

## EDITOR'S PAGE

### **OIL SHALE SYMPOSIUM: OIL SHALE ENERGY REQUIRES CO-OPERATION ON A GLOBAL SCALE**

The oil shale industry has slowly but steadily increased its reach in the global energy sphere. The sharing of experience between experts plays an important part in education in the energy field, and the the latest International Oil Shale Symposium, which took place from 10 to 11 June 2013 at Tallinn University of Technology, in the capital of Estonia, once again provided a great opportunity for that.

All who took part in the summary discussion of the Symposium came to the conclusion that the oil shale community is a small and very interdependent one, which makes co-operation in this sector extremely important.

Although more than 400 experts from the energy field participated in the Symposium, yet many were unable to attend because there were not enough places available. It is those people in particular to whom I want to give an overview of this important event in the oil shale field.

The first speakers of the opening day concentrated on the broader trends in the energy field, their speeches and presentations relating to the history of the oil shale industry, as well as to oil shale deposits around the world. Besides the experiences in the field of oil shale processing, environmental and socioeconomic impacts were also considered. Environmental topics were the focus of a separate session on the second day of the Symposium.

The Symposium was opened by Sandor Liive, Chairman of the Management Board of Eesti Energia, according to whom the interest in non-traditional energy sources keeps growing around the world. Oil shale is a very slowly changing type of energy whose locations, quality, and accessibility have been studied thoroughly. "Although the accurate forecasting of the future is difficult, the valuations conducted by the International Energy Agency and others show that oil prices should remain constant – and on the level that makes oil shale profitable," Liive said.

The oil shale reserves of the US are significantly greater than Estonia's, but the latter has the most experience in oil shale processing.

Jeffrey D. Levine, the United States Ambassador to Estonia, pointed out that for the US both security and affordable prices are important in the



energy field, and developing the industry should be done sustainably. "There is no single solution. We have to study different possibilities, non-traditional sources and renewable sources. Oil shale has not been used or studied much in the US recently, but the country has a strategic opportunity to achieve greater energy independence. It is an opportunity that many other countries are still examining," said Levine at the conference.

Juhan Parts, Estonia's Minister of Economic Affairs and Communications, also stressed that national energy independence cannot be underestimated. "As you know, Estonia is one of the few countries in this region that is independent in terms of electricity supply. Only three European countries have such a low level of dependence," said Parts. "Estonia has been a major exporter in the field of electricity as well as liquid fuels. We also supply energy to our neighbours, which is accompanied by the creation of thousands of well-paying jobs," he said. Parts pointed out that one third of Estonia's scientific research investments is used to study oil shale. The Minister also said that the industry's environmental impacts have become much smaller thanks to technical developments and asked whether Estonia should, in the future, or perhaps even this year, increase its excavation volume. "I am convinced that we do not have to choose whether to use oil shale for electricity or oil production. We need to find a solution that keeps both doors open," added Parts.

Dr. Leonhard Birnbaum, Vice Chair Europe, World Energy Council, said in his speech that oil shale helps to diversify fuel sources, to improve the security of supply and to decrease the effect of fluctuating oil prices. "In order to gain greater social approval, strategies for increasing public awareness in the field of oil shale have to be developed and introduced. An effective means for obtaining social approval is a reliable life cycle analysis, since it helps to better understand the economic and environmental impacts of oil shale," Dr. Birnbaum said.

According to Hardo Pajula, economic analyst, the market value of energy obtained from oil shale in Estonia is about EUR 800–900 million per year. "It may not seem a large sum, if you come from the US, but one has to consider how small Estonia's economy is. Estonia's annual GDP is EUR 19 billion. All in all, the percentage of the oil shale industry output is about 5% of the entire country's GDP, if not more," said Pajula.

According to Erkki Truve, Vice Rector for Research at Tallinn University of Technology, it is important that Estonians continue to invest into keeping Estonia at the forefront of the oil shale industry. "During the 1930s, Paul Nikolai Kogerman was rector of Tallinn University of Technology – he is the man who may be called the father of oil shale chemistry," Truve added, when explaining that Estonia has been one of the leaders in the field of oil shale research for many years.

