

LIFE IN Estonia

SPRING | 2010

**Estonian
Scientists**

Push
Green Energy

Real Power
Lies in
Green Power

Malle Leis

Flora as
Pure Art

Jaanus Purga's Dream:
VKG Diesel, made in Estonia

Estonia's Message at EXPO -

Saving, Recycling, Innovative Solutions

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LIFE IN Estonia



COVER

Jaanus Purga
Photo by Sven Tupits

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Pärnu mnt 69, 10134 Tallinn, Estonia
www.lifeinestonia.ee

Editor

Reet Grosberg
reet.grosberg@lifeinestonia.ee

Translation

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Language editor

Richard Adang

Layout

Positive Design

Partner



EAS
Enterprise Estonia

Unbelievable! This has been the reaction of several energy specialists after finding out about the developments in the Estonian energy sector during this century. Within the last 10 years, the Estonian energy sector has gone through changes which in other countries have taken more than 30 years. Even looking at the statistics of 2005 or 2006, we can tell that this is really outdated information – the changes are continuing here and now!

Consider this: within seven years, energy intensity of the economy has decreased in Estonia two times! It took 30 years for Denmark to attain the same result. Or the fact that within 5 years the share of renewables in the electricity balance has increased from 0.5% in 2005 to 13% expected in 2010! Usually it would take about 10 years to make such a change.

For decades, oil-shale has been the cornerstone of the Estonian energy sector and has provided us with unique know-how regarding this resource, whose energy content in the world exceeds the crude oil reserves several times. In parallel with the depletion of crude oil reserves and the increase in oil prices, the interest in the use of oil-shale technologies has become interesting for several countries.

Estonian companies are currently exploring and introducing new technologies for shale oil production and for power production from oil-shale. The tests have shown that the production of diesel fuel from oil-shale is feasible. This kind of fuel will be available in coming years and will provide the opportunity to use another kind of resource for powering cars which is competitive with traditional car fuels.

But this is just one development in our energy sector. The introduction of green industries has been a great success story in Estonia. Some companies based in Estonia have currently become strong green industry players worldwide. Generators for wind turbines and base towers for off-shore wind parks are just two examples of the global use of products from Estonia. The introduction of modular low-energy houses has been another success story for an Estonian company, and it is currently the hottest Estonian green energy product available in the market. And there is more to come!

The government has been supporting such business developments and is looking forward to supporting further improvements in energy efficiency and energy production in Estonia. The aim of the renewed Energy Sector Strategy 2020 is to increase diversity in our energy portfolio, moving Estonia towards liberal energy markets and more efficient energy consumption. It would not be surprising if, after the next 10 years, we can report that the improvements in the Estonian energy sector have actually been even greater than anybody expected. To be honest, this was also the case for our projections from 10 years ago.

Einari Kisel

Deputy Secretary General,
Ministry of Economic Affairs and Communications



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replaces oil with renewables
to produce base commodity
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An Estonian company, NordBioChem Ltd., has created a unique, fully IPR-protected technological platform for Lactic acid chemistry, which is leading to competitive high-volume replacements for petrochemicals as standardized commodity chemicals and polymers, as well as a significant reduction in toxic reaction components and CO2 emission.

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Eesti Energia, as one of the main energy producers in the region, has adopted the strategic objectives of diversifying its power generation portfolio and, in order to do so, introducing various clean and green energy projects in Estonia and other Baltic countries.



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Estonia's Enefit is utilizing its decades of oil shale development experience by developing and implementing the most efficient and economic shale oil production technology to date. Operating in Estonia under the name Eesti Energia, the company has experience in the whole value chain of energy production: resource mining, oil and electricity production, and energy sales.

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The global technological giant ABB wants to take the wind generator business up to a new level in Estonia. In this interview, Bo Henriksson, the Baltic manager of the company, and Matti Pekkarinen, Head of the Electrical Machines Factory, talk about how Estonia became one of the largest wind generator producers in the world.



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The Estonian technology company Yoga will build intelligent model offices in San Jose, Mumbai and Abu Dhabi in 2010. Another company, UltraKUB, is building energy efficient houses and has received positive feedback in France and Denmark.w



47 **Electric cars to save Estonia from hanging on to oil pipeline**

The Estonian company ZEV Motors is striving to develop one of the most efficient electric cars in Europe and to sell at least 50-100 of them in Europe over the next couple of years. The Elektromobiilne Eesti 2020 project foresees creating a pilot infrastructure for recharging electric cars in Tallinn by 2010, and by 2020 a fifth of our traffic flow should consist of vehicles which are run by electricity.



54 **Malle Leis. Flora as pure art**

When painted by Malle Leis, a gooseberry has a taste and a potato is pretty. By painting such boldly lifelike plants, the artist has often faced criticism. Are her works more graphic art or painting, coloured drawings or drawn paintings? Leis cannot be easily placed in any art school. She has arbitrarily selected the advantages of several streams and brought them together into her own unique world-view.

59 **PORTFOLIO. Malle Leis**



68 **Best Estonian restaurants**

In our recent issues, we have been introducing you to the best restaurants in Estonia, based on the first list of the top Estonian restaurants, compiled in 2008. In this issue, we bring you the next five restaurants in Tallinn, which all have a little twist to them – in milieu and service, cosmopolitan flair, gastronomic experimenting or innovation.



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JAZZKAAR 2010

For the 21st time, the Tallinn International Festival Jazzkaar will present the best

sounds of today's jazz to jazz-lovers. There will be more than 40 concerts in 10 days, with performers from Europe, America and Asia. The headliners of Jazzkaar 2010 are the highly acclaimed jazz vocalist **Dianne Reeves** (USA), the legendary keyboard wizard **George Duke** (USA), the open-minded bassist and composer **Avishai Cohen** (Israel) and the Spanish new fusion-flamenco star **Concha Buika**.

In addition to the featured artists, the programme includes the jazz guitarist **Wolfgang Muthspiel** from Austria, the

guitarist **Ulf Wakenius** and the vocalist **Lina Nyberg** from Sweden, the German trombone player **Nils Wogram**, the noisy quartet **Ploctones** from the Netherlands, the pianist **Leszek Możdżer** from Poland, the singer **Youn Sun Nah** from Korea, the Japanese club music project

from France, and the new Estonian groove-band **Lin's System**.

Many young talented Estonian musicians are participating in the Festival this year: **Kristjan Mazurcak**, **Marti Tärn**, **Kadri Voorand**,



Dianne Reeves



Avishai Cohen

JazzTronik, the 13-year-old pianist **Gadi Lehavi** from Israel and many more. The festival will start with an opening party, including the performers **DJ Alexander Barck** from **Jazzanova**, the energetic **Jean Louis Trio**

Peedu Kass, **Kristjan Randalu**, **Tuuli Taul** et al. The European Broadcasting Union will broadcast the concert of the **Villu Veski – Tiit Kaluste quintet**, 'The Best of Nordic Sounds'; in addition, a number of

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Barbara Sings the Blues
BARBARA HENDRICKS

Magnus Lindgren · saxophone
Mathias Algottson · piano

April 10, at 7 pm
Estonia Concert Hall

April 11, at 4 pm
Vanemuine Concert Hall

www.concert.ee
www.barbarahendricks.com

Swedbank

SEASON FINAL CONCERT
BREMEN PHILHARMONIC ORCHESTRA

ESTONIAN NATIONAL MALE CHOIR
Conductor **MARKUS POSCHNER**
Schubert | Brahms | Vasks

Th 13.05 19:00 Jõhvi Concert Hall
Fr 14.05 19:00 Tartu, Vanemuise Concert Hall
Sa 15.05 19:00 Pärnu Concert Hall
Su 16.05 17:00 Tallinn, Estonia Concert Hall

www.concert.ee

concerts will be broadcast locally by Klassikaraadio.

As is traditional, the **Sunday of Art and Music** will take place on 25 April, when music lovers can visit concerts in various museums and art galleries in Tallinn. **Kirtana Rasa**,



Helin-Mari Arder, Eva Mitreikina and **Sergei Pedersen** are among the performers of these art and music concerts. Also, a concert by Jazz Painting and a morning 'birdsong'

concert will take place. For the fourth year in a row, we are celebrating **Jazz Month** during April. The aim is to bring jazz to the widest possible audience. Many activities are planned, including an exhibition of jazz posters, public interviews with Estonian jazz musi-

cians, jazz brunches, the concert of Jazz Painting and Jazz Cinema. This year's jazz ambassador will be Dianne Reeves, who will present the Estonian Jazz Awards. The Jazz

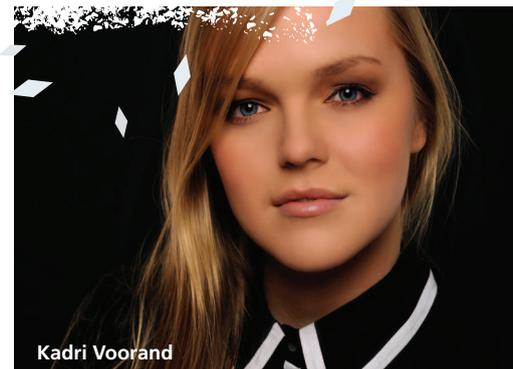


Awards will be given to a distinguished jazz musician, to a young talent and to a jazz promoter.

The gold sponsor of the festival is Estonia's largest telecommunications company, Elion, which also sponsors the Jazz Awards.

Tickets to the festival will be sold in Piletilevi, Statoil and over the Internet at www.piletilevi.ee beginning 15 February. Ticket info +372 666 0030 or piletid@jazzkaar.ee

Find your favorites on our website www.jazzkaar.ee



Swedbank  

FINNISH RADIO SYMPHONY ORCHESTRA



NIKOLAI LUGANSKI
(piano, Russia)



Conductor
SAKARI ORAMO
(Finland)

Rahmaninov. Piano concerto no 4
Saariaho. "Laterna magica"
Nielsen. Symphony no 4

Fri 23 April at 19 00 Estonia Concert Hall

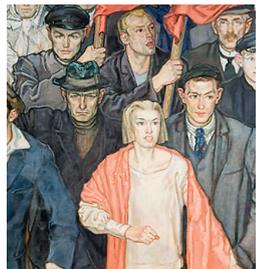
        

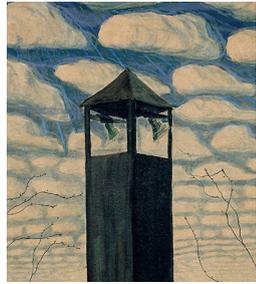
KUMU

2008 European Museum of the Year Award

Permanent exhibitions:
Treasury. Estonian art 18th c. – 1945
Difficult Choices. Estonian art 1945–1991



Exhibitions
Soviet Woman
8 APRIL – 26 SEPTEMBER 2010
When Soviet power was established in Estonia, a new type of woman began to be imposed – the Soviet woman. Released from gender limitations and made equal to men, she was to devote herself to work – the building of a new society.

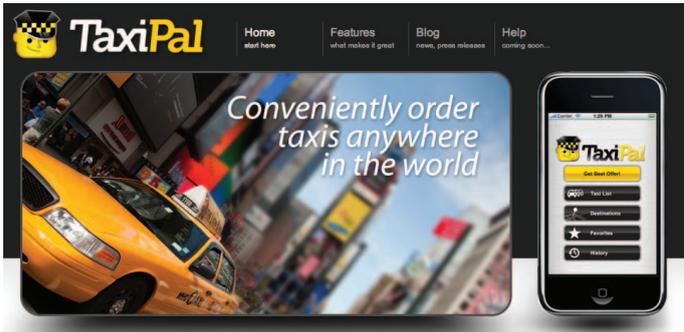


Čiurlionis and His Time in Lithuanian Art
30 APRIL – 8 AUGUST 2010
Major works by the Lithuanian artist Mikalojus Konstantinas Čiurlionis (1875–1911), one of the grand and characteristic representatives of the art nouveau era: a neo-romantic and unusual symbolist, whose paintings are closely related to musical pieces.

KUMU ART MUSEUM
Weizenbergi 34 / Valge 1, Tallinn
Phone (372) 602 6000, (372) 602 6001
muuseum@ekm.ee, www.ekm.ee/kumu
Open: Wed–Sun 11am–6pm

V. LOJK. PROTEST SONG. 1963. ART MUSEUM OF ESTONIA. M. K. ČIURLIONIS. SPRING MOTIF. 1907. M. K. ČIURLIONIS NATIONAL ART MUSEUM

New taxi ordering service **TaxiPal** tested in Estonia and Finland



Raoul Järvis, an entrepreneur, has begun to test his highly acclaimed innovative taxi service in Estonia and Finland. If all goes well, Järvis has promised to make the service available in all larger European cities by the end of the year.

The Estonian tech undertaking T+1 Solutions, owned by the entrepreneur Raoul Järvis, is preparing for the European launch of its new taxi ordering service TaxiPal. The company has promised to make it available during this year in several countries.

It is possible to register as a tester on the homepage TaxiPal.com, available to a wide range of mobile platforms: owners of iPhone, Android, Windows Mobile and J2ME telephones. Those interested will be included on a first come, first serve basis.

TaxiPal, more effective in bigger cities, is a mobile taxi ordering service that helps consumers anywhere in the world connect with trusted taxi companies. Customers have to indicate their position themselves, or this can be done by default. The

desired time and destination is sent from a user's mobile phone to a taxi brokering server. Local taxi companies then submit competitive bids and proposed routes to the consumer.

