



## The Environment

Eesti Energia's range of activities covers all the processes connected to energy generation, from oil shale mining to electricity distribution and sales, and all these activities have an impact on the environment.

We always aim to act in a way that minimises our environmental impacts. This is done by using new and cleaner technology and finding ways to lower the effects of our current equipment and facilities.

**To achieve these goals we have set out the general principles of environmental protection at Eesti Energia:**

- We use environmental management systems that conform to the international standards ISO 14001 and EMAS to manage environmental impacts.
- We analyse the environmental impact of our activities constantly and use the best available technology (BAT) to reach our targets.
- We use all our resources carefully and conservatively, we are increasing our reuse and recycling of waste and we are lessening our environmental emissions.
- We are reducing the CO<sub>2</sub> intensity of the energy we supply to our clients lessening in this way our contribution to climate change.
- We are open to new and environmentally sustainable solutions in our activities.
- We work actively together with science and research institutions and consultation firms to reach the set goals.
- In procurement tenders if all other conditions are equal we prefer suppliers with a certified environmental management system

The environmental principles of each Eesti Energia company are based on the general principles and focused for the activities and environmental impacts of the individual company.



## Changes in the Legal Environment

Eesti Energia's activities in 2011 were impacted by new enforced directives and directives still under the revision. Also several national development programmes that will affect our work were approved during 2011.

The European Union's Industrial Emissions Directive (IED) came into force at the start of 2011, bringing together five different directives including Large Combustion Plants Directive (LCPD), Waste Incineration Directive (WID) and the Integrated Pollution Prevention and Control Directive (IPPCD). Eesti Energia's existing combustion plants are covered by the conditions in Estonia's EU accession agreement, which will remain in force until the end of 2015. The requirements for new combustion plants have changed and become stricter and the conditions of use for the current combustion facilities after 2015 have been set out more precisely. The directive should be adopted in Estonian legislation by the beginning of 2013 at the latest.

In 2011 the revision of the Fuel Quality Directive, which came into force in 2010, started to add the requirements for the management of climate change. The revision has led to serious discussions about calculating and limiting the CO<sub>2</sub> emissions created by fuels and about calculating and limiting the greenhouse gases (GHG) from the whole life-cycle of fuel production, which could affect the competitiveness of liquid fuels produced from oil shale. The revision process for the directive will continue in 2012.

At the end of 2011, negotiations started between the EU and member states about revision of the National Emissions Ceilings Directive (NECD). This directive sets the annual limits for all of the main pollutants for all member states on the basis of the sources of pollution on the territory of each state. The aim of the revision of the directive is to lower the permitted emissions for the member states and bring the EU requirements into line with the Gothenburg Protocol of the Convention on Long-range Transboundary Air Pollution. This would mean stricter pollution limits for Estonia, which would affect the oil shale industry. The negotiations will continue in 2012.

Eesti Energia's environmental principles include efforts to reuse and recycle the waste produced from our operations. In March 2011 the government approved the National Development Plan for Mineral Resources Used in the Construction Industry for 2010-2020, which listed the waste rock left over from the oil shale enrichment process used in mining as an important resource. This development plan also creates a better legal basis for the wider use of the waste rock and other mineral materials produced in mining.

Eesti Energia has started diversifying its electricity generation through the increased use of biomass and wood in particular. A very important condition for this was the Estonian Forestry Development Plan until the year 2020, which was approved by the Estonian Parliament in February 2011. The sustainable levels of logging set out in this development plan support Eesti Energia's plans for diversifying generation by increasing use of the biomass.

There were also important events within the EU ETS implementation in 2011. In the middle of the year the certification of historical references for CO<sub>2</sub> was done at much stricter levels than before and used as the basis for the CO<sub>2</sub> trading permits and free CO<sub>2</sub> emissions allowances for EU ETS third period starting from 2013. The requirements for the verification of GHG reports for the current CO<sub>2</sub> trading period were also changed from 2011.