Volli Kalm, Rector of the University of Tartu, greeted the participants in the Symposium in the name of the University of Tartu as a scientific institution where geological research of oil shale started around 100 years

ago. Estonia started using oil shale 96 years ago. It was also the time when the first research paper on Estonian oil shale was published at the University of London, supported by the Republic of Estonia, which was at that time just two years old. According to Kalm, it shows how important oil shale has been for Estonia since the republic was formed. He said that now, a century after Estonia started using oil shale, an ever-increasing number of businesses are supporting oil shale-related research.

Volli Kalm also noted that the biggest challenge is in developing an oil shale industry that would balance both environmental impacts and economic benefits, which aspect was also touched upon by Hardo Pajula in his presentation.

Pajula said that there must be a balance between environmental impacts, socioeconomic impacts, and production requirements. It is not reasonable for environmental impacts to outweigh socioeconomic needs or vice versa. All in all, from Pajula's presentation it can be concluded that any industry has an impact on the environment, but it also gives jobs to many people and contributes to the growth of the country's economy. Therefore, the industry should be allowed to operate, and at the same time the environmental impacts should be managed capably and with a goal to retain a balance between industry, environmental impacts, and socioeconomic needs.

The Symposium also included ten sessions that dealt with different aspects of the oil shale industry. For instance, particular attention was paid to mining, technologies for electric energy production, oil shale chemistry, oil shale development projects, research in the field of geology and oil shale resources, and the industry-related environmental impacts.

The Colorado School of Mines representative, Dr. Jeremy Boak, gave an overview of where, when and how much the oil shale industry is growing. Boak said that the biggest development leaps are yet to come in the US and Jordan, where there is keen interest in introducing oil shale. "In Jordan, there are no other good local energy sources besides the sun. The US has resources ready to be used and waiting for the application of new technologies," Boak said. According to Boak, shale oil production has almost doubled in recent years – from about 18,000 barrels up to 35,000 barrels per day. In the next 15 years, Boak sees the potential for growth of up to ten times. The greatest shale oil production volume increases can be observed in China, Jordan, and Australia. "The development of oil shale has outgrown its baby shoes and there are some very exciting technological developments in the works," Boak said. At the same time, Boak thinks that such expansion necessitates a major monetary contribution. This is accompanied by the field's general growing importance and its increased visibility for media, governments, and the public.

Anton Dammer, National Oil Shale Association, also talked about oil shale project developments at large. According to him, a radical irrational opposition to the use of oil shale because of water or land use is a problem of concern. "One man from Colorado compared the importance of oil shale

with that of the potato and, imagine that, his story even ended up in the newspaper," Dammer said. "The public probably has a problem with living in the past. If something new is attempted, we take two steps forward and two steps back. Every time the discussion comes to a new field the same problem arises. We need to get over the fear of the boom and crash cycle," he said. At the same time, Dammer said that the US is currently already on the threshold of introducing oil shale commercially. "Oil shale is a wonderful resource, there is no need to argue about that," Dammer believes.

Jostein Dahl Karlsen, representative of the International Energy Agency (IEA), spoke of the technology framework and the work of the IEA in the field of fossil fuels. He considered the options to use the IEA for co-operation and exchange of information. "We are seeing a new global aspect – energy independence. It is a new paradigm. Coal is the backbone of the world economy, but its use may change in the future. The question lies in how fossil fuels can remain a part of sustainable energy in the long term," Karlsen said. He stressed that countries must co-operate in sharing their experiences – "Estonia has experiences it can communicate to the world. The purpose of the IEA is not just to educate countries but also to take their experiences and educate the whole world. The world has lots of resources for producing kerogen. Therefore, there are many countries that wish to learn from Estonia's experience. We, for our part, want to create a system that facilitates learning."

David Argyle, representative of London Investment Partners, concentrated on the investment challenges of oil shale projects. "As a rule, there is no equity capital for developing large-scale oil shale projects. My experience of four years tells me that the bankers and investors' opinion of the oil shale sector is neutral or negative because they have not heard much about this sector. Therefore, finding capital is often difficult," Argyle said. According to him, the oil shale sector currently lacks the history to automatically attract investors and more effort is therefore needed. "Clear evaluations about the project's value are primary, but risks always remain: petroleum or oil prices drop, the collapse of political regimes, etc.," he added. However, Argyle confirmed that it is possible to earn money in the field of oil shale, and Estonia, Brazil, and China have proven this. "Estonia is the best oil shale country, but it is not known among large enterprises. The sector must convey more of its success stories, and Estonia is a very good example. Brazil has dealt with oil shale for 30 years, but even awareness of that fact is very scarce. I myself live in China, but I have not even visited the oil shale industry there," Argyle said.