The creator of TaxiPal, Raoul Järvis, has selected approximately two hundred iPhone owners in Estonia who will use the service during a two-week trial period and provide feedback. If all goes well, the new solution will be available to customers in February.

In February, TaxiPal was presented in Barcelona in Spain at the Mobile Premier Awards, one of the largest competitions for start-up companies in the field of mobile services.

The TaxiPal (formerly Taxi4me) software solution triumphed in the Navteq Global LBS Challenge 2009, winning the Grand Prix. It has also received prizes with a total value of more than USD 560,000, including cash, software and Navteq's mapping data licenses.



Orest Kormašov conducted the classical analyses of the "Lucianian portrait".

On February 5-12, a potential self-portrait of Leonardo da Vinci, the "Lucianian portrait", was exhibited at the Kadriorg Art Museum, and an international conference, "A Key to Leonardo", was held in Tallinn University to introduce the analyses of the painting. The head of the Tallinn University Art Department, Orest Kormašov, said that Estonia was the only and, should the painting be acknowledged as authentic, presumably the last foreign country where the painting would be displayed outside Italy.

The portrait of Leonardo da Vinci, accompanied by a group of scientists, art historians and officials, made its first flight on air Baltic via Riga to an exhibition in Estonia, more than 500 years after Leonardo da Vinci sketched the designs of his flying machines.

Alleged self-portrait of Leonardo da Vinci presented in Estonia

Photo: Peeter Langovits, PM/ Scanpix

The portrait was found at the end of 2008 in a private collection in southern Italy. It was noticed due to its remarkable similarity with Leonardo da Vinci's portrait in the Uffizi Gallery, Florence. The Uffizi portrait was previously considered to be da Vinci's self-portrait and the painting was for centuries the primary source used for creating the image of the genius. When, in the 1930s, a 17th century painting was discovered underneath the portrait, it lost its status as an original. The myth of what Leonardo looked like has been preserved until the present based on that painting. Until now, no original has been found that could have been the source of the Uffizi painting. It is possible that the discovery made at the end of 2008 could be an answer to that question.

About twenty researchers from Italy and Estonia have analyzed the painting. In addition to chemical and technical studies, a 3D simulation of the portrait was created to find possible similarities with the known drawings that portray da Vinci. The executors in two different fields - classical and contemporary - were Estonians. Orest Kormašov, a lecturer of painting and painting technology (Tallinn University), created a classical portrait sculpture and Helen Kokk, a student of graphic design (the Estonian Academy of Art), created a computer simulation. All studies conducted with the painting confirm that it depicts Leonardo da Vinci and that it is very likely that da Vinci himself painted it.

The portrait was on display for a week and it attracted about 7,000 visitors.

Text: Alo Lõhmus, *Postimees*

Photos: Margus Ansu, *PMI Scanpix Baltics*

Tartu scientists invent glass with adjustable transparency

The future of the curtain-making industry is looking dim, as Tartu-based nanotechnologists have invented a new kind of window glass which can be made non-transparent with a mere push of a button.

Picture a modern lecture hall or a meeting room with glass walls. When the room is empty, anyone can take a look through its walls. But when work is in progress, the glass walls become opaque at the push of a button. Or just let your imagination wander in your home: if the glass in your windows could suddenly turn into a protective shade, would you still need curtains?

Glass which changes its optical characteristics (including transparency) with the help of electric current is no longer the stuff of science fiction. The scientists of Nano TAK (Estonian Nanotechnology Competence Centre), in collaboration with the Institute of Physics at the University of Tartu, have already invented it. The company Andrese Klaas AS is getting ready to start production.

An innovative method

In its normal state, glass is almost opaque. Only a hazy outline of a human face, for example, can be seen through it. However, pressing a switch transforms the glass into a clear and see-through window. As the name of the institute which developed it suggests, the effect thus created is linked to the achievements of nanotechnology. The glass which changes its transparency is made up of two glass panes glued together. Both panes have been separately covered with an extremely thin film of indium-lead oxide, which conducts electricity, and between the two layers of oxide there is a layer of salt-gel glass. According to the researchers, the latter is just like regular glass, only liquid. The layer turns solid only after being transferred onto the glass panes. Most importantly, the salt-gel glass contains microscopic drops of liquid crystal. These are the particles responsible for making the glass either transparent or opaque. When electric current is released into the layers of indium-lead oxide, the liquid crystal molecules are positioned so that the impact of electricity makes the glass see-through, according to Kristjan Saal. When the current is stopped, the liquid crystal molecules change back to a random position and consequently the light dissolves and the optic transparency of the glass disappears. There have been previous attempts to produce glass products which change transparency, but those are based on organic polymers.

Have you ever come across such a product in practice? Probably not, and the reason is the complex nature of the technology and the fact that such glass normally has poor resistance to the external environment (for example UV light). The technology created by the Tartu scientists is revolutionary in this sense. Firstly, their glass can be produced at normal room temperatures and the result is much less costly than the material which changes its optic transparency that has been produced using previously available methods. Secondly, the scientists had no problem covering very large glass surfaces with

the transparency regulating gel layer – they have used modified spray paints, for example. Spraying solves the problem of unevenness, which turned out to be fatal for the old technology – window glass, which is smooth on the surface, is actually slightly wavy and has variable thickness. Thirdly, the new glass can deal with UV light and other environmental impacts as well as normal window glass does.

Patent exists

According to the Head of Nano TAK, Ilmar Kink, it was imperative that they acquire a patent for the above methodology. This provides the technology created in Estonia with a strong competitive edge. This is the reason why Andrese Klaas, a partner of Nano TAK, plans to produce the innovative glass and is already in the process of creating appropriate production lines. From the very beginning, the inventors of the glass have emphasised the low price of the future product, which would be affordable for a wide range of consumers. "For example, I live on the ground floor and I could really use such glass for my kitchen window," says Rünno Lõhmus.

An average window of this type consumes as much electricity as an average energy-saving bulb, and that much energy is used only when the glass is transparent. In addition, this kind of glass can be a useful design material in creating interior and exterior designs, including advertising billboards, and in constructing certain types of measuring equipment.



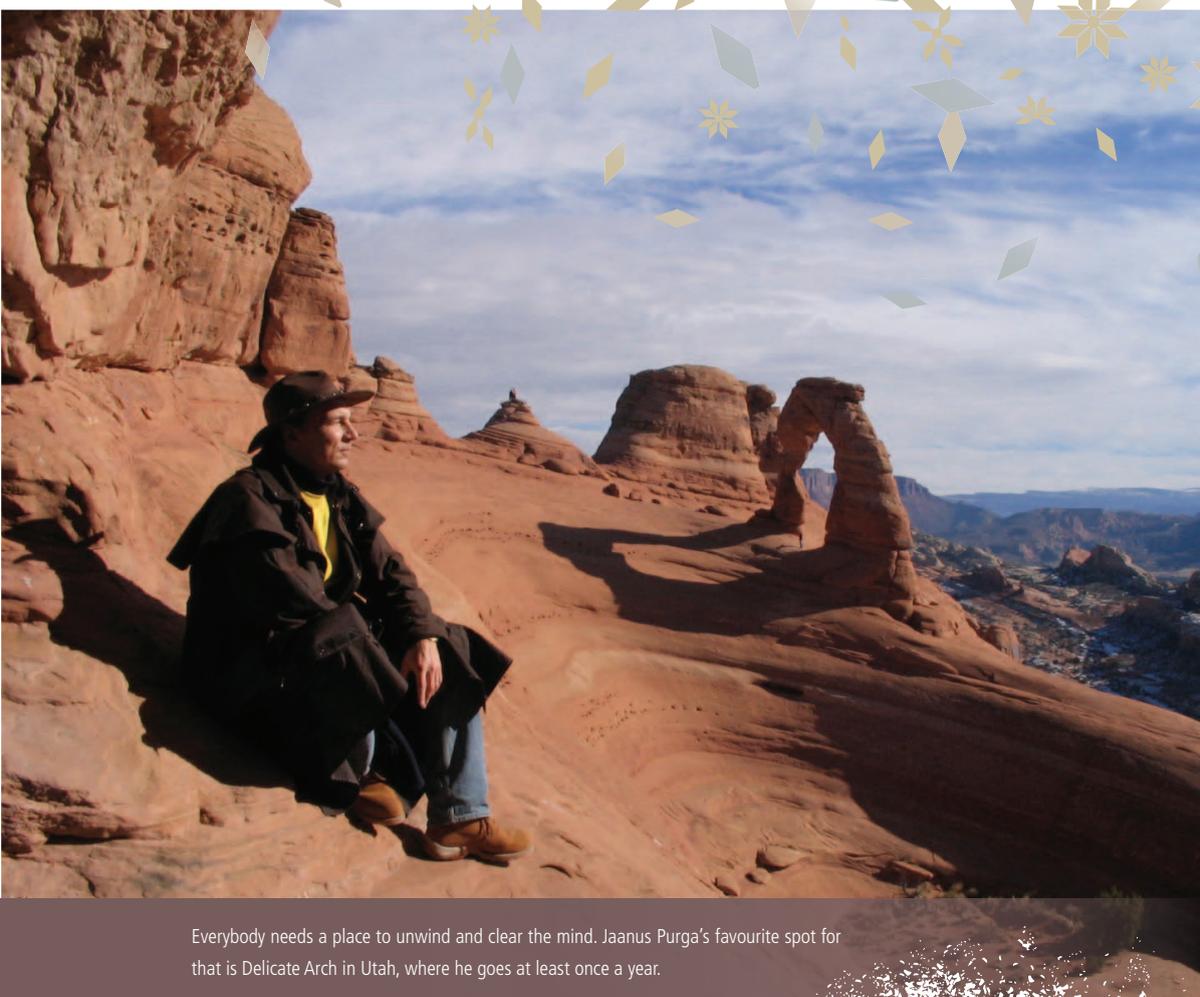
A man in a dark suit stands in a grand room with wooden chairs and a chandelier. He has his arms crossed and is looking directly at the camera. The room has high ceilings and ornate woodwork.

Jaanus Purga turns rock into fuel

Text: Rein Sikk, *Eesti Päevaleht*

Photos: Sven Tupits, VKG, private collection

Fairy-tales and legends speak of giants who were so strong that they could squeeze water out of rocks. Jaanus Purga is able to do even more - he can squeeze rocks until they yield... diesel.



Everybody needs a place to unwind and clear the mind. Jaanus Purga's favourite spot for that is Delicate Arch in Utah, where he goes at least once a year.



Jaanus on his visit to Fushun, the largest oil shale processor in the world.

On one fine summer morning in 2015, long queues suddenly form at all petrol stations all over Estonia. This day has already been made famous by radio and television stations, not to mention newspapers. The bold advertising signs on the petrol station announce *VKG diesel, made in Estonia*.

The patiently queuing drivers are not upset about waiting, but deep in conversation about the possible characteristics of the fuel brought onto the market on this day. And they look proud when the tanking pistol is inserted into the fuel tank. Why shouldn't they feel proud when their petrol tanks are filled with diesel made from Estonia's own natural resource – oil shale (*põlevkivi – burning stone in Estonian –ed.*)

The burning rock

A legend from north-east Estonia speaks of a villager who wanted to build himself a sauna. He used the local brown stone as the building material. When the sauna was finished, he started to heat it and, alas, the sauna burned down completely...

This legendary tale has a grain of truth in it, for the prime mineral resource in Estonia, oil shale, is really a rock which burns. One just needs to light a match to see it happen.

The reason for the burning is the significant amount of organic matter locked into oil shale rock - sediments of a variety of sea organisms from hundreds of millions of years ago.

But, let us come back to the present. In the industrial north-east Estonian

town of Kohtla-Järve, Jaanus Purga, Member of the Board and Development Director of VKG, puts on an ethnic flat cap, looking just like the Estonian epic hero Kalevipoeg from some national romanticist painting. From another angle, he could be mistaken for a folk dancer.

There is nothing in his looks which would tell us that this guy in the cap is in fact one of the biggest oil shale industrialists in the whole country and the intellectual leader of Estonia's most well-known oil shale chemical plant. On the afore-mentioned summer day in 2015, another hour of fame for him will most likely arrive.

'At school, my mark in chemistry was once even a 3', (*an average mark –ed.*), the oil shale chemist recalls. 'The subject was so easy that I didn't bother to go to the lessons,' he adds with a hint of a smile. As a student in a school with a strong music emphasis, he was more attracted to music, choral singing and sound technology. At university, he studied both chemistry and physics, but mostly environmental technology, as 'environment' seemed to be a bit of a buzz word. In his work today he combines chemistry, physics and environmental protection.

A strong pull

Fifteen years ago Purga arrived in Kohtla-Järve, the capital of the oil shale industry in Estonia. One would think that a music-loving lad would be shocked to suddenly find himself among the giant droning, hissing, smoking, acridly stinking factories of this industrial landscape. But quite to the contrary, he

The largest oil shale processing company in Europe

Industrial shale oil production began on the property of Viru Keemia Grupp AS (VKG) in Kohtla-Järve in 1924.

VKG is a holding company made up of eight enterprises, where VKG owns 100% of the stock of seven subsidiaries.

There are 1,400 employees in the companies belonging to VKG.

