA)	liige	Rahvusvaheline
Jüri-Rivaldo Pastarus	Rahvusvahelise konverentsi "Environment. Technology. Resources."	orgkomitee liige	Rahvusvaheline
Jüri-Rivaldo Pastarus	Rahvusvahelise sümpoosioni "Mine Planning and Equipment Selection" (MPES)	orgkomitee liige	Rahvusvaheline
Jüri-Rivaldo Pastarus	Rahvusvahelise sümpoosioni "Environmental Issues and Waste Management in Energy and Mineral Production" (SWEMP)	orgkomitee liige	Rahvusvaheline
Veiko Karu	Maailma Mäeprofessorite Ühing	liige	Rahvusvaheline
Veiko Karu	Eurodoc - Euroopa doktorantide ja noorteadlaste nõukogu	delegaat	Rahvusvaheline
Ülo Sõstra	Geoloogilise Päranduse Säilitamise Euroopa Assotsiatsioon	liige	Rahvusvaheline
Mall Orru	International Peat society. Balneoloogia komisjon	aseesimees	Rahvusvaheline
Mall Orru	International Peat society. Turbageoloogia komisjoni töögrupi	juht	Rahvusvaheline
Heidi Soosalu	Fennia, Soome Geograafia Seltsi rahvusvahelise ajakirja toimetuskond	liige	Rahvusvaheline

2.4 Soovi korral esitatakse aruandeaastal saadud T&A-ga seotud tunnustused (va punktis 2.3 toodud tunnustused), ülevaade teaduskorralduslikust tegevusest, teadlasmobiilsusest ning hinnang oma teadustulemustele.

Teadlasmobiilsus:

Perenimi	Eesnimi	Ametikoht	Riik	Linn	Organisatsioon	Ajavahemik	Sõidu eesmärk
KARU	VEIKO	assistent	Soome	Oulu	Oulu Ülikool	04.02-07.02	Rahvusvahelise projekti töökoosolek
VALGMA	INGO	professor	Soome	Oulu	Oulu Ülikool	04.02-07.02	Rahvusvahelise projekti töökoosolek
VALGMA	INGO	professor	Saksamaa	München	Bauma 2013	12.04-23.04	Osalemine koolituse nimi "BAUMA2013 The Peak of Excellence".
ROOTS	RAUL	laborant	Saksamaa	München	Bauma 2013	12.04-23.04	Bauma 2013 messil ja konverentsil osalemine
KOLATS	MARGIT	spetsialist	Saksamaa	München	Bauma 2013	12.04-23.04	Bauma 2013 messil ja konverentsil osalemine
VÄIZENE	VIVIKA	spetsialist	Saksamaa	München	Bauma 2013	12.04-23.04	Bauma 2013 messil ja konverentsil osalemine
KARU	VEIKO	assistent	Saksamaa	München	Bauma 2013	12.04-23.04	Osalemine koolituse nimi "BAUMA2013 The Peak of Excellence".
SAARNAK	MARTIN	laborant	Saksamaa	München	Bauma 2013	12.04-23.04	Bauma 2013 messil ja konverentsil osalemine
RAHE	TIIT	spetsialist	Saksamaa	München	Bauma 2013	12.04-23.04	Bauma 2013 messil ja konverentsil osalemine
VALGMA	INGO	professor	Kreeka	Milose saar	Mäeprofessorite ühing	25.06-04.07	Osalemine rahvusvahelisel konverentsil SDIMI, suuliste ettekannetega
KARU	VEIKO	assistent	Kreeka	Milose saar	Mäeprofessorite ühing	25.06-04.07	Osalemine rahvusvahelisel konverentsil SDIMI, suulise ettekandega
ORRU	MALL	dotsent	USA	Washington	The Geological Society	24.08-30.08	Osalemine The Geological Society poolt korraldatud rahvusvahelisel sümpoosiumil „Medical Geology“ suulise ettekandega.
KARU	VEIKO	assistent	Rootsi	Örebro	University of Örebro	09.09-12.09	Rahvusvahelise projekti töökoosolek

VALGMA	INGO	professor	Soome	Espoo	Aalto University	31.10-01.11	Osalemine ettekandega konverentsil „Finnish Rock Mechanics day”.
KARU	VEIKO	assistent	Soome	Oulu	Oulu Ülikool	27.11-28.11	Rahvusvahelise projekti töökoosolek
KARU	VEIKO	assistent	Poola	Kraków	AGH Ülikool	04.12-07.12	Rahvusvahelise projekti töökoosolek
VALGMA	INGO	professor	Poola	Kraków	AGH Ülikool	04.12-07.12	Rahvusvahelise projekti töökoosolek
VÄIZENE	VIVIKA	spetsialist	Poola	Kraków	AGH Ülikool	04.12-07.12	Rahvusvahelise projekti töökoosolek
VÄIZENE	VIVIKA	spetsialist	Läti	Riia	Riga Technical University	14.10-15.10	Osalemine konverentsil "Environmental and Climate Technologies"