



“Actions speak  
louder than words.”

Estonian proverb

# Environmental Activities

Our range of activities, from oil shale mining to electricity distribution and sales, has a significant impact on the environment. The environmental impacts of energy generation are felt through the use of land and resources, the generation of waste, the emissions of pollutants to air and water and the aggregated impact of all of the above, which is seen in climate change issues. In order to lower our negative environmental impact, we take the following steps: increase the use of renewable resources, reduce environmental emissions and ensure a more efficient use of natural resources.

We cannot undo the environmental impact of our activities, but we can keep working to minimise it in order to ensure sustainable development.

Eesti Energia's general principles of environmental protection:

- 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 any new project before starting it and apply the best available technology (BAT) to reach our targets.
- We use our resources carefully and conservatively, we are increasing our reuse and recycling of waste and we are reducing our environmental emissions.
- We are lowering the CO<sub>2</sub>-intensity of the energy delivered to customers and thus the impact of this energy on the climate.
- We work closely with scientific research establishments and consultation firms and we are always looking for new solutions.
- Under equal conditions in procurement tenders, we prefer suppliers with a certified environmental management system.

## Keeping Focus on Environmental Impacts

Our activities are on a large scale based on oil shale that we use to generate heat and electricity and to produce liquid fuels. Our main environmental objective is to reduce the environmental pollution associated with our activities.

is 2.5 times lower than the initially allowed amount. To do that, in the beginning of 2012 we completed our five-year research and testing project by installing unique desulphurisation systems on four generating units of the Eesti power plant.



*“In 2012, we have been bridging the path to the future. As a result of a project lasting almost five years, the desulphurisation equipment was finally installed in four blocks of Eesti power plants. We have also completed the building of an additional lime dosing system. In this light, I consider the year 2012 as being rather successful.”*

*Aleksandr Nartov  
Project Manager of the Technology Development Division  
at Narva Power Plants*

As the result, SO<sub>2</sub> emissions were reduced more than twice and electricity generation became considerably cleaner.

With these systems we will be able to maintain the generation capacity of the Narva power plants after 2016, when tighter environmental requirements of the European Union are applied. It cost us 108 million euros to equip the generating units with desulphurisation systems, and in 2012 we also started installing equipment to reduce NO<sub>x</sub> emissions so that we can meet more stringent restrictions on the NO<sub>x</sub> emissions that will come into effect in 2016.

Another effort was made to reduce airborne emissions when we replaced some of the oil shale

### Reducing Airborne Emissions

Whatever the use of oil shale as a fossil fuel, it is associated with air pollution. Upon joining the European Union, Estonia assumed the obligation to cut annual SO<sub>2</sub> emissions to 25,000 tonnes, which

with biomass in the CHP generating unit of the Balti power plant. We used over 560,000 tonnes less oil shale to generate electricity in 2012, and the Narva power plants generated 250,000 tonnes less oil shale ash because biomass has a significantly lower ash content of up to 7% compared to 45-46% for oil shale. Moreover, the emission of estimated 457,000 tonnes of CO<sub>2</sub> was prevented.

## We are Reducing the CO<sub>2</sub> Intensity of Our Activities by Diversifying our Production Portfolio

Our internationally unique experience and know-how in using oil shale deserve to be shared, and we strive to contribute to the reduction of greenhouse gas emissions. To do that, we are diversifying the fuels we use for electricity generation, increasing our production efficiency with new equipment, using combined production of liquid fuels and electricity and increasing the generation of wind energy.

In addition to upgrading our power plants, we have started building a new 300 MW CFB (circulating fluidised bed) power plant in Auvere. The new power plant will allow, alongside oil shale, to burn peat for up to 20% and biofuels for up to 50% of its fuel intake, so it will be using fuel more efficiently, and we will be able to reduce emissions from each unit of energy generated.

We are investing in small CHP plants. We are building small CHP plants in areas where the combined production of heat and electricity is economically feasible and the most environmentally friendly way to supply energy to the local community.

In 2013 the new Iru waste-to-energy power plant, which is to create energy from mixed municipal waste generated in Estonia, will start up. Despite sorted waste collection, the country annually generates 300,000 tonnes of waste, and we will be able to reuse up to 220,000 tonnes of that waste for energy generation, which will reduce the annual amount of natural gas the industry needs by 70 million cubic metres. The Iru waste-to-energy power plant will be using the best incineration technology available, which can convert about 85% of the energy in the waste into electricity and heat. In total more than 400 waste incineration units around Europe use this technology.

We use wind energy as one of the renewable energy sources. We have been generating energy from wind since 2002, when we built the first wind generator in Virtsu. We are developing new wind parks in addition to those that are already used. For example, we started up wind parks on the Narva ash deposit site and in Paldiski in 2012. These developments will increase Eesti Energia's renewable energy generating capacity by a total of 133 GWh.