One of the subsidiaries, VKG Oil, is the largest oil shale processing company in Europe. Its main fields are the thermal processing of oil shale, production of oil shale fuels and chemicals. It is the third largest oil shale processor in the world, after the Chinese Fushun and the Brazilian Petrosix. VKG Oil is Estonia's largest producer of shale oil and chemicals.

The new oil factory opened at the end of 2009, and cost 1.1 billion kroons; it is the biggest Estonian-capital-based industrial investment in Estonia.

In 2009, 1.8 million tons of oil shale were processed. With the opening of the new factory at the end of 2009, 2.5 million tons of oil shale will be processed annually. The turnover in 2008 exceeded 2 billion kroons, and 1.7 billion kroons in 2009.

Products made of shale oil include transportation fuels, fuel oils, oil coke, phenols and phenolic compounds, for example several resins used in the rubber industry, as well as high purity chemicals - components for hair dye.

National enterprise awards received by VKG Oil AS: best industrial enterprise 2007, best innovator 2008, best enterprise 2009 and best exporter 2009.



Shell Oil's oil shale project in Colorado is located on the largest oil shale deposit in the world.

suddenly felt the strong pull of special opportunities. He realised that this was the best place to accomplish something huge. Precisely here in the Estonian oil shale land, in the middle of factories and mines, in the area considered by many to be a real disaster area. There are those who consider Ida-Viru County to be the Wild West of Estonia, a place where only the fittest men survive, just like hundreds of years ago in the Wild West on another continent.

Often, the young specialists who have been assigned to the oil shale country spend five working days there, only to escape to somewhere else in Estonia for the weekend. Jaanus, however, bought an apartment at once, and later a farmhouse, and became a local, much to the disappointment of his friends in Tallinn, who predicted he would return rapidly to the embrace of the capital city. Today Jaanus Purga is in his tenth year of employment at the Viru Keemia Grupp AS, messing about with oil shale.

'The problem in Estonia is not a lack of ideas, but a lack of people to execute them. Fortunately we in VKG have such people,' says Purga. Four billion Estonian kroons have been invested in production in VKG during the 10 years of 'Purga's time' in order to upgrade Soviet-style plants into today's state-of-the-art oil shale processing industry.

Besides travelling, Jaanus Purga has an interesting hobby – he collects special musical instruments from the countries he has visited. For example, his collection includes a ukulele, a tiny string instrument bought in Hawaii, as well as a cedar wood flute of the Navajo Indians, which can produce really mystical sounds. It seems that his hobby is all about experiencing and investigating how things work and why they work as they do. Oil shale chemists do the same kind of stuff. They magically produce chemicals – even cosmetics - out of a brown rock.

Purga continuously emphasises that the VKG has been a great work place for him. He speaks of his long-term colleagues Priit Rohumaa and Janek Parkman, and the creativity and progressive way of thinking on the shareholder side. "Colleagues understand me without having to go into detail," says Jaanus. Most importantly, he wants to work in the company not only because of the salary, but also because of the joyful mental challenge that the work entails. Hardly could they create so many special substances out of a brown piece of rock without some fun. VKG is much more than just a bunch of factories. Oil shale chemistry is a lifestyle and a daily crossword puzzle for many of the staff and they approach the challenge with smiles on their faces. "When it stops being fun – I will retire," Purga says.

Today, approximately 75% of all oil shale mined in Estonia is burned in power stations, where all the released heat from the power production is funnelled into the river. 'This is a waste of resources,' says Purga. In his dreams, a proper oil shale industry should function like the world's best meat factory, where the only thing that remains of a pig is its squeal.

'We should be smart and get the maximum from oil shale, as this brings the biggest benefits,' he says. In addition to oil and chemical production, VKG already has its power stations fuelled by oil – shale gas heating the town of Kohtla-Järve, as well as the factories operating in the vicinity. In the near future, VKG will have its own mine, shale oil refinery and, further down the road, a cement factory which will make use of the mineral content of oil shale – mainly limestone. At the end of last year, VKG opened its new oil factory – the largest Estonian-capital-based industrial investment in Estonia. VKG's products reach the furnaces of large ships, which propel the giants of the ocean.

Most importantly, tests have now been completed which prove that Estonian shale oil can be industrially used for production of diesel fuel, while complying with ever stricter EU norms.



Oil shale mine in Brazil. Jaanus is rather well informed about the major oil shale deposits in the world. He has done a lot of research and has assessed their potential and risks for VKG.

Better than Chanel

There are a couple of flasks, filled with transparent liquid, on the shelf in Jaanus Purga's office. He takes one gently, as though caressing a woman, turns it around in his hand, and smells it. He takes a deep breath, as if this was some fine perfume, like Chanel. But no! Inside the test tube is diesel made of oil shale produced by recently developed and tested technology. And its

Ash hills into folk dancing stage and rally track

Ash hills on the horizon announce one's arrival in the county called Ida-Virumaa. From a distance, some people detect a likeness to the Egyptian pyramids, while others visualise the back of a dinosaur. It is a fact that the ash hills of Kohtla-Järve and the neighbouring industrial town of Kiviõli are the highest artificial objects in the Baltic States, rising 100 metres or more in height. The largest ash hills are located on 100 hectares of land.

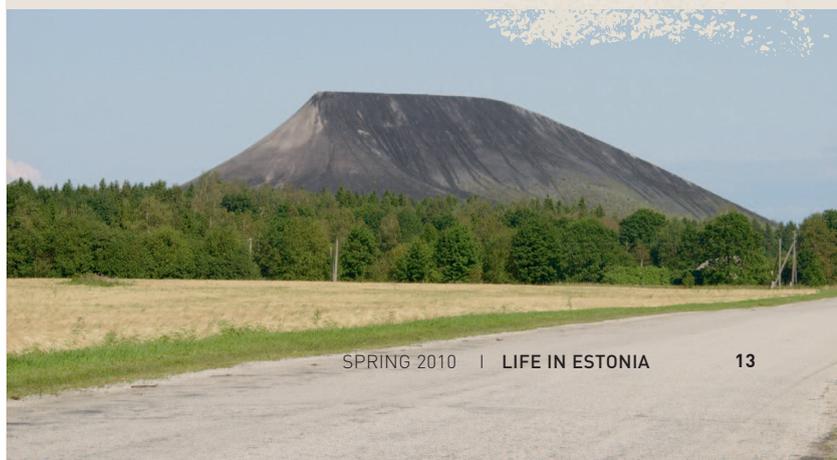
The ash hills tell the story of the eighty years of the Estonian oil shale industry. They contain oil shale ash and some amounts of chemical industrial waste which may be harmful for the environment when uncontrolled or not stabilized. With rain, toxic substances might enter the ground water. By 2013, the ash hills are required to be 'sorted out' and their harmful effect to the environment decreased.

VKG was the first oil shale processor in the world that built a new disposal area in accordance with the EU regulations for spent shale – a by-product of oil shale processing. In future, spent shale will be used for cement production. VKG opened a new disposal area even before the EU's deadlines.

Estonia accepted its obligation to close the rubbish tips of industrial waste which are leftovers of the Soviet era by, at the latest, 16 July 2013, in compliance with requirements established during the accession negotiations to the European Union. An EU-funded project costing half a billion kroons has been started to achieve this aim. It is the most expensive environmental project in Estonia to date. It was ten times cheaper to cover the radioactive waste storage area next to Sillamäe, to make it environmentally safe.

As part of the project the steep slopes of the spent shale hills will be made less steep and covered with a water-resistant protective layer, which will also be covered in greenery. A special water-processing system will be built to collect water from the hills and direct it to a cleanser (water-treatment facility). In addition, a seven-kilometre barrier wall will be built into the hill, which will prevent the escape of possible pollution. In the public interest, some parts of the ash hills will be kept the way they are.

Skiing and moto-cross tracks have been opened into the ash hills of Kiviõli. In the mining community of Kohtla-Nõmme, the ash hill forms part of the exposition of the popular mining museum. Local artists have used the location for years to organise a dance festival, which offers quite a surreal picture – hundreds of people in national dress dancing Estonian folk dances with industrial waste as a backdrop. This year, the dancing even took place inside the mines.





During the last nine years, 4 billion kroons have been invested in VKG. The largest investments were made in the building of the new oil factory, which was opened at the end of 2009.



smell has a far more exciting effect than Chanel on the man who has given his soul to the oil shale industry. In order to dispel any doubts, Purga has poured Estonia's first diesel into the tank of his car in front of television cameras and then driven away in order to prove that it works. It definitely does.

We have the raw materials, we have the technology, we know the size of the investment - all that needs to be built is the factory. Purga believes that it could be operational by 2015. Independence from foreign energy supplies is a cornerstone of the sovereignty of a state, and energy independence is

the privilege of very few countries. Today, the Development Director, Jaanus Purga, is convinced that Estonia can achieve this privilege if the will is there.

'With today's production volumes, we have another fifty years of oil shale mining available. Half of the oil shale could go to producing electricity and heat, in other words to the state-owned Eesti Energia power stations in Narva and elsewhere. The other half should be used to produce shale oil and, subsequently, diesel fuel and high value chemicals. Estonia's oil shale reserves and the planned capacity of the refinery are sufficient to cover Estonia's diesel fuel demand. There is no need to produce more than necessary for Estonia internally – it would become too burdensome on the environment. This applies both to electricity and diesel,' he states.

And when Estonia has its own electricity and car fuel, the country will be more free and independent in the choices it makes.

A poster on the wall of Purga's office depicts a filling station and petrol pistols. One of them has the sign VKG Diesel on it – a nice dream, which must not remain only that.





Rock which burns

Oil shale is a sedimentary rock which developed during the Ordovician era 400-500 million years ago from mineral substances and the remains of sea life and algae.

There are about 600 known locations worldwide where oil shale can be found.

Oil shale is mined in Estonia, Russia, China, Brazil and Germany.

The best quality oil shale in Estonia is found in Ida-Viru County, where there are active reserves of 2.2 billion tons.

Although there are records of using oil shale in the Kukruse manor in the 1870s, industrial mining in Estonia began during World War I, when there was a fuel crisis in Russia.

The Estonian oil shale industry developed during the first independence period of the republic, from 1918-1939. The state established mines in Kukruse and Käva, and an oil factory in Kohtla-Järve.

The area impacted by oil shale mining in Estonia is over 1% of the total land area, which in comparison to other countries is unusually large.

VKG opens new factory called Petroter

A new VKG oil shale processing plant was opened in Kohtla-Järve on 21 December 2009. The participants at the ceremony included the owners of VKG and the President of the Republic of Estonia, Toomas Hendrik Ilves. In his speech, the President mentioned the importance of VKG in the economic life of Estonia, especially due to its role in increasing the share of export turnover. He also talked about the good development potential that the Estonian oil shale industry has in the global context.

'Today is a truly special day, as we opened a new, modern factory built with the know-how and the hands of our people,' said Priit Rohumaa, Chairman of the Board of VKG. 'VKG, as the legal descendant of Eesti Põlevkivitööstus, is responsible for the development of this traditional branch of industry in Estonia, and we can confirm that another large step has been taken in this direction.' It is foreseen that the plant will operate on a longer-term basis starting in 2010.

The preliminary work for the construction of the new factory began in VKG in 2002. The project preparation began in 2005 and the construction itself in

early 2007. All the buildings and pieces of equipment had been completed by October 2009. In total, there were 27 companies participating in the design and construction of the factory. The construction of the new factory provided jobs for a hundred people. The cost of the project was 1.1 billion Estonian kroons. The new VKG plant is one of the largest production investments opened this year.

The President of Estonia and VKG owners cut the red ribbon.





World EXPO 2010

Will take place from May 1–October 31 2010 in the Republic of China, in Shanghai, which is home to around 19 million inhabitants.

The World Exhibition will be located on a 5.28 square kilometre area around the Huangpu River in Shanghai. Two hundred countries and 50 international organisations will participate in the largest World Exhibition to date. Approximately 70 million visitors are expected at the exhibition.

The main theme of EXPO 2010 is “Better City, Better Life”.

The exhibition will draw the attention of the global community to problems related to urbanisation, with the aim of seeking solutions. The theme of EXPO reflects the desire of humankind for a better life in the urban environment.

In the year 1800, only 2% of the global population lived in cities; in 1950, this reached 29% and, according to United Nations estimates, the share of the population living in cities in 2010 is 55%.