## Use of Resources

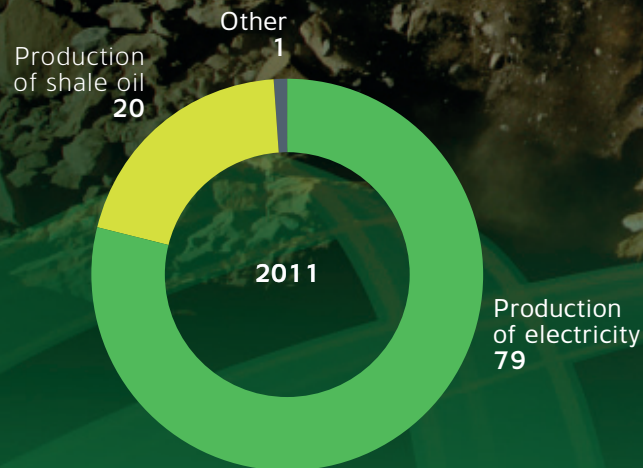
Eesti Energia's activities are on a large scale based on oil shale. We generate heat and electricity from oil shale and we produce liquid fuels from it. However, we have also started to diversify the range of primary energy sources we use. In 2011 we used a total of 15.8 million tonnes of oil shale, 98.2 million m<sup>3</sup> of natural gas, 415.4 tonnes of biomass and 12.0 tonnes of liquid fuel. We also used wind and water power to produce electricity.

In the past year, a total of 18.0 million tonnes of oil shale were delivered to customers from our mining business, of which 88% were used within the Group and 12% by other clients. At the end of 2011 Eesti Energia had 559 million tonnes of mineable oil shale resources in Estonia.

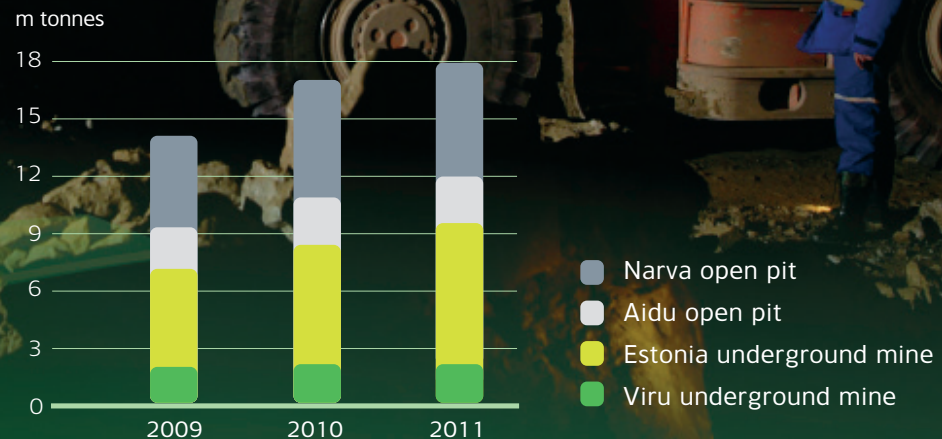
We mine oil shale in two opencast mines or quarries and two underground mines. To ensure the security of supply of oil shale over the long term we have started detailed preparations for the opening of the new underground mine in Uus-Kiviõli. After thorough assessment of the environmental impacts, we were granted mining licences for extraction work in the Uus-Kiviõli mining site. The mitigation of environmental

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USE OF COMMERCIAL OIL SHALE (%)



PRODUCED COMMERCIAL OIL SHALE





impacts continues during all the steps of the opening process of the mine in close cooperation with local authorities and community.

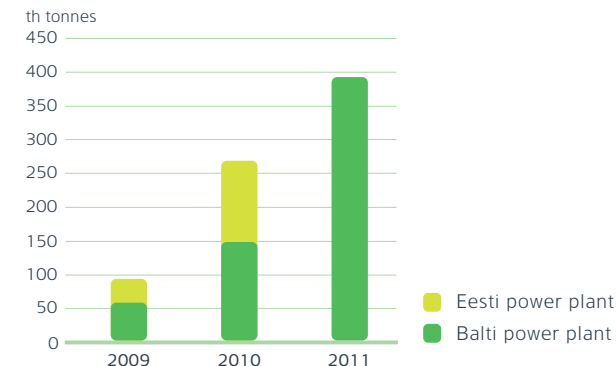
**After thorough assessment of the environmental impacts, we were granted mining licences for extraction work in the Uus-Kiviõli mining site.**