## We Use All Resources Carefully and Conservatively, Recycling as Much as Possible

The large amounts of waste produced in the process of oil shale mining and using oil shale to generate electricity make us the largest waste-generating company in Estonia. We consider maximising the recycling of by-products, especially mine waste and oil shale ash, extremely important for reducing our environmental impact. We maintain cooperation with various interest groups to find the best solutions.

Oil shale processing generates waste rock, which is mostly limestone. Even untreated, it can be used as mineral filler, and it becomes a valuable construction or raw material after processing. One example of using unprocessed oil shale waste rock is as filler in road construction. We recover waste rock by producing high-quality gravel that can be used for a variety of construction projects. We have been using waste rock for the construction of facilities meant to contribute to the environment of Ida-Virumaa region; for example, significant quantities of rock waste were used for the reconstruction of the Jõhvi bypass.

Thermal treatment of oil shale creates solid waste called ash. Oil shale is rich in mineral matter, so up to a half of the burned oil shale can turn into ash. Oil shale ash is mainly used for the production of construction materials as a raw material for

building blocks and as a component of cement and dry mixes. To increase the amount of oil shale ash recycled, we have started several research programmes and development projects in cooperation with Estonian and international research institutions and companies. We continued working on several development projects in 2012 in order to test new areas of application. One of the major undertakings was the OSAMAT project on using oil shale ash as foundation and for the mass-stabilisation of road embankment in road construction. In addition, we participate in the SMOCS projects involving major ports of the Baltic Sea, which looks into the use of oil shale ash as cement replacement to stabilise the environmentally hazardous sediments in ports.

We cooperate with the Department of Mining at Tallinn University of Technology to develop the opportunities for backfilling mines with oil shale ash and waste rock, and we aim for a loss-free mining technology in the long term. We are also working with the Laboratory of Inorganic Materials at Tallinn University of Technology to research and improve the use of oil shale ash for neutralising acidic agricultural land.

One of Eesti Energia's objectives is to make every possible effort to recover and restore the value of the industrial sites we have been using. In 2012 we closed down the Aidu oil shale quarry that had been

in use for over 40 years and became depleted. We are recultivating the quarry area to make sure that it creates significant additional value for the social and economic environment of the local community. In cooperation with the district of Maidla, by 2015 we will have built the unique Estonian water sports and recreation centre there.

At the same time we have started preparations for the closing of the Viru underground mine in 2013. We would like to turn the former Viru mine into an area with a high value in use, which will be of interest to the local community and expand business opportunities.

In 2012 we started up the Narva wind park on the closed ash field of the Balti power plant. During the closure of the ash field in 2008, which was a major environmental project, we planted the surface of the ash field with trees and shrubs, constructed roads to access the ash field and built a water surplus pumping unit. The environmentally friendly electricity generated by the wind park will be enough to meet the annual electricity needs of 35,000 average Estonian households.



*“As unbelievable as it may sound, just ten years ago it was a common practise among miners not to conclude contracts with local residents if they wanted to extract natural resources near some village. On paper everything looked fine; however, when the reality of the situation finally dawned upon them, it was usually too late for local residents to influence the course of events. Now, the situation has changed significantly.”*

*Estonian daily newspaper Põhjarannik  
October, 2012*



In 2011 we received the “Environmental Award for Business 2011” for our environmentally friendly use of the former ash field.

By regularly replanting forest on the Narva quarry, we annually recultivate as much of the quarry area as we have used for mining

## Assessment of Environmental Impacts

To achieve better results, our activities must include production development, and one of the integral parts of any development is the assessment of the possible environmental impacts of each project and informing all the interested parties about these impacts. In the process of environmental impact assessment, we discuss all the intended developments with all the parties at the initial stage of the project. The assessment is performed by experts representing a particular area, and the information about the process is available to the public. Public discussions guarantee project stability and agreements with interest groups. In 2012 we performed the environmental impact assessment of oil shale processing solutions (for instance, producing liquid fuels from oil shale), alternative solutions (for example, combined production of heat and electricity from municipal waste), and the closing of mines. We continued discussing the Enefit280 oil plant, the first oil plant to start combined electricity generation and

shale oil production, with interested parties and the authority that is to issue the environmental permit. With the new plant, our production capacity will double, and the whole process will be more environmentally friendly. In addition to the strategic assessment of the environmental impacts of the project, we will perform the assessment of individual environmental impacts as the project takes shape. We use this two-stage assessment process to choose the technology that will ensure the lowest possible environmental impact.

We prepared the environmental impact assessment report about the closing of the Aidu quarry, and now we need to perform an environmental impact assessment so that we can close down the Viru mine. To secure the availability of raw materials for energy production in the future, we have started preparations for developing a new mine, referred to as "Uus-Kiviõli" at the moment.