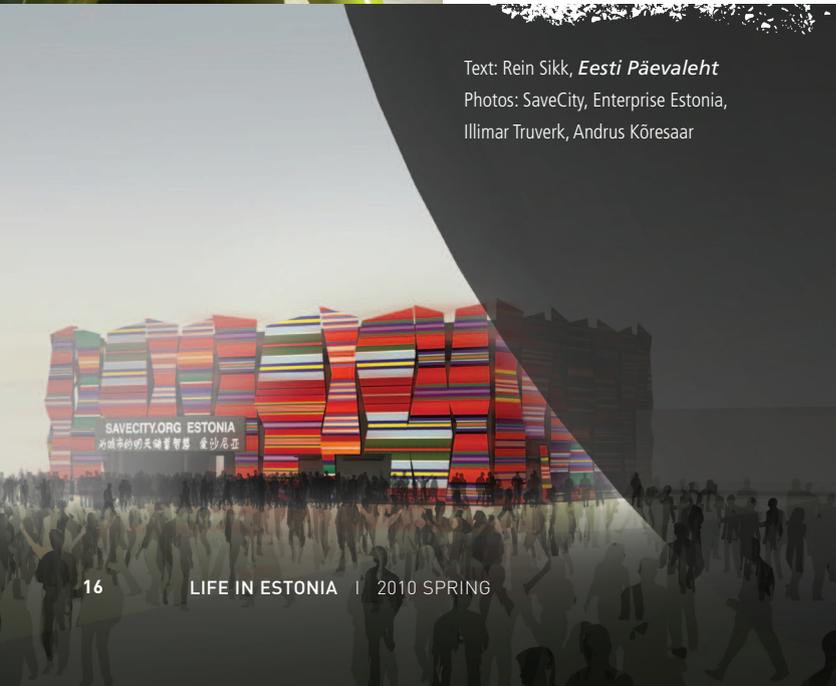


EXPO 2010 Shanghai: Estonia endeavours to save the world with piggy banks

Text: Rein Sikk, *Eesti Päevaleht*
Photos: SaveCity, Enterprise Estonia,
Illimar Truverk, Andrus Kõresaar

Despite it being an expensive venture for a small country, there was never a question about whether Estonia would participate in EXPO 2010 in Shanghai, China. The general view today is: if you are not at EXPO, you do not exist.

Even in his sleep, Ambassador Toomas Tiivel, Commissioner General of Estonia for World Expo 2010, is able to sketch the precise outline of everything to be seen at the Estonian pavilion between May and October. In order to gain attention, the smart ideas taken to China by Estonians constitute an effort to outweigh the opportunities available to large countries.





The person who will take Estonia to EXPO Toomas Tiivel

Born in 1952, Professor in 1993, Ambassador in 1994.

Studied biology. Has been employed by the Academy of Sciences, the Ministry of Foreign Affairs, and has been Estonian Ambassador to Latvia and Sweden.

Has written 50 scientific and 100 popular science articles, and 19 books on biology, the history of science, evolution, democracy, and whisky and other spirits.

Estonians know Toomas Tiivel, Professor of Biology, first and foremost, as the charismatic President of the Estonian Whisky Club UBC. Since 2008, he has been in charge of taking Estonia to EXPO.

Tiivel, a sturdy guy with a beard and surrounded by the aromatic whiff of his pipe, gets more and more excited as the time of the opening of the exhibition approaches. He carries the responsibility of taking Estonia's message out to the world, competing with the over two hundred countries and organisations which will participate in the fair.

Colourful piggy banks can achieve more than high tech solutions costing millions - this is the hope expressed by Tiivel in his interview with Life in Estonia.

Toomas Tiivel, there were 23 entries in the idea competition. What did you hope to achieve through the competition?

We hoped to find a message for Estonia which we could take out to the world and which would facilitate dialogue in Shanghai. We were looking for a uniform solution for the facade, the interior and the central idea, in order to introduce Estonia as an innovative small country with a favourable business environment, diverse nature and history, one which would make it a memorable tourism destination. The reason for participating is the opportunity to allow Estonia to be acknowledged globally and to express itself in the global arena. The idea needed to link to the main theme of EXPO, 'Better City, Better Life', and also to allow Estonia to market itself under its new slogan of 'Positively Surprising'.

Imagine that you are a Chinese guy living in Shanghai and you have come to the world exhibition with your lovely wife and child. You happen to stop in front of the Estonian pavilion. What do you see?

A huge crowd in front of our pavilion and the pavilions of our neighbours – Swedes, Finns, Danes - and in front of ours. The people will, after all, want to know what kind of surprises those countries have in store for China and the rest of the world.

But why should a Chinese man be drawn to the Estonian pavilion?

Estonia stands out among its neighbours. As we have less money than our neighbours, we do not have such a magnificent pavilion; however, we are more colourful...

What I find most boring is when a pavilion is perfectly built and includes a huge amount of information, but no soul. For example, huge screens which show films may be interesting and professionally done, but when I want to go to 30-40 pavilions but see more or less the same thing everywhere, I will just limit myself to about four or five pavilions and that will be that.

There are probably not many pavilions which have been covered in ethnic patterns on the outside.

Also, Estonia is almost unknown in China. The average citizen in Shanghai knows nothing about Estonia. By the way, the Nordic Council of Ministers investigated what the Chinese know about the Nordic countries and the result was: just about nothing. The most familiar 'thing' was Hans Christian Andersen and his fairy tales.

Estonian pavilion at EXPO - a smart idea is more important than the cost

Estonia's message – saving, recycling, innovative solutions

The idea competition for the Estonian EXPO pavilion had 23 entries and the winner was the solution called SaveCity.

The 1,000-square-metre pavilion will be located in the immediate vicinity of the Finnish, Swedish, Danish and Norwegian pavilions. There will be a Nordic Square located in the middle of the Nordic pavilions.

The pavilion will introduce Estonia as an innovative IT country; it will focus on sustainable thinking and the need for cross-border cooperation, and it will stand for the freedom to think outside the frame and to include everyone in developing solutions.

The facade of the pavilion will be covered in colourful Estonian ethnic patterns, which will make it stand out from its neighbouring buildings. The emphasis inside is on attractive piggy banks, each one telling its own story – a humorous and memorable image which will facilitate free interaction and dialogue.

Ionel Lehari, a member of the winning design team of the Estonian EXPO entry summarizes the project: 'The building carries the scent of our time – it has a restless form and an ethnic texture. The key word from the technical point of view is low-tech. We considered the pavilion more than just an architectural task. We focused on the impact of the space and made the building tell a story in order to include visitors in it. The interior design has a strong theatrical feel.'



You are now inside the pavilion, and what do you see?

Whoa – thirty-three different coloured piggy banks! Red ones, golden ones, white ones...

How big?

About a metre in height. And those piggy banks are definitely of interest to any child, including any Chinese child. The kids will certainly want their photos taken standing next to the pigs. And this opportunity is there. We will upload the photos later on our website.

But each piggy bank also has a message to deliver. We speak of innovation, of saving, of recycling in the context of global urbanisation. This is Estonia's message. In addition, there is the question of what we ourselves can do in order to save the cities.

For example, we will think about traffic jams in connection with urbanisation, about parks and playgrounds: are there enough of them? How many shopping malls are there, how much pollution? Each piggy bank carries its own message and we will try to provoke people to think along and act with us. We will ask what each person can do to make the urban environment a better one. As most Chinese people probably have their own mobile phones, they can send a text message to our pavilion number and express their opinion about what problems are most urgent in their cities. We will attempt to process and summarize this data quickly. And there will be prize drawings among participants every ten or fifteen minutes. For example, one can win a reflector shaped like a piggy bank, with the logo of the Estonian pavilion.

Super! As far as I know, reflectors, which are commonplace in Estonia, are more or less unknown in the rest of the world.

Indeed, in China reflectors are almost unknown. And they also carry our idea of 'SaveCity', as squirrels in the forest do not need reflectors. They are essential to save lives inside cities.

We will try to do everything to make visitors to the Estonian pavilion proactive. For example, each piggy bank has an opening through which people can insert their wishes. We will also look at all the wishes and put up summaries on our homepage. Every month, one of the winners of the prize drawings will receive a free trip to Tallinn, the European Capital of Culture 2011.

In Hanover in 2000, there were 2.7 million visitors to the Estonian pavilion. How many do you hope for this time?

The Chinese themselves estimate that 70-80 million visitors will come to EXPO. Being a sceptic by nature, I think that if three million of them come to the Estonian pavilion, we will have quite a steady flow of people, as the pavilion itself can house about 200 people at a time and the average duration of a stay is fifteen minutes. In addition to the piggy-banks, the visitors should be interested in the screening of specially produced material about Estonia, about Tallinn as the better city, as we are, after all, convinced that Tallinn is one of the best cities in the world. In addition, we will showcase Estonia as a tourism country and business partner, on smaller screens. We will introduce our culture and educational system.



Toomas Tiivel (in the middle) on his visit to Shanghai this March.

Will our message be delivered through piggy banks and saving?

We hope so. Everyone is working toward that end. Some have high technology. Estonia is not going to invent an ingenious new gadget, but we will try to make our gadgets work in the larger system.

Our pavilion will also have a conference centre, the 'closed area'. There we will work in particular with those visitors who have a special interest in Estonia. There will be screens with permanent exhibitions, including presentations on biotechnology, education, tourism and transit. There will even be information on Estonian sculpture and bogs, for example.

This is where all Estonian companies, higher education institutions and societies are welcome to take their programmes, to invite their partners and people who have a specific interest in Estonia. This is also where we will have concerts and where our president will come to celebrate the Estonian National Day on 18 October. The conference centre is meant for in-depth conversations, for two hours if necessary. There will be permanent and temporary exhibitions outside. For example, exhibitions of Estonian graphic art, fashion and jewellery, as well as a display of our currency units will be put on by the Bank of Estonia.

This is the place where I will be able to host, for example, the Deputy Mayor of Shanghai, to give a short presentation about Estonia, Tallinn or anything he might be interested in.

Why does EXPO matter to Estonia?

Juhan Parts, Minister for Economics and Communications:

There is no reason to doubt the value realised from the expenses our participation in EXPO entails. If all other countries participated except Estonia, we would miss out on displaying the openness of our economy, and on the search for new opportunities. Asia is not as far as it seems. If we want to find new opportunities for production and sales, then we need to make ourselves visible there. If we consider that it is estimated that approximately 70-80 million Chinese people will visit EXPO, the positive effect this may have on attracting students to Estonia and enlivening tourism is clear.

Ain Kaljurand, Chairman of the Port of Tallinn:

There are 200 million consumers living around Tallinn, in Scandinavia, the Baltic States and Russia. And, in the future, Tallinn may turn out to be the destination of container freight traffic from Asia by sea. In cooperation with the railway system, we will be able to take the containers to consumers fast. EXPO provides us excellent opportunities to introduce our plans and to make new business contacts.

Raivo Tamkivi, Adviser to the Board of the Tallinn Technology Park, Tehnopol:

EXPO is most likely the place where we will see where human technology is headed in five, ten or fifteen years. While the numerous meetings our technology specialists will have with Chinese partners are tactical in nature, much of what is seen at EXPO will determine long-term strategy.



What will you take along to China, in addition to the exposition?

I'll take the book of Estonian fairy-tales which is the first Estonian literary work to have ever been translated into Chinese. As surprising as this may be, to date only short stories have been translated from Estonian into Chinese, but not a whole book.

Once EXPO is finished, what kind of outcome will you be happy with?

Thousands of tourists coming to Estonia would be good. But the arrival of one important person may outweigh even the visit of 2,000. EXPO ends in October, and we cannot expect a result in November. The result may come in ten years, through Estonia attracting attention and being remembered when most necessary.

During the night before EXPO opens on May 1, you are unlikely to get very much sleep...

That's probably true ...



Estonia at EXPOs



The first World Exhibition took place in 1851, in London.

In 1862, when another World Exhibition took place in London, Estonian newspapers announced that a glass jar of Tallinn anchovies (Tallinna kilud), distilled liquor and other drinks, vinegar and grain samples were on their way to England.

The Estonian blue-black-and-white flag was first seen in the World Exhibition in Brussels in 1935. The country brought out its own exposition in 1937 in Paris, in the exhibition titled 'The Art and Technology of Modern Life'.

During the years of the Soviet occupation, Estonia was a part of the Soviet Union pavilion, showing items ranging from textiles to an electric organ.

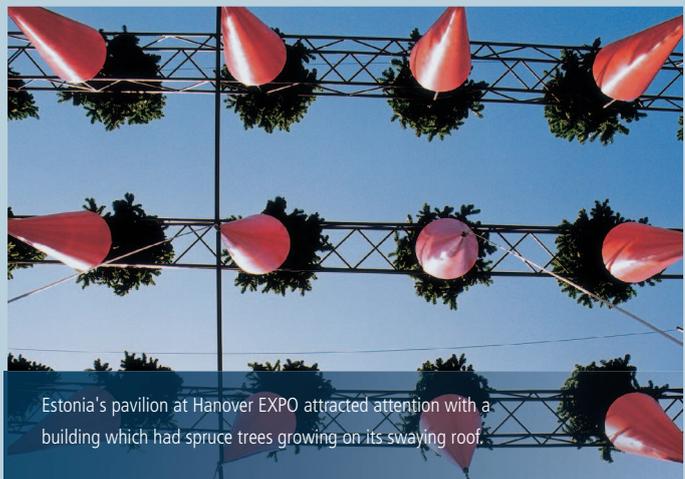
Estonia had its own pavilion again in Hanover in 2000, when it attracted attention with a building which had spruce trees growing on its swaying roof, but the trees reminded many people of carrots instead.

During a five-month-period, 2.7 million people visited the Estonian pavilion in Hanover. In terms of the number of visitors, the Estonian pavilion was among the top ten pavilions of the 173 countries and international organisations.

The influential US magazine *Time* called the Estonian pavilion the silliest of the World Exhibition.

However, world architectural magazines were more forthcoming with praise for Estonia. *Architecture* (USA) and *Architectural Review* (UK) published a full-page photo of the Estonian pavilion and called Estonia and Lithuania the biggest surprises at EXPO.

De Architect (Netherlands) compiled a ranking of EXPO pavilions, based on interviews with professionals, and the Estonian 'carrot field' came in 11th.