The systematic recultivation of mining areas continued in 2011 on around 200 hectares of land, which is the same area as was mined from the quarries during last year. Mined areas are recultivated according to the plans that are agreed with local authorities and are mostly reforested. As a part of the International Year of Forests we organised an event in Aidu quarry together with the Centre for State Forest Management in summer to present the recultivated and reforested mining land. Aidu quarry is the oldest of our mines and is becoming exhausted and will need to be closed down. In parallel with the planning for the future of the quarry, which foresees an international rowing course, a resort, a shooting range and more, we are looking at ways of extracting the oil shale resources that remain in the area of the quarry. Preparations for the closure of Aidu quarry show clearly that the place will be valuable and can be used in many different ways in the future.

Important research also continued last year into ways of extracting oil shale from underneath of wetlands. Mining new areas in future and getting the maximum possible resources out of existing mining areas will require new mining technology with low environmental impact to be used to extract oil shale also from under bogs and marshland without damaging the sensitive natural environment. Recent research results shows that this is possible, but the research needs to continue in 2012 to produce clear conclusions .

In order to lessen the environmental impact of electricity generation, Eesti Energia has started to use increasing amounts of biomass to partly substitute oil shale. The use of biomass for generating heat and electricity in the Balti power plant was increased last year 243.8 thousand tonnes from the level of the previous year, reaching at least 20% of energy that went into the boilers. We have improved the reliability of the co-combustion system in various weather conditions by working with our partners on the preparation and storage conditions of the biofuel. At the end of 2011 a separate biofuel feed system in the Balti power plant was completed at a cost of 14.6 million euros, increasing the maximum biomass usage up to 50% and ensuring the stability of the process. The new 300-MW generating unit of the Eesti power plant will to use biomass for up to 50% of energy input, which could lead to a massive rise in the use of biomass in future. In our current and future procurements for biomass, we look closely at the sustainability of the supply sources, which helps us to avoid any adverse environmental impacts from our increased biomass usage.

## USE OF BIOMASS IN ELECTRICITY GENERATION



Construction and the preparations for commissioning of the first combined heat and power (CHP) generating unit in the Baltic states using municipal waste as a fuel source continued in 2011. It is worth noting that we are carrying out additional environmental impact assessment and thorough research into ways of re-using the ash created from the waste to energy process to reduce the impact of the generated ash on the environment. The generating unit will be commissioned in 2013 and will significantly reduce the amount of municipal waste that is stored in landfills by turning it into energy.

**Year 2011 was important for the wind energy developments because a 39 MW wind park was built.**



Year 2011 was important for the wind energy developments because a 39 MW wind park was built on the closed oil shale ash field of the Balti power plant. The wind park contains 17 2.3-MW E82 generators made by Enercon GmbH and is unique for having been built on the old industrial landfill site rather than on a freshly developed site. Doing this has allowed to use the closed ash field in a much better and efficient way.

Another successful development was the addition of three 3-MW WinWind generators to the Aulepa windpark, bringing the total capacity of the park to 48 MW. Also the development of Paldiski wind park of 9 GE generators with a total capacity of 22.5-MW has started well.

Eesti Energia continues to operate the Linnamäe and Keila-Joa hydro-electric power plants. The Linnamäe hydro plant is the largest working one in Estonia and was renovated in 2002. In summer 2011 we carried out extensive research to assess the technical condition of the dam and improve the movement of fish on the site.