# Key Environment Figures

			PRODUCTION		
			2011	2012	
			Electricity (GWh)	10,428	9,378
			Heat (GWh)	1263	1137
			Liquid fuels (t tonnes)	184.5	211.1
			Producer gas (million m <sup>3</sup> )	58.1	65.2
			USED RESOURCES		
			2011	2012	
Commercial oil shale (million tonnes)	15.8	14.8			
Natural gas (million m <sup>3</sup> )	98.2	59.4			
Biofuels (million tonnes)	0.4	0.5			
Cooling water (million m <sup>3</sup> )	1,522.9	1,307.2			
Pumped mining water (million m <sup>3</sup> )	224.8	203.0			
incl. water from quarries (million m <sup>3</sup> )	131.8	112.2			
incl. water from underground mines (million m <sup>3</sup> )	93.0	90.8			
			EMISSIONS		
			2011	2012	
			SO <sub>2</sub> (th tonnes)	56.8	23.2
			incl. the Narva power plants (th tonnes)	56.6	23.1
			NO <sub>x</sub> (th tonnes)	12.8	9.9
			Lendtuhk (th tonnes)	28.3	6.5
			CO <sub>2</sub> (million tonnes)*	12.3	11.0
			WASTE		
			2011	2012	
Oil shale ash (million tonnes)	7.1	6.9			
incl. recycled (th tonnes)	97.5	121.3			
Mine waste (million tonnes)	9.0	8.1			
incl. recycled (million tonnes)	8.1	7.6			
			WATER POLLUTANTS		
			2011	2012	
			Suspended matter (th tonnes)	1.7	1.1
			Sulphates (th tonnes)	131.5	76.0
			ENVIRONMENTAL FEES PAID		
			2011	2012	
Resource fees (million euros)	28.7	30.4			
Pollution fees (million euros)	19.8	17.8			

\* Preliminary figures

## Application of Environmental Management Systems

Environmental issues are plenty, and we need a substantial number of environmental permits for our activities. We use environmental management systems that conform to the international standard ISO 14001 in our companies whose activities imply that their environmental impact will be significant. This means that all the company levels must be aware of the environmental impacts of the company's operations and will have devised plans to systematically reduce and mitigate these impacts. We review the extent and significance of the companies' environmental impacts and their plans at least once

a year and update them if necessary. In addition to ensuring environmental compliance, an environmental management and auditing system such as, for example, the EMAS used by the Iru power plant, allows information about the operation and environmental impacts of the power plant to be shared with all the interested parties. We are using this experience to change all Eesti Energia's companies to the EMAS in the nearest future in order to make our environmental activities even more trustworthy and transparent.

	ISO 9000 series	ISO 14001	OHSAS 18001	EMAS
EE Kaevandused	9001	14001	18001	
EE Narva Elektriijaamad		14001:2005		
EE Õlitööstus	9001:2008	14001:2005		
EE Iru elektriijaam	9001:2000	14001:2004	18001	EMAS
Elektrilevi	9001	14001	18001	
EE Tehnoloogiatööstus	9001:2008	14001:2005	18001	
EE Võrguehitus	9001:2008	14001:2005	18001:2007	

## We Share Our Knowledge about Oil Shale

Since the most advanced knowledge about the use of oil shale as a raw material for energy industry comes from Estonia, then there isn't the most up-to-date information about oil shale in EU guidelines. The composition of oil shale differs from that of regular fuels, so technologies developed for conventional solid fossil fuels cannot be used to process it. Since the beginning of 2011 Eesti Energia has been working together with the Ministry of the Environ-

ment, Estonian research institutions and other oil shale companies to change the relevant guidelines and add information about oil shale, so that we can ensure that our investments are sustainable and comply with the best available technology principles in the long term. Publicly available information concerning oil shale will also be amended in the process.

## Cooperation with Research and Academic Institutions

Anything we do requires some research and development. Being the only energy company in the world to use oil shale to such a great extent, we consider cooperation with local academic institutions and international research bodies to find new solutions extremely important. For instance, we need research to construct new circulating fluidised bed boilers that can burn oil shale or to find ways of using the by-products of our industry. For the purposes of evaluating oil shale reserves in other locations of the world and mining in Estonia, we carry out extensive cooperation with Tallinn University of Technology and

the University of Tartu, the employers of the best and most experienced oil shale specialists. We also work together with Tallinn University of Technology researching the sphere of oil shale incineration. The university specialists have contributed to modifying the temperature conditions and chemical characteristics of the circulating fluidised bed technology so that it could be used for burning oil shale. We have been inviting the best researchers from Estonia and other countries to take part in our development projects, and we intend to keep doing that.