Estonia's pavilion at Hanover EXPO attracted attention with a building which had spruce trees growing on its swaying roof.

Text: Tiit Kändler

Photos: Elcogen, Crystalsol, TUT, Pressifoto

Estonian scientists intensify the production of environmentally friendly electricity

They have managed to decrease the working temperature of a fuel cell and increase its efficiency, and to increase the efficiency of a photovoltaic module and decrease its price.

Katri Muska, a scientist at Crystalsol, is weighing sulphur.



Researchers of the University of Tartu testing fuel cells

When, in 1800, the British scientists William Nicholson and Anthony Carlisle discovered electrolysis by passing a voltaic current through water and decomposing it into its constituent elements of hydrogen and oxygen, they didn't know that that was the beginning of one method of producing electricity. Thirty-eight years passed and Sir William Robert Grove tried reversing the reaction, combining hydrogen and oxygen to produce electricity and water. He discovered that when one end of two platinum electrodes was put into sulphuric acid solution and the other end into pots of oxygen and hydrogen, electricity was produced. As the pots also contained water, Grove noticed that, along with the electric current, the water level in the containers rose as well. By adding these pairs of electrodes and containers to batteries, he invented what he called 'a gas voltaic battery', which we now know as 'a fuel cell'.

For decades, people have been hoping to use a cell that produces electricity from any source fuel – from hydrogen, natural gas or any hydrocarbons – to heat and light houses, and to run car and plane engines. Centres of excellence all over the world, including in Estonia, have done a lot of research to find a simple and reliable and, at the same time, cheap solution, but with no clear success so far.

Predecessors of fuel cells and solar modules

A fuel cell would not have been invented had the Italian physician and physicist Luigi Galvani not touched an exposed sciatic nerve of a dead frog with two instruments of different metals in 1791. He discovered that the muscles of dead frogs' legs twitched when struck by a spark. He called this animal electricity fluid. He emphasized that the two instruments should be of different metals.

Alessandro Volta decided to experiment on himself and make use of coins. He noticed that when he put a silver or golden coin on his tongue and touched either a tin or lead plate with the tip of his tongue, the plate tasted sour. This discovery led to his invention of a 'pile' in 1799, later called the voltaic pile, the first electric battery in the world – he literally piled up several pairs of alternating silver and zinc electrodes, separated by cardboard soaked in salt water.

These inventors knew nothing about the composition of the atom, not to mention the electrons that play an important role in these devices. Present-day scientists and inventors who are trying to improve on these inventions need to know a lot about the composition of materials and the ongoing processes in them. That's why the development of fuel cells and electrical batteries requires a lot of knowledge and the combined efforts of scientists and researchers at centres of excellence. They succeeded in improving the batteries and, strangely enough, the first car made at the end of the 19th century ran on an electric battery. Still, electric cars are very expensive and can not be driven far before needing to be recharged. That's why electric cars are still hybrid vehicles which combine an internal combustion engine and one or more electric motors. Researchers hope to make a breakthrough with the fuel cell here, as it doesn't use gasoline as its fuel, but hydrogen and hydrocarbons, methane for example.

At the beginning of the 20th century, it became clear that electricity can be produced not only by burning fossil fuels or building hydroelectric power stations and wind turbines. There is one more natural possibility, the same source thanks to which all life exists – the sun. A cleverly built solar battery can produce electricity from sunlight.



Researchers at the University of Tartu, led by Professor Enn Lust, are working on a solid oxide fuel cell in which the electrolyte and electrodes are mainly made of rare earth metal oxides.

How can the sun produce electricity? This serious question was solved by Albert Einstein in 1905. He showed that a light quanta photon can activate and release an electron when absorbed in an atom. This was based on Max Planck's discovery, made in 1900, that perfect black body radiation is quantized i.e. it is not continuous but is emitted by quanta of light called photons. These discoveries paved the way to the quantum world, which is governed by quantum mechanics and which has made it possible to invent the transistor radio, the mobile phone, the computer and the energy saving light bulb. And the solar cell or photovoltaic cell.

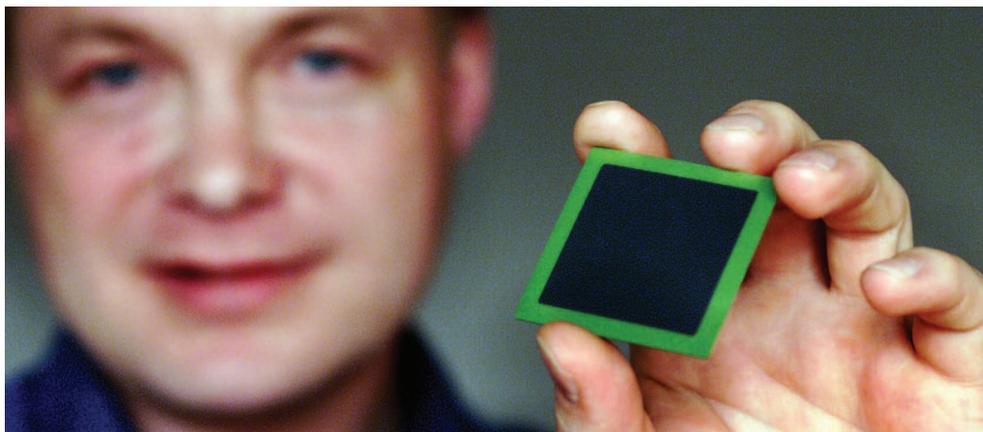
Simple complicated things

In principle, both solar cells and fuel cells are rather simple. But when it comes to building such cells that are easy to maintain and produce, it is clear that the task is not an easy one. Finding the perfect materials for these electricity producing devices is as difficult as looking for a needle in a haystack. But scientists are determined to improve the existing devices. In order to improve anything, one needs to know what is wrong with what already exists. The first weak point is the high price of both solar cells and fuel cells. Optimists are convinced that the price will decline as production grows. But still, the materials used are rare elements and the price remains high. That's why newer and cheaper materials are being sought. Hydrogen, used in fuel cells, is a highly flammable gas, and scientists are looking for safer ways to heat the cells. As their operating temperature is high, up to 1000 degrees Celsius, you can't just put them into your pocket like Volta cells. As for solar cells, the main problem is their low efficiency, which raises the price of the electricity they produce, plus the fact that solar panels require a large surface area.

It is generally accepted that new effective energy sources and methods of producing electricity should be, on one hand, environmentally friendly and, on the other hand, should make it possible to change the structure of energy production. Over time it has become clear that concentrated power stations are not the best solution, not for the consumer, not for the producer, and definitely not for security. Therefore, it is only natural that Estonian scientists are dealing with these problems that are so crucial for Estonia, the European Union and the whole world.

Cooling of the fuel cell

A fuel cell has three main component parts: an anode, a cathode and an electrolyte. The anode and the cathode have relatively high porosity, which allows gases to pass through them. Depending on the type of the fuel cell, the electrolyte, between the anode and the cathode, conducts either oxygen ions from the cathode to the anode (e.g. in a solid oxide fuel cell, SOFC), or protons from the anode to the cathode (e.g. in a polymer electrolyte membrane fuel cell, PEMFC). In order to balance the process, electrons return through an external circuit from the anode to the electron deficient cathode, producing a flow of electrons, or electricity. Because of losses in the electrochemical process at the electrodes, and the resistance of the electrolyte, heat is also generated. Fuel cells are characterized by their electrolyte materials and, as the name implies, the SOFC has a solid oxide electrolyte.



Enn Õunpuu, the CEO of Elcogen, shows a fuel cell, an electrochemical device that converts a fuel source into electricity. In principle, a fuel cell operates like a battery. Unlike a battery however, a fuel cell does not run down or require recharging. It will produce electricity and heat as long as fuel and an oxidizer are supplied.

Elcogen, a technology company developing SOFC, has been the initiator of fuel cell development in Estonia. Elcogen will produce single SOFCs and stacks based on proprietary technological solutions created through fundamental and applied research.

Elcogen works in strategic partnership with two leading Estonian research institutions, the Institute of Chemistry of the University of Tartu and the National Institute of Chemical Physics and Biophysics. To date, Elcogen has been financed by private Estonian investors and Finnish clean-tech investment fund PowerFund II under VNT Management OY. In addition, the company has received grants from the EU- and government-sponsored Enterprise Estonia.

Researchers at the University of Tartu, led by Prof. Enn Lust and his colleagues from the Department of Physical Chemistry of the University of Tartu, are working on a solid oxide fuel cell (SOFC) in which the electrolyte and electrodes are mainly made of rare earth metal oxides. The biggest disadvantage of this type of fuel cell has been the high operating temperature, but the theoretical and achievable electrical efficiency is much higher than that of other types of fuel cells.

When the research at the University of Tartu was started in 2001, the goal was established to reduce the operating temperature of SOFC from 900 degrees Celsius to 500-700 degrees. In addition, research was conducted on how to improve the electrical double-layer capacitor (EDLC), which has an unusually high power density. This kind of energy-storage device is inevitable for storing the energy produced by cyclically working solar modules or wind turbines in order to provide consumers with electricity continuously. Another study concerned the replacement of the noxious solvent in EDLC with an environmentally friendly one. Enn Lust received a National Research Award in 2008 for these studies.

Overall, they managed to work out the synthesis method of nanoporous materials with high specific surface area and to research the behaviour of these materials in the temperature range in question.

'We have modified the synthesis methods of micro/mesoporous solid cathode materials, and Elcogen has filed patents for this – US and European patents, and one patent application in the Russian Federation. We have synthesized and characterized these cathodes using X-ray diffraction, SEM, nitrogen adsorption, cyclic voltammetry and electrochemical impedance methods,' Lust explains. 'We were among the first to synthesize micro/ mesoporous cathodes using rare earth metal nitrates and a pore former.'

It was also discovered that strontium-doped lanthanum cobaltite and praseodymium cobaltite are suitable as intermediate temperature SOFC cathodes,

and fuel cells made of these materials operate at a lower temperature than those based on traditional lanthanum manganite. This makes it possible to use cheaper stainless steel instead of expensive ceramics in the manufacturing of fuel cells stacks and systems. 'We proved that it is possible to develop fuel cells and even prepare patents in Estonia,' says Lust.

'At the moment, Elcogen has filed one patent application,' says Enn Õunpuu, the CEO of Elcogen, founded in 2001. He adds that the research in the University of Tartu has been concentrated mostly on the development of the cathode. The cathode is a thin porous layer on the electrolyte where oxygen reduction takes place. The cathode is rather important in the operating effectiveness of the fuel cell. At the same time, we cannot underestimate the part played by the anode and other functional layers.

'In recent years, Elcogen has concentrated on developing a prototype of the fuel cell for commercial use, created through fundamental and applied research,' says Õunpuu. 'Now we have worked out our prototype. Naturally, it is not final, as constant development is necessary. Besides the University of Tartu and the National Institute of Chemical Physics and Biophysics in Tallinn, we have involved companies and research institutes from the USA, Germany, the Netherlands, Finland and Slovenia,' states Õunpuu.

The prototype has passed the tests of the VTT Technical Research Centre in Finland with very good results. 'VTT experts, who have a good perspective on the development trends and results worldwide, assessed Elcogen's cell as follows: "Elcogen's cell performance is, on average, about 10 per cent better than the best known available commercial cell." Let me remind you once again that the operating temperature of the Elcogen fuel cell is 650 degrees Celsius,' emphasizes Õunpuu.

Elcogen's objective this year is to start the first production line, as the company intends to be ready for small-scale production by the end of 2010. At first, the planned annual production volume is 2 MW of fuel cell power output. Depending on the cell size, the power of one cell will be up to 250 W. Peaks olema: Depending on the cell size and working temperature, the power of one cell will be up to 500 W. Cells produced in Elcogen can be used not only in distributed power production, such as single family houses, small and medium-sized commercial applications and power plants, but also in APUs (auxiliary power units) for transport applications.

'Every developer nowadays uses more or less the same materials in its fuel cells. But there are some differences in the technologies of making the layers which, in turn, determine the effectiveness and price of the fuel cell,' says Õunpuu.



Monocrystalline layer

Crystalsol, a photovoltaic startup company develops a remarkably lower cost photovoltaic module

The situation is a bit different when speaking of photovoltaic elements. Their price is determined both by the technologies and the materials used. The most energy-consuming part of standard elements based on silicon is the purification of crystalline silicon – the efficiency depends on the concentration of unwanted impurities.

The academician Enn Mellikov, Head of the Department of Semiconductor Materials Technology of the Tallinn University of Technology, and his colleagues have researched application alternatives for silicon technology for years. One solution was to use semiconductor polymers as a buffer layer of photovoltaic modules instead of Cadmium sulphide (CdS), which is a potential environmental hazard. They even made several hybrid multilayer structures of PV modules.

Another solution was to build the light absorbing active layer of the modules on monocrystals, i.e. on tiny single-crystals which are connected to each other by electrodes. 'We have eliminated the vacuum technology for the active layer and aimed our efforts at cheaper productive powder technologies,' says Mellikov, who, in 2006, received the National Science Award.