### Waste Handling

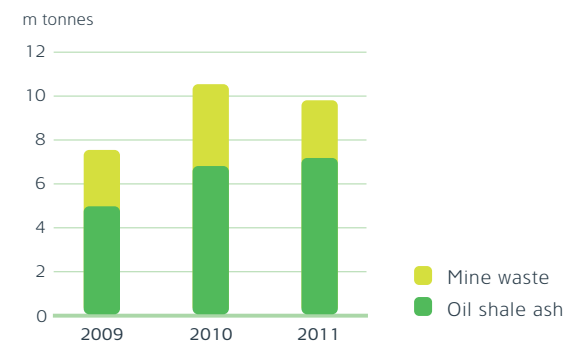
Thermal treatment of the oil shale to get electricity, heat and liquid fuels creates a significant amount of ash. In 2011 we stored a total of 7.1 million tonnes of fly and bottom ash in the ash fields of the Balti and Eesti power plants. We use a closed hydro transportation system to remove and store the oil shale ash, as our long experience has shown this to be technically and environmentally the best solution. This helps us to ensure that the whole system meets all the environmental requirements. We have increased

the environmental safety of the whole ash removal system markedly through systematic maintenance, sediment removal from the water return system and continuous monitoring of ground and surface water. In 2012 we plan to conduct additional geo-technical investigations of the soil properties around the ash field to get additional information to enhance the safety of the ash fields.

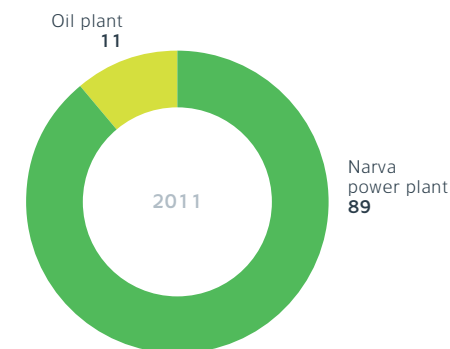
Oil shale ash is in fact a very good raw material in various applications, for example in the production of construction materials, as a replacement for cement in various mixes, in large-scale mass stabilisation processes, and for neutralising acidic agricultural land. We have started to develop these potential solutions by working with various research institutions on several research and development projects. In 2011 we initiated with our partners the OSAMAT project cofinanced by the EU LIFE+ programme to study the usage of oil shale ash in road construction. In parallel a research group led by Tallinn University of Technology is working with Eesti Energia on various aspects of recycling ash and widening the types of oil shale ash that can be recycled. Preparatory work continued for tests to backfill mines with oil shale ash and waste rock. Planning of the tests of using oil shale ash CO<sub>2</sub> binding properties were ongoing. With every planned oil shale ash recycling option we are preventively assessing very carefully the possible environmental impacts.

As well as researching the recycling possibilities of oil shale ash, we are also preparing to expand significantly our capacity for removing ash from the power plants in dry way as this is an important factor of increasing the amount of ash

### DEPOSITED WASTE



### ORIGIN OF OIL SHALE ASH (%)





recycled. Our strategic target is to increase the amount of recycled oil shale ash at least fivefold over the next five years.

When oil shale is mined, it is usually enriched, meaning that the oil shale is separated from limestone and other minerals in a process that gives the oil shale its required calorific value. Enrichment produces waste rock, which is mostly limestone. In 2011, 2.6 million tonnes of waste rock produced from mining was stored in waste rock heaps.

The waste rock that is produced in quarries is used for recultivating the quarry areas. The waste rock from underground mining has so far mostly been stored onto waste rock heaps. For more efficient use of our resources, we have built gravel production units from waste rock at Aidu quarry and the Estonia mine with a total production capacity of 1.5 million tonnes of gravel a year. As well as producing gravel, we have found several other ways of using waste rock in large amounts. A good example of this is the motor sport park being built in Mäetaguse parish and other large building projects using waste rock.

It is an important principle in waste handling that all the waste that is produced is recycled to the maximum possible extent in the simplest possible processes. We are already engaged in further assessment of the environmental impact of making safe, recycling or landfilling the fly and bottom ash from the waste to energy heat and electricity generating unit that is due to start up in 2013 at the Iru power plant, aiming for the minimum possible environmental impact and the maximum

possible level of recycling. The results of the assessment and the proposed next steps will be announced in 2012.

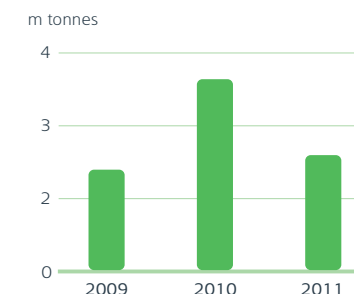
### Air Pollution

The thermal treatment of any type of fossil fuel through combustion or pyrolysis creates emissions into the air as well as solid waste.