During the Symposium, the managers of Eesti Energia's international development projects gave overviews of the current state of projects in the State of Utah in the US, and in Jordan. Rikki Lauren Hrenko, CEO of Enefit American Oil, said that thanks to thorough pre-development operations Enefit now has a very good overview of the oil shale resources on the territory and their distribution. "The initial plan is to finish the pre-

development phase in 2016. Regarding the time spent on construction, we have planned to start production in the US in 2020. We will begin operations on Enefit South private land, which is owned by us. Local oil shale contains 1.2 billion barrels of shale oil, meaning that we can produce at an output of 50,000 barrels a day for 30 years," said Hrenko. Production at such a level would cover 1/3 of the entire state's current fuel requirement. This summer, extensive tests will also be started in Germany, in Enefit's pilot plant.

Andres Anijalg, Director of the Jordan Project at Eesti Energia, talked about Eesti Energia's activities. Currently, Eesti Energia is doing mining and construction procurements in order to establish an about 500 MW power plant in Jordan. "Lately, we have done a lot of geologic surveys in Jordan. We have drilled around 300 boreholes, tested different boring methods and analysed materials. We have also done seismic studies in order to understand the different movements in that block. We map the geography and study the age of oil shale deposits in the area. We thoroughly study the land in order to understand local oil shale layers." Anijalg said. He also refuted the myth that Jordan lacks the water which the industry needs. "There is water. It is true that it is at a depth of 400 metres and not suitable for drinking, but it meets the requirements of our industry," he said. Anijalg pointed to the approval of the environmental impact assessment as the latest big milestone. "It means that we now have all the permits needed for the development of the oil shale industry in Jordan," he said. According to Anijalg, the Jordanians are very motivated to develop the oil shale industry. "The government of Jordan is very interested in this project because it will provide them with cheaper electricity. Electricity production in Jordan today is very expensive, about five times more expensive than in Estonia," he noted.

In order to effectively develop international projects and better study the properties of local oil shale, Eesti Energia just completed a pilot plant in Frankfurt. The plant uses up to 300 kg of oil shale per hour and it is possible to test different oil shale types from the world in order to analyse what adaptations Enefit technology requires in order to be used in other countries.

Besides international projects, an overview of the developments of the Enefit280 shale oil plant in Estonia was also given at the Symposium. "It is the first project of its kind. In the case of the Enefit280 plant, the technologies have been combined in such a way for the first time," said the project director Priit Ploomipuu, when talking about the project's uniqueness. The cold commissioning of the plant took place a year ago and the first tonne of oil shale entered production in October last year. The designer estimates that the oil plant should reach full capacity by the end of 2014. Eesti Energia's core partner in the construction and activation of Enefit280 is Outotec GmbH. Outotec engineer Andreas Wirtz gave an extensive overview of the activation of the oil plant and said in conclusion that the plant's technological cycle functions and main technological nodes, such as retort, work smoothly. However, for the plant to operate stably, some technical details still need to be polished.

In the summarising discussion of the Symposium, Pierre Allix (Total), Pearce Bowman (QER), Rikki Lauren Hrenko (Enefit American Oil), Jeremy Boak (Colorado School of Mines), Maher Hijazin (Saudi Arabian Corporation), and Sandor Liive (Eesti Energia) concluded that the players in the oil shale industry influence each other, regardless of what part of the world they operate in. "If one of us is doing well, then it influences the reputation of the entire oil shale sector but, vice versa, the same is also true of any problems. We influence each other's success," said Rikki Lauren Hrenko, CEO of Eesti Energia's project in the US. Discussion participants found that the Symposium was very important and a necessary opportunity to meet with the oil shale sectors of different countries, get to know each other, share ideas, and exchange contacts. "The most important thing I have seen here is the will – a large number of experts who gave presentations really want to become successful in the oil shale sector and develop the field," said Maher Hijazin, President of Saudi Arabian Corporation for Oil Shale.

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*The presentations, videos and photographs from the Symposium are available at <http://www.oilshalesymposium.eu/>*

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