The core innovation is the light absorbing layer, made of a patented new crystalline semiconductor powder, in which Estonian scientists have succeeded in replacing extremely scarce indium, in the most used thin film absorber CuInSe_2 material, with other more abundant elements. Instead of silicon,

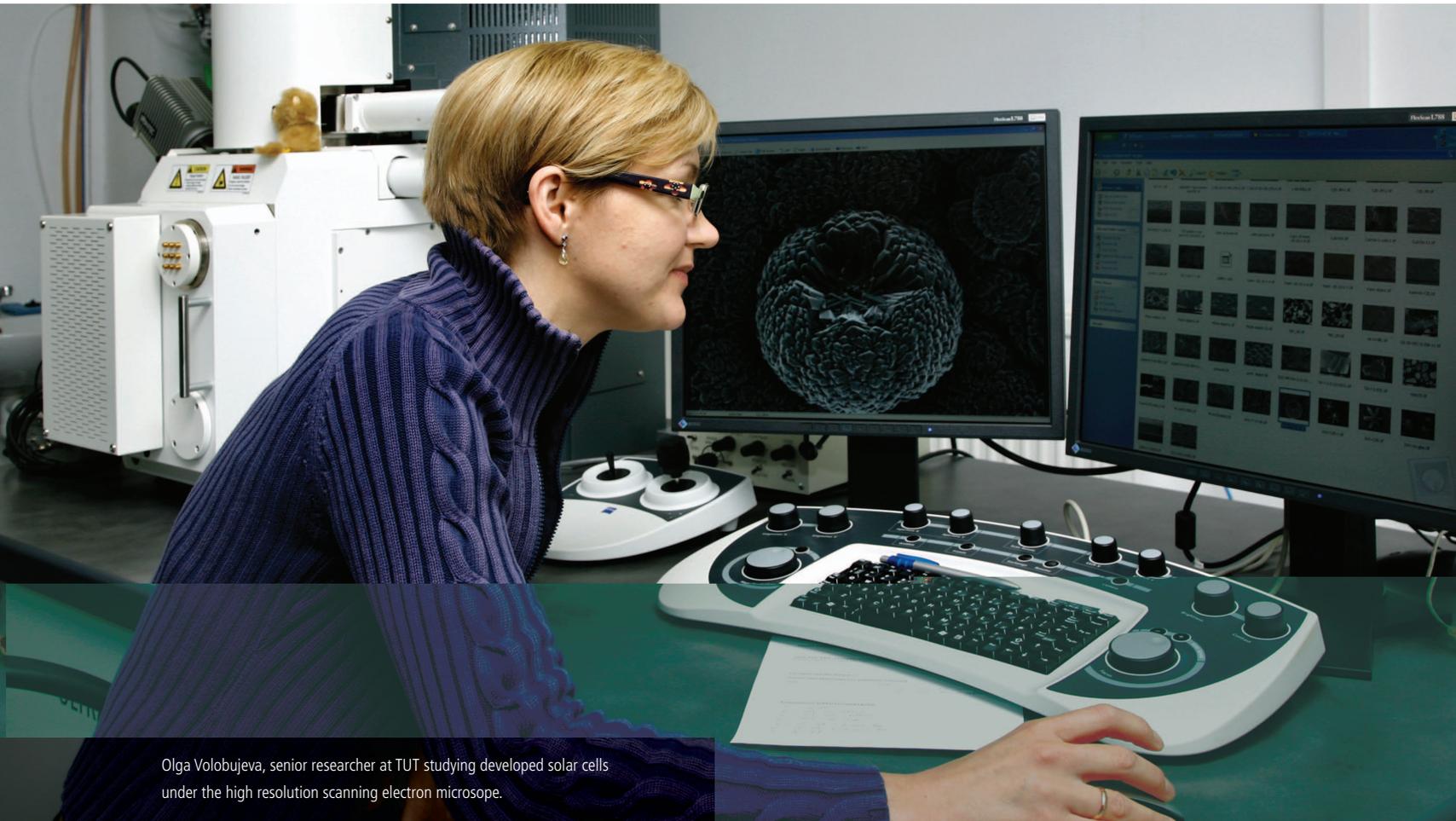
indium and tellurium, the module worked out by Estonians has a light-absorbing active layer made of 'Monocrystalline Membrane', a special crystalline semiconductor powder of copper, zinc, tin, sulphur and selenium particles, with a typical diameter of 30 to 60 μm , arranged as a single layer fixed by a polymer film. With the duration and temperature of the growth process and the chemical composition of the absorber, it is possible to regulate the size and shape of the crystals. This technology is now patented in Europe, the USA and Japan.

Work with monocrystalline photovoltaic modules is going on now in co-operation with the Crystalsol company. According to Dr. Thomas Badegruber, Managing Director of Crystalsol, this new type of PV module has significant advantages in cost (a reduction of 70-80 percent) and versatility.

Dieter Meissner, the founder and leading scientist of Crystalsol, works as a Professor at the Department of Semiconductor Materials Technology of the Tallinn University of Technology. 'Our aim is to get good quality crystals and that's why we grow them in molten salts,' he says.

Crystalsol was founded in 2008 as a spin-off company of the Tallinn University of Technology. Its revolutionary technology and strong patent portfolio is the result of more than 30 years of R&D in the research laboratories of Professors Enn Mellikov and Dieter Meissner, in Estonia, Germany and Austria.

The technology is based on decades of research for the Russian military and Philips semiconductor know-how. In the 1960s Philips Research Laboratories



Olga Volobujeva, senior researcher at TUT studying developed solar cells under the high resolution scanning electron microscope.



Prof. Dieter Meissner, the founder and a leading scientist at Crystalsol, and Dr. Thomas Badegruber, Managing Director of Crystalsol, regard price, production cost and efficiency as the most important parameters of a PV module.

in Eindhoven patented early versions of the technology and used Monograin Membranes for the production of light sensitive switches. Since then, Prof. Dieter Meissner has led the research on the photovoltaic application of Monograin Membranes. Behind the Iron Curtain, the Estonian research group of Prof. Mellikov was independently working on Monograin Membranes for about 20 years in projects for the Russian military.

During the 1990s, the joint research of Prof. Enn Mellikov's and Prof. Dieter Meissner's groups focused on Monograins made of copper indium diselenide (CIS). The rising costs of indium led to the search for alternatives. A breakthrough at the Tallinn University of Technology (TUT) allowed the replacement of indium with zinc and tin. Since then Crystalsol and its team of scientists have advanced this innovative technology. According to the scientists, they have reached an efficiency rate of 5.9 per cent and their aim is to raise the efficiency even more.

Breakthrough in technology gets financial support

Last August, the Estonian photovoltaic start-up Crystalsol received a EUR 2.5 million seed investment, from the powerful Nordic VC consortium Conor Venture Partners and Energy Future Invest, to accelerate the development of Crystalsol's revolutionary powder-based photovoltaic technology. 'The proceeds, together with generous support from Enterprise Estonia, the Austrian Wirtschaftsservice, and the Austrian Research Promotion Agency, have allowed us to dramatically speed up our development process,' says Dr. Thomas Badegruber, Managing Director of Crystalsol.



Semiconductor crystals made from copper, zinc, tin, sulfur and selenium (CZTS). Each particle is only 5 hundredths of a millimeter (50 micrometers) in size, but is a tiny working solar cell.

'After several years of experience with investments in solar technology companies, we are happy to find and be able to invest in such a breakthrough technology,' says Harald Olderheim, Investment Manager at Energy Future Invest, a Norwegian venture capital company dedicated to the CleanTech sector and with its main focus on Clean Energy. 'The low production costs combined with low material costs make this case especially promising,' he points out.

'We are particularly happy to announce our first investment in Estonia in such a highly interesting field of renewable energy. The sound academic semiconductor research, combined with strong international business know-how, makes this start-up particularly strong,' comments Jari Mieskonen, Managing Partner of Conor Venture Partners, a leading early-stage technology VC investing in Finland, Sweden and the Baltics. 'We also welcome Energy Future Invest - a strong energy focused VC - to the syndicate, to give good support to the start-up.'

'Price, production cost, efficiency,' says Meissner, listing the most important parameters of a photovoltaic module. As each single monograin is, by itself, a tiny solar cell, it makes no difference how big the finished module is. This is an advantage compared to other thin film technologies, in which all upscaling to larger areas requires costly and time-consuming development. Besides low cost, another advantage of the Crystalsol technology is flexibility. The modules developed in the Tallinn University of Technology can be used for many different applications but the initial focus will be on building integration. Modules can be opaque for rooftop installation or transparent for integration into windows. They can be laminated with polymer foil for integration into structured facades or encapsulated in glass for higher stability.

'The production of this kind of PV modules is as simple as printing a book on a printing press,' says Meissner. 'Due to the simple production process, the modules can be tailor made in terms of shape, size, number of cells and encapsulation.'



The PV module worked out by Estonian scientists, led by Professor Enn Mellikov, has a light-absorbing active layer made of 'Monograin Membrane'.

Nordbiochemistry™ replaces oil with renewables to produce base commodity chemicals and polymers

'The stone age did not end because we had a lack of rocks and the oil age will not end because we have a lack of oil.' *Sheikh Zaki Yamani*

An Estonian-based private, profit-oriented R&D management company, NordBioChem Ltd., has created a unique, fully IPR-protected technological platform for Lactic acid chemistry (called Nordbiochemistry™), which is leading to competitive high-volume replacements for petrochemicals as standardized commodity chemicals and polymers, as well as a significant reduction in toxic reaction components and CO₂ emissions.

NordBioChem's Mission is to develop and implement industrial technologies for the production of base chemicals from renewable raw materials. The production of chemicals from renewable resources is a very promising and seminal business. The concomitant contribution for the protection of our environment gives additional ecological and social value to sustainable chemistry.

However, why is NordBioChem engaged in industrial biochemistry?

The chemical industry faces big changes in which industrial biochemistry is going to replace petro chemistry to a remarkable degree. It is expected that, inevitably (because it's less complicated), the areas of Propylene-/C3-Chemistry will be affected the soonest, as well as the most, producing urethanes, styrols, polyesters, polypropylenes, acrylates and other materials for the car-, electronic-, engineering-, environmental protection- and textile industries, as well as many others areas.

We believe that the breakthrough in industrial biochemistry will lead, in the next 10 years, to replacements of approximately 1/5 to 1/3 of the approximately 80 million tons and 100 billion Euro market of C3-Chemistry. Therefore, we can even talk about replacement-chemistry: eventually a totally new industry sector will arise.

The reason for the replacements lies in the nature of petro chemistry – in the lack of propylene (considering the permanently rising demand) during a time of direct competition between propylene and petrol for the contingents from the same fraction of the oil-cracking process. However, petro chemistry cannot solve this problem by itself.

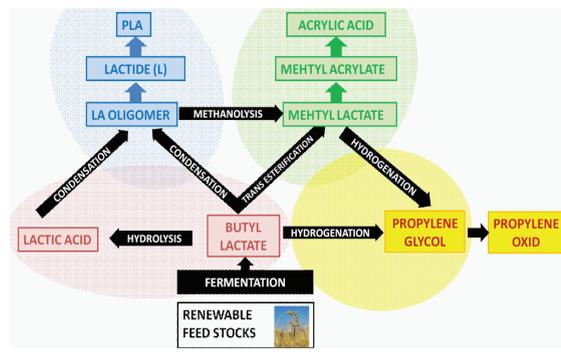
There is a lot of intensive research going on in industrial biochemistry today. The most critical, but still missing factor is an effective, waste-reducing fermentation technology which satisfies the need for high-volumes for large-scale industries.

There will be a significant breakthrough in replacements as soon as the appropriate fermentation technology is available and we, NordBioChem, affirm that we have developed this technology.

NordBioChem has worked out and owns respective IPRs for technologies, which demonstrates, in our 1m³ pilot fermenter, an average fermentation speed of over 60 g/l/h of ammonium lactate.

The technology and catalysts of NordBioChem are remarkable and unique, al

lowing us to produce PLA by bypassing the Lactic acid phase and generating waste of less than 50 kg/t of PLA, not 1.4 tons as today's common technology does.

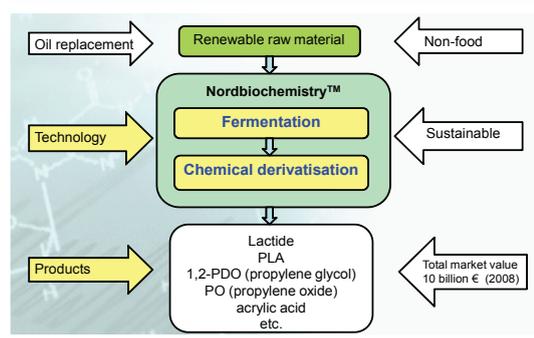


The principal objective of Nordbiochem is to develop and implement technologies for the industrial production of high-volume chemicals and polymers by using combinations of biotechnological processes and chemical catalysis. It is a whole technological platform with fermentation, catalysis and derivatisation, which makes it possible to produce a large range of different chemicals and polymers, including 1,2 Propylene glycol, Propylene oxide, Acrylic acid, Lactid, PLA and many others, and at the same time to permit significant cost savings. We call it Nordbiochemistry™.