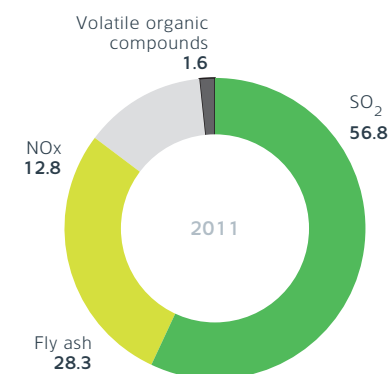
In 2012 much stricter environmental restrictions will apply to Eesti Energia's emissions and the overall amount of SO<sub>2</sub> emitted from the Balti and Eesti power plants will be limited to 25,000 tonnes a year. Because of this, we continued working to install and fine-tune the NID technology-based emission reduction filters to cut SO<sub>2</sub> emissions from four generating units of the Eesti power plant. This solution means that these filter equipped units will meet the tighter limits on sulphur emissions in flue gasses that will come in from 2016. Measures are also being taken to reduce nitrogen emissions and this will mean that the units will be able to work at full capacity after 2016, without limits.

As well as installing the filtering system, we also worked all year round on testing alternative solutions for reducing SO<sub>2</sub> emissions from the other generating units of the Eesti power plant, in order to increase their possible working time from 2012 and ensure that they can also be used for limited periods after 2016. The tests have been successful so far and the amount of SO<sub>2</sub> released from the boilers appears to be significantly lower.

### MINE WASTE STORED IN HEAPS



### AIR EMISSIONS (th tonnes)





In the past year work started on a new 300 MW capacity generating unit using fluidised bed technology at the Eesti power plant. Our extensive experience of using fluidised bed technology for the combustion of oil shale means that the atmospheric emissions from the new unit will be substantially lower than those from older units. Further environmental benefit will be achieved by the use of biomass for up to 50% of the fuel input capacity. The new unit will mean that electricity generation capacity can be maintained even as environmental restrictions become more stringent.

The same situation applies for the Enefit-280 plant, which we are currently building. It is a modernised version of the Enefit-140 plant currently used in our oil plant. The new improved technology will be more reliable and have a lower environmental impact. In 2011 the Enefit-140 was fitted with new chimneys and the old electrostatic precipitator (ESP) used until now on the Enefit-140 was renovated. The result of this is that the new ESP cut emissions of particulates and related heavy metals from the Enefit-140 to one twentieth of the levels permitted in the environmental licences, improving significantly the quality of the air in the surrounding area.

### Climate Change and GHG

Eesti Energia's activities released a total of 12.3 million tonnes of CO<sub>2</sub> into the atmosphere in 2011. In the light of the EU's climate policy and international measures on climate change management, Eesti Energia has set a target of cutting the CO<sub>2</sub> content of our electricity generation by 30% from the 2007 level by 2015 and by

70% by 2025. To achieve those targets we have various solutions in place such as diversifying the fuels that we use and increasing the proportion of biomass, increasing the efficiency of our generation by introducing new equipment and using more combined generation of electricity and liquid fuel, and expanding the use of wind power etc. By combining all these methods we can reach our set targets.

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The discussions last year between Estonia and the European Commission about the National Allocation Plan (NAP) for greenhouse gases for second period (2008-2012) were successful for us. After almost five years of negotiations, the Estonian NAP for 2010-2012 was approved at the end of 2011. The allowances in the approved plan were based on actual verified average CO<sub>2</sub> emissions from 2005-2010, which gave Eesti Energia's installations allowances for 1.26 million tonnes of CO<sub>2</sub> emissions per year. The approved NAP also allows 10% of the CO<sub>2</sub> emissions of 2011 and 2012 to be covered by CERs and ERUs under the Kyoto mechanisms. The approval of the NAP was important for Eesti Energia to be able to plan future activities.