The outcomes of current worldwide developments promise such a level of productivity and savings in fermentative chemistry that it is just a matter of time before there is a significant breakthrough in replacements to petro chemistry

Key advantages of Nordbiochemistry™

- Cost-effective fermentation technology (speed over 60 g/l/h), leading to competitive large scale/industrial size replacements for petro chemistry.
- Competitive at oil price levels, starting at USD 40-50 per barrel
- Non-food low-quality raw materials: sugar derivatives (e.g. molasses), starch or cellulose
- The implementation of Nordbiochemistry™ will considerably decrease capital expenditures and lower the production costs of relevant chemicals up to 40%



NordBioChem, after analyzing the markets and today's existing technologies, forecasts that Propylene glycol and Propylene oxide, with their market value of approximately 12 bi €/y, will have the highest perspective for replacements. Within the next 10 years, up to a quarter of them could be produced as replacements. And this is a real challenge.

That is why NordBioChem operates in the terrain of industrial biochemistry, searching for new options and possibilities, as well as being dedicated to initiating different industrial production units by cooperating with interested parties.

NordBioChem Ltd. www.nordbiochem.eu

Greening up our energy

Estonia's energy sector is currently going through major changes. The sector, which has been characterised for years as inefficient, wasteful and polluting, has within this new century made a major shift and is now moving forward into international business.

What do you know about the Estonian energy sector? Some people might know that Estonia is one of the few countries in the world that uses oil-shale for electricity production. Currently, more than 80% of the electricity in Estonia is produced from this unique resource. Oil has been extracted from oil-shale for more than 80 years. However, the usage of this fossil fuel has an adverse environmental impact and Estonia should move towards more environmentally-friendly solutions.

The other interesting feature of the Estonian energy system is its very strong ties with neighbouring energy systems. The power links with Russia, Latvia and Finland currently have a capacity of around 3000 MW, while our power consumption at its peak is nearly 1600 MW. This provides the Estonian power system with wide export-import and transit possibilities.

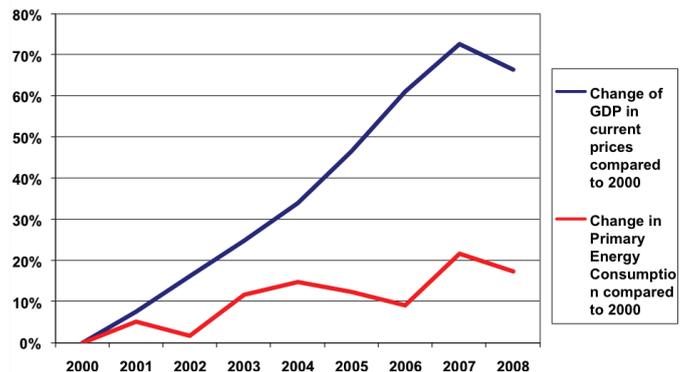
Improving energy efficiency

Estonia's economic growth has been impressive in the last 10 years, despite the economic downturn in recent years. Less known is the fact that Estonia has managed to increase its GDP without a substantial increase in primary energy consumption. Usually every 1% of the increase in GDP brings with it a 0.3-0.5% increase in primary energy consumption. In Estonia, our GDP increased about 60% between 2000-2006, but the primary energy consumption has increased only 10%.

In addition, during the years of the fastest growth, in 2005-2006, Estonia managed to decouple the economic growth from primary energy consumption. While the economic growth rate in those years was 10-11%, the primary energy consumption decreased by 2-3%! This is an unprecedented development in the world, which would be very difficult to match. Looking at international statistics on the development of energy intensity (calculated as the consumption of primary energy per unit of GDP), this figure for Estonia decreased by almost 200% from 2001 to 2008!

Considering 2007, this graph indicates the influence of one single change: at that time the new interconnection between Estonia and Finland became operational and Estonian power companies started electricity exports to Finland. This sole change increased the primary energy consumption in Estonia nearly 10%, with only a minor impact on the GDP.

Trends of GDP and Primary Energy Consumption in Estonia



What is behind such a development? Considering the statistics, one can find major changes in heat consumption. During the last 10 years, the heat consumption in Estonia has decreased about 15%. This is mainly due to the housing boom, which has brought to the market more energy-efficient buildings and, more importantly, has significantly upgraded the energy efficiency of existing housing stock.

The second driver of the decrease in primary energy consumption has been the upgrades in the heat and electricity networks. As a result of these upgrades, the electricity losses in the grids have decreased by 35% and losses in district heating grids by 30%.

Increasing energy prices have also initiated new business opportunities in the field of energy efficiency. New solutions for low energy consuming homes and IT solutions to control the energy consumption of homes are just some of the interesting solutions which Estonian companies have brought to the market. Also, the energy auditing business has started up in Estonia, with an eye on the East European markets, where there are similar energy efficiency issues.

Estonian solutions for the governmental financial support of renovation of the housing stock have been praised on several occasions by specialists. Lowered interest rates and fiscal support for energy audits and renovations have served very well the objective of reducing heat consumption in blocks of flats. In some cases, the reduction of heat consumption has even exceeded 50%!

The government is currently preparing an ambitious programme to further upgrade the energy efficiency of the housing stock. The aim is to support the renovation and construction of buildings with very low energy consumption and with a 0-energy concept. These measures are expected to become available during this year and should also provide new impetus to the real estate sector.

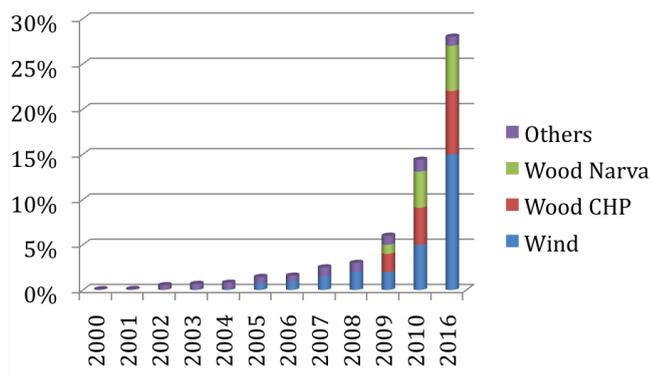
Green Energy boom

Estonia today has one of the highest shares of renewable energy in final energy consumption among the EU member states: with its 18% share in 2005, Estonia ranked number 6, even better than Denmark. This high share is mainly due to the fact that, in the heating sector, close to 30% of energy comes from different biomasses. For 2020, the target agreed to in the European Union was set at 25% for Estonia, which is 5 percent higher than the EU average.

However, in electricity production the share of renewable resources has been quite modest. This is largely due to the fact that Estonia has no large rivers for large-scale hydro power generation. When Estonia joined the European Union in 2004, the target was set that by 2010 at least 5.1% of electricity consumed should be produced from renewable resources. Back in 2003, this share was virtually 0 in Estonia and the target was considered to be quite challenging. As a result of the special support scheme introduced in legislation in 2007, a great interest in wind- and biomass-based power production has emerged.

By 1 January 2010 the total capacity of wind parks in Estonia had reached 142 MW. For a small country, this is quite a high figure. In comparing wind capacity per capita with other EU member states, Estonia has now entered the top ten of the EU member states, and is probably also in the top ten in the world. Estonia has also witnessed one of the highest growth rates in wind power among the EU member states: in the last three years, wind capacity has increased almost 500%!

The other growing renewable electricity sector is biomass. Several new biomass-based power plants are currently starting their operations or are under construction. They currently cover about 5% of Estonian electricity needs and their share is expected to increase substantially in coming years. In addition, the oil-shale-based power plants in Narva have started to partly use biomass in their new boilers.



Development of the Share of Renewables in Gross Electricity Consumption in Estonia

Both of these developments have brought about a major shift in electricity production. It is expected that the share of renewable energy sources in 2010 will be around 13% instead of the 5.1% target set just a few years ago! And the targets set in the new Energy Sector Development Strategy foresee that, by 2018, the capacity of on-shore wind parks should increase to 400 MW, off-shore wind parks to 500 MW and biomass-based power plants to 200 MW. Reaching those targets would mean that, in 2016, the share of renewable resources would reach nearly 28% in Estonia! Those targets also take into account Estonia's strong interconnections with neighbouring states, where this power could be sold as well.

One of the issues with wind power is always its fluctuating nature. In order to balance those fluctuations, one should have specific power plants to deal with them. Here again, the Estonian business community has brought to the table a unique project: an underground pump hydro storage plant. The idea is to pump seawater into underground storage to generate electricity at those times when the wind is not blowing, and to pump this water back into

the sea again when there is wind. Such an unprecedented technical solution would, in principle, provide the opportunity to store excess wind energy.

There have also been some investigations into whether solar energy could potentially be used in Estonia. The results of those studies are not as promising - the sun does not shine often in Estonia, especially in wintertime. For example, last December the 'sunniest' place in Estonia had 24 hours of sunlight during the month, and the least sunny place had only 14 hours of sunlight during this period...

Green economy

All of these trends in the energy sector have also brought about the fast development of green industries in Estonia. The largest green business in Estonia is the ABB factory, which produces generators for wind parks. This one factory produces around 20% of the worlds' generators of wind turbines. The ship yard company BLRT has started to produce the base towers for off-shore wind parks, and the interest in their products has exceeded all their expectations. There are many other examples of green industries with impressive growth rates, which are introduced in more detail in this issue.

Estonia has also set the target of being one of the first countries to introduce smart meters for all customers. This programme will start in 2010 and should be finalised for all business customers by 2013 and for households by 2017. Through this approach, the Estonian power grid and customers will be much more flexible in reacting to changes in the power market.

One of the developments which Estonia is following closely is associated with electric cars. The possibilities of loading cars with excess wind power and optimising the operations of the power system are just some features which may be made available. The reduction of the dependency on imported transport fuels is a bonus of electric cars. As Estonia upgrades its current electricity networks and power production portfolio, this option will be taken into account in the new set-up of the infrastructure.

Due to the fact that more than 50% of the Estonian territory is covered by forest and that forest industry residues are available, companies are also looking into possibilities of starting up second-generation bio-fuel production in Estonia. Currently, there are also several small factories producing first generation bio-fuels to supply the whole of Europe with their products. Those developments will lead to a substantial shift in our transport sector.

Green science

Developments in the green economy are also supported by educational and scientific research in those fields. Estonian scientists are very well known in the development of materials for energy appliances. The main research targets today involve the development of better materials for fuel cells and solar panels. Also, new insulation materials are under research in several companies and universities in Estonia.

Scientific research projects also support the introduction of bio-energy appliances and the development of new green technologies. The outcomes of those projects have been used by a wide range of companies and researchers all around the world.

Interestingly enough, in some international studies Estonia has already been shown to have one of the highest shares of green economy in relation to GDP. With the current developments and political targets, Estonia is expected to become a green showcase for the world. We are small, but efficient.



Eesti Energia will invest significantly into flue gas cleaning equipment for Narva Power Plants.

For the last hundred years, Estonia has been the world leader in oil shale energy, using it to extract oil and generate electricity. Compared to the other Baltic countries, Estonia currently has a fairly competitive power generation portfolio and the benefit of a domestically generated power supply. However, in order to ensure long-term sustainability it will undoubtedly be necessary to reduce the average CO₂ emissions level in the future. In order to achieve this aim Eesti Energia, as one of the main energy producers in the region, has adopted the strategic objectives to diversify its power generation portfolio and in order to do so, to introduce various clean and green energy projects in Estonia and other Baltic countries.

Estonia's strive towards clean and green power generation





In the summer of 2009 Eesti Energia opened its largest wind farm in Aulepa, on the west coast of Estonia.

Power from wind, water and waste

As a result of the renewed strategy in the summer of 2009 Eesti Energia opened its largest wind farm in Aulepa, on the west coast of Estonia. Having a capacity of 39 MW, this is the most powerful wind park in the Baltic countries, generating more than 100 GWh of electricity on an annual basis. The output of the 13 turbines at Aulepa cover about 1.3% of the electricity consumption in Estonia and supply power to about 35 000 Estonian families. An important additional benefit is that this wind park enables us to save nearly 120 000 tones of CO₂ annually, which would have otherwise been emitted by using oil shale.

And this is just the beginning. The company is already planning to launch its next wind energy projects in eastern Estonia on the closed ash field of Narva Power Plants and in western Estonia on the Paldiski peninsula, which was home to two Soviet type nuclear submarine training reactors. Complementary to its on-shore wind farms, Eesti Energia is also planning to develop an off-shore wind farm in Estonian coastal waters. There are also plans to renovate some small hydroelectric plants, in addition to the already existing plants at Keila-Joa and Linnamäe.

For a long time household waste has been considered a problem rather than an opportunity. These times will come to an end soon. Through utilization of the most advanced technologies, Eesti Energia is planning to start recovering waste for fuel. It's important to acknowledge that waste is actually an important source of energy and has a similar calorific value as oil shale. As such, the Board of Eesti Energia has adopted an investment decision to set

up a waste to energy plant nearby Tallinn by 2012. The plant's projected production is about 17 MW of electricity and 50 MW of heat with a fuel capacity that will incinerate up to 220 000 tones of household waste annually.

Increased efficiency from combined heat and power generation

Heat is an important byproduct of electricity production which has previously been mainly released to the environment. As part of the program to increase the efficiency of energy production, Eesti Energia has decided to significantly extend its foothold in the field of combined heat and power (CHP) generation. The first investments have already been made in and nearby Tallinn. The company considers this as a small but very lucrative business opportunity as local mini-CHP plants help to reduce electricity transmission losses, ensure the supply of electricity to small settlements and reduce the price of heat for consumers. This branch of power generation also enables Eesti Energia to significantly boost the country's energy independence as locally produced biomass (wood chips, timber cutting waste, bark and other renewable solid fuels) will be the main fuel, in addition to some already existing older gas powered CHP plants.