In the past year preparatory work started for the GHG trading period 2013-2020, which will see major changes in the principles for distributing emissions allowances. The new GHG trading directive does not normally permit electricity generation to receive allowances for free from 2013, and they will have to be bought from the market. Decreasing quantities of free allowances are still available for heat generation. The directive also allows states to give limited amounts of free CO<sub>2</sub> allowances to electricity generators under strict conditions for investment in building new and environmentally sustainable generating capacity. It is possible that the allocation distribution principles for industries that are sensitive to carbon leakage may apply to the production of liquid fuels from oil shale.

As a consequence of this, we had independent accredited agents carry out a verification of our past reference values and we presented the results of this verification to the Ministry of the Environment together with the application for free allowances for heat generation. Given that Estonia has derogations for the distribution of allowances, Eesti Energia applied to the Ministry of the Environment for free allowances for the new and much more sustainable electricity generation capacity that is being built. The application is currently under consideration at the European Commission. In addition to all this, Eesti Energia applied for CO<sub>2</sub> trading licences for the next trading period for all of our plants that come within the GHG trading system.



## Social Responsibility

**As the country's largest company and largest employer,** Eesti Energia is responsible for the impact of its decisions and its actions on its employees, clients and partners and also on local communities, the environment and the wider society. For this reason we continued to support projects relating to the energy industry, environmental protection and society in 2011. We put a total of 570,849 euros into our support for various efforts in 2011.

In 2011 the Responsible Business Index drawn up by Äripäev, the Responsible Business Forum, the EBS Centre for Ethics and the Ministry of Economic Affairs and Communications ranked Eesti Energia fourth in its list of socially responsible businesses and awarded us with the official logo of Estonian Responsible Business 2011.

### We are promoting youth entrepreneurship in Estonia

In 2010 we launched the Estonia-wide Entrum youth enterprise development programme, which encourages young people to be active and entrepreneurial with backing from top Estonian achievers. In the first year, 644 young people from Ida-Virumaa took part in the Entrum programme, and together they launched 87 projects. In September 2011 Entrum came top in a competition organised by the Ministry of Economic Affairs and Communication to acknowledge the

promoters of entrepreneurship and it won title of Corporate Social Responsibility Initiative of the Year at the Swedish Business Awards 2011. The programme that started in autumn 2011 will see around 200 young people from Jõgevamaa, Põlvamaa, Tartumaa, Valgamaa and Võrumaa take part and try to develop their business leader instincts with the help of some of the most successful people in the country. The young entrepreneurs from south Estonia who have joined the Entrum programme have now set up 98 projects in their local region.

### We are promoting a healthy lifestyle and living environment

In August 2011 we held the first Narva Energy Run, our new annual sporting and cultural event, which hopes to put Ida-Virumaa more clearly on the map of Estonian sporting events and encourage people in Estonia to find out more



vastutustundlik  
ettevõte 2011

about this beautiful region. More than 2000 runners took part in the first run, of whom over 400 work for Eesti Energia.

The Eesti Energia Jogging (Eesti Energia Tervisejooks) and Eesti Energia Nordic Walk (Eesti Energia Tervisekõnd) series have proved popular with the public and among fitness enthusiasts.

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The ninth season finished in September with 2122 runners and walkers having taken part. A grand total of 133,520 kilometres was covered by all the participants, enough to stretch three times round the world.

We are working together with Swedbank and Merko on the Estonian Health Trails (Eesti Terviseradajad) to offer the people possibilities for various outdoor activities. More than 80 health trails have been fixed across Estonia to give everyone in the country access to a place outdoors where they can exercise for free all year round. In autumn 2011 Eesti Energia employees worked with the Äkke sports club to fix the Narva Pähklimäe health trail and build an outdoor gym there.

In September the Eesti Energia sports club started a monthly health day to promote healthy and sporty lifestyles among the company's employees.

## We care for the natural environment

Among other local initiatives, we supported the Purtse river festival Purfest 2011 in August 2011 to attract attention and explain to the representatives of the local community the pollution and environmental problems of the Purtse river.

We worked with Looduse Omnibuss (Nature Omnibus) to run 101 nature and cultural trips which took over 6000 people out into the country to learn something new in 2011, and more than 7000 came along to the 32 weekly nature

evenings to find out about our environment. The support from Eesti Energia allowed Looduse Omnibuss to start its nature and culture trips in Ida-Virumaa too and to carry out several major educational events in Tallinn and Jõhvi. Üheskoos korraldatud konkursile Looduse Aasta Foto 2011 saabus fotosid 1850 autorilt.

We are helping Looduse Omnibuss to broaden its work so that even more people can get good energy from the Estonian natural environment.

## We spread information about electrical safety

For several years now we have run a spring campaign across Estonia to promote electrical safety so that children and parents become more aware of the dangers of electricity and how to avoid them, and of what to do in dangerous situations. Greater awareness will mean that there will be fewer accidents and deaths caused by electricity or its misuse. The awareness campaign saw people from Eesti Energia Jaotusvõrk working with almost 3000 children in regional safety camps and attention was also drawn to electrical safety through articles and an advertising campaign under the slogan "It is OK to be scared of wires!".

## We promote discussion about electricity and energy

We encourage debate within society about energy issues by hosting public forums on questions that affect the future of the energy industry and

possible scenarios for its future development, and by presenting innovative solutions that can make the energy business cleaner and more efficient. In September 2011 the energy forum Where Will Tomorrow's Energy Come From? debated the future of the electricity market in Estonia and across Europe, while in Jõhvi in Ida-Virumaa we organised the oil shale day for the eleventh time, focusing on new mining technology and the production of liquid fuels. We demonstrated the reality of liquid fuels produced from oil shale by giving the first test drive to a vehicle running on diesel made by Eesti Energia from oil shale.

We helped with the Oil Shale – Opportunities for Cooperation conference organised by the Virumaa College of Tallinn University of Technology and its Centre of Excellence in Oil Shale Technology. The conference aimed to promote partnerships between education, science, business and society where they share an interest in the sustainable development and use of oil shale.

## We advance the energy industry

Eesti Energia places a high value on applied education in engineering, a scientific approach to the world and innovative thinking, and these are also important for all of Estonia. For this reason we aim to promote energy as a subject of popular interest and to encourage understanding of energy and engineering throughout society.

We believe that it is particularly important to promote education in engineering and popula-



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rise it among the younger generation. We need to make sure we will have a well-trained future generation, and to achieve this we are contributing to modernising and broadening the teaching of subjects that are important to us. Among other things we give students the chance to see and get to know the real world of their chosen subject during their studies. To read more about our work with future generations see the chapter Employees on page 52.

We are one of the founders of the Energy Discovery Centre (Energia Avastuskeskus), which organises exhibitions for children and adults on topics related to energy. The exhibitions of the Energy Discovery Centre use hands-on examples to help make subjects that are in the national curriculum for science more exciting and easier to understand. In the past year the centre hosted two exhibitions on mythical creatures in Estonia and natural phenomena.

We helped with an engineering competition run by the student organisation Best-Estonia by setting the challenges for the young IT specialists taking part.

We are supporting the systematisation, archiving and publication of the history of electricity in Estonia, because we appreciate the importance of our own history. In the past year we organised and systematised the Eesti Energia museum archive and we are collecting valuable historical materials from our current and former employees.

## We support local initiatives in Ida-Virumaa

A majority of Eesti Energia's employees and activity are based in Ida-Virumaa and we have focused above all on promoting development in the region.

We are planning to work with the Ministry of Culture, the Estonian Olympic Committee, the Estonian Rowing Association and the district of Maidla to build a water sports centre with a rowing course on the territory of the Aidu quarry, which is currently in the process of being closed. We want to redevelop the quarry area so that it could greatly improve the social and economic

environment in the Maidla district. The planning work for the redevelopment has started and by 2015 the water centre should be finished together with a rowing course that will meet all the international standards and become a local visitor attraction.

We are working with the Kohtla-Nõmme Mining Museum on a modern visitor centre for the energy industry, funded by the European Union's structural funds. We want to make the European Union's only museum dedicated to oil shale energy into a theme park showcasing oil shale mining and use and also the broader energy industry. We are helping to create and install the permanent interactive exhibition covering the history and current state of oil shale energy in Estonia. The new preliminary design for the exhibition in the visitor centre was drawn up together with experts. Building work on the underground part of the visitor centre started in 2011.