Lessening the environmental impact of oil shale electricity

It is, of course, obvious that the transition to clean and green energy will not happen overnight. In the coming years the bulk of Estonia's electricity will still be generated from oil shale as this strongly supports the country's energy security needs.



There are also plans to renovate some small hydroelectric plants, in addition to the already existing plants at Keila-Joa and Linnamäe.

Nevertheless, in order to reduce the environmental impact of electricity generation the company has adopted a number of important decisions. First, Eesti Energia will invest significantly into flue gas cleaning equipment for Narva Power Plants. This will lower the sulphur and nitrogen content in the exhaust gases, which will allow us to bring our older generation capacities into compliance with the current and also more stringent future environmental requirements of the European Union (EU).

We are also further developing the possibilities to reuse ash, a byproduct as a raw material in the cement and construction industry. This not only minimizes our waste production as well as the CO₂ footprint of the cement and construction industries, but it also provides us with an additional revenue source.

Last but not least, in order to curb CO₂ emissions and further develop the Estonian biomass industry, Eesti Energia started to burn biomass as part of the fuel mixture at Narva Power Plants, further offsetting power production usually fired by oil shale.

Going into nuclear?

As the plans and developments related to diversification of Eesti Energia's power generation portfolio are well under way, the question on the country's main baseload electricity source still needs to be answered. According to Estonia's energy strategy, one scenario is construction of up to two new oil shale fired power blocks. At the same time, taking into account the latest developments of the EU's climate and energy policy, the government is also

willing to explore the possibility of initiating a nuclear power plant in Estonia or joining similar project in a neighboring country.

As the European political establishment is quickly moving towards low carbon or carbon free energy production, there are a number of reasons to carefully consider which energy source should be developed to cover the country's base load needs into the future. Investments into electricity generation are long term and mistakes today will be very costly for the future. The country's long term experience speaks for further developing oil shale electricity based on our domestic resource. But the strive towards a carbon free future is shedding more and more light on the nuclear option.

Although Estonia was home to two Soviet type nuclear submarine training reactors, which have now been decommissioned, the knowledge and experience related to nuclear power is completely missing in Estonia. In this light, it should be admitted that the goal foreseen in the national energy strategy to adopt a law on nuclear energy by 2012 is a highly ambitious task. Therefore it is more probable that Eesti Energia will first carefully evaluate and possibly participate in the new nuclear power plant project in Lithuania, of which the company has also been invited to take part.

Regardless of the outcome of present and future discussions, it's obvious that the Baltic region needs new power generation capacities and we don't have much time to discuss the details. Taking into account the present political background it's rather obvious that the strive towards a clean and green energy future will continue and so shall Eesti Energia.

Estonia's Enefit is utilizing its decades of oil shale development experience by developing and implementing the most efficient and economic shale oil production technology to date. Operating in Estonia under the name Eesti Energia, the company has experience in the whole value chain of energy production - resource mining, oil and electricity production as well as energy sales. Enefit, however, is already sharing its know-how with the world through oil shale development projects with major economies such as the US and China as well as Jordan.

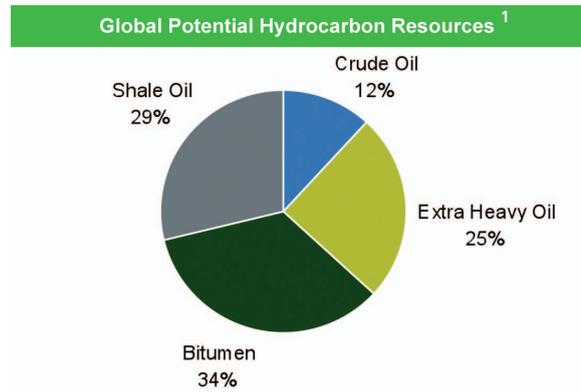


Enefit technology – world class efficiency in oil shale

Why develop an oil shale industry?

The world's shale oil resources are estimated to actually surpass the amount of conventional oil resources¹. However, shale oil is currently commercially produced in only three countries – Estonia, Brazil and China. "What has hindered the development of worldwide shale oil industries is that so far, there has been a lack of a fully developed technology which could meet environmental as well as efficiency and reliability demands," Enefit's Development Manager, Alo Kelder, brings out. He also points out that the availability of easily reachable conventional oil resources has been one of the reasons that until a few years ago, the world oil price had not seen many dramatic rises. However, the International Energy Agency (IEA) predicts that this will change. Due to increasing oil demand and world oil reserves that are becoming more and more difficult to extract, they expect to see a long term growth in oil production costs and subsequently the world oil price. There may be periodic price drops due to temporary improvements in market conditions, but the IEA predicts that the nominal price of a barrel of oil will rise consistently, reaching 200 dollars a barrel by 2030.²

1 Total shale oil resources worldwide estimated at 2.8 trillion barrels, more than 2 times that of conventional oil. World Energy Council 2007.
 2 International Energy Agency World Outlook, 2009



Another important factor that will influence oil shale's future is the level of oil consumption. On the global level, the conventional oil industry will be achieving its highest possible production volumes which will be followed by a subsequent decline in capacities. At the same time, the global consumption trend will constantly grow. While this idea of "peak oil" and its timeline is hotly debated, venerable international energy agencies are forecasting that demand for crude oil will exceed available resources.



Enefit's Jordanian oil shale deposits



Enefit 140 oil plant in Narva, Estonia.

Discovery of new oil fields, use of reserves and extension of the lifespan of oil fields through additional investments and production technology upgrades may slow the decline in production volumes, but will hardly stop it

Oil shale development is a possible answer to the resource shortage, as the insecurity prevalent on the world oil market is leading to rapidly increasing demand for alternative methods of oil production. More and more investments are being directed into increasing the production of liquid fuels from deep sea, heavy oil, oil sands and oil shale - as a result of which, Enefit's experience in processing oil shale is receiving ever more international attention. As the search to find new conventional resources expands its boundaries, production costs are driven higher making alternative sources, such as oil shale, more competitive.

Enefit's leading proprietary technology

Estonia is one of only three countries in the world with an oil shale industry and Enefit's commercial shale oil production plant in Narva, Estonia is the only plant in the world currently operating based on the solid heat carrier technology. "Almost 80% of the original design has been replaced by Enefit's engineers over the course of about 30 years, and the Enefit technology

Enefit is unlocking the potential of a unique energy resource:

Technology Provider

TECHNOLOGY PACKAGE

INCLUDES:

- Feasibility studies
- Bench/pilot services
- Engineering
- Turn-key plant delivery

Project Developer

KEY SERVICES:

- Resource assessment
- Feasibility studies
- Construction
- Operation
- Technology license is included in all Enefit projects

is patented by Eesti Energia," Eesti Energia Oil & Gas CEO, Igor Kond, explains. "The current plant has two units capable of processing 140 tons of shale oil per hour, producing 2,500 barrels per day each. Our new and advanced generation oil plant, which we are currently constructing together with our partners Outotec, will have double that capacity."

Cooperation with Outotec has been one of the key points in Enefit's technology development and industry expansion. The international engineering company is known for its global presence and significant experience in providing innovative solutions to various minerals and metals industries. Outotec's proven capability in circulating fluidized bed (CFB) technology and their extensive R&D facilities coupled with Eesti Energia's leadership in oil shale operations and development are unlocking the potential of oil shale.

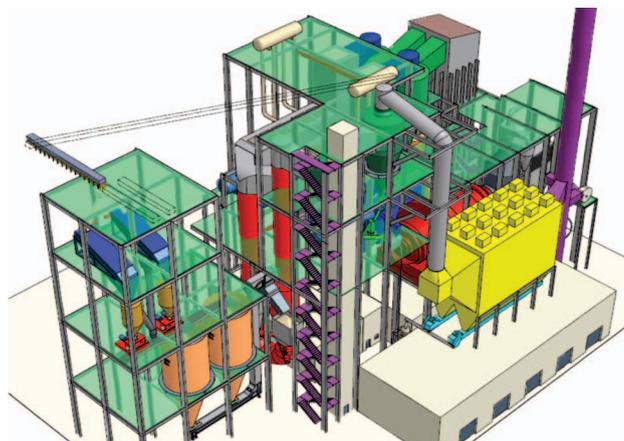
New Enefit 280 oil plant

THE NEW OIL PLANT PRODUCTION AND CONSUMPTION:

- Oil shale consumption: 2.26 million tons/year
- Shale oil: 1.8 million bbl/year
- Retort gas: 75 million m³/year
- Electricity: 35 Mwe by steam turbine

ENEFIT TECHNOLOGY:

- Efficient - extraction of ALL energy in the oil shale and utilization of all mined oil shale
- Clean - low emissions, compliance with all future EU standards, ash that can be sold to the cement industry
- Profitable - integrated power generation and products with additional revenue streams
- Proven - Advancement of Enefit's proven, already best available technology



New-generation Enefit-280 plant

Construction has commenced on the first implementation of the new generation Enefit technology at the Narva Oil Plant in Estonia.

The new technology, developed through Eesti Energia's cooperation with Outotec is cleaner, more dependable and scaled-up. It will be the most efficient commercially utilized oil shale fuels production technology and a significant advancement of the industry. The construction has already broken ground and the plant start-up will take place in 2012.

One key competitive advantage of the Enefit technology is that it produces co-products – electricity, gas and ash which can provide additional revenue streams and a higher value project. The new plant will use 2.26 million tons of oil shale per year, producing 1.8 million bbl of shale oil and 75 million m³ of retort gas which can be utilized for electricity generation or hydrogen production, similar to natural gas. There is also a 35 MW steam turbine integrated with the oil plant, which utilizes the residual heat from the oil production process to produce electricity. The ash from the process can be sold to the cement industry, offsetting the CO₂ emissions from clinker production.

“Construction of the new oil plant is another step taken by Eesti Energia to establish a high-quality oil shale fuels industry in Estonia. It is also a precondition for offering our technology elsewhere in the world,” Eesti Energia's CEO Sandor Liive said when discussing the project.

In the coming years, Eesti Energia plans to develop a liquid fuels industry, producing high-quality oil that could be used as motor fuel according to existing fuel norms. “High-value liquid fuels are more valuable than any other oil shale product and by taking this step, we give the maximum value to oil shale, while guaranteeing Estonia's energy security,” Mr Liive emphasized.

In order to meet this goal, Eesti Energia has plans to build an Estonian based shale oil upgrading facility to enhance the raw shale oil value. The planned product will be a synthetic crude oil, which will be a premium feedstock for conventional refineries. The expanded industry could produce up to 30,000 barrels of synthetic crude oil per day, exceeding Estonia's liquid fuel consumption needs. Development and testing are ongoing, not only to maximize the value of the local oil shale resource, but also to strengthen Estonia's energy independence and provide a secure, domestic liquid fuel supply.

Environmental goals drive technology development

One of the key aims behind Enefit's development program is making shale oil production cleaner and more resource efficient. The Enefit technology not only meets the most strict upcoming European Union environmental regulations, it can also be fine-tuned to be CO₂ capture ready and minimize water consumption. While the oil shale industry has sometimes gotten a bad reputation of being dirty and water greedy, as with any other industry, the technology has seen drastic improvements, particularly in environmental performance. Enefit's oil extraction process itself is water free and the byproduct is a stable ash with no harmful impacts to soil or water. Air emissions can be addressed using standard, industry proven solutions and the excess process heat is converted into electricity, which more than covers the plants power needs. Eesti Energia is committed to continue improving the impact of the industry and is striving towards a more clean and more efficient oil shale industry.



High-quality oil shale fuels maximize the resource's value

High-quality oil shale fuels maximize the resource's value

The Enefit technology is not only creating a secure domestic oil supply for Estonia, but can be implemented for other types of oil shale found across the world. Already today, Jordan, China, Morocco, the US and many other countries that are interested in developing their oil shale resource are turning to Enefit.

The benefits of developing a shale oil industry can be extensive and include independence in the energy sector and stronger security in the form of a local fuel supply; development of new industry sectors and the associated jobs that encompass the entire oil shale value chain from mining to finished production; additional revenues for the state as the resource owner and a balance of payments through decreasing conventional oil imports. Synthetic oil production is also knowledge-intensive and can significantly increase the amount and calibre of research and development activities. An increased demand will be created for training specialists in the field and for research at universities and scientific institutions, which will have positive economic impacts.

Oil shale is not only an opportunity to achieve energy independence, but it can help to create a considerable competitive advantage for a country. The Estonian know-how is recognized across the world, with Enefit as a leader in oil shale development and utilization. Since Enefit is currently the only shale oil production technology that is able to process all of the mined resource, while also being environmentally friendly, it provides a very economic solution to the world energy mix.

Please find out more at www.enefit.com

Enefit potential





Matti Pekkarinen, Head of the Electrical Machines Factory, has been the heart and soul of the ABB factory in Jüri.

Text: Toivo Tänavsuu, *Eesti Ekspress*, TigerPrises.com

Photos: ABB

ABB considers creating a development team for wind generators in Estonia

The global technological giant ABB wants to take the wind generator business up to a new level in Estonia. In this interview, Bo Henriksson, the Baltic manager of the company, and Matti Pekkarinen, Head of the Electrical Machines Factory, talk about how Estonia became one of the largest wind generator producers in the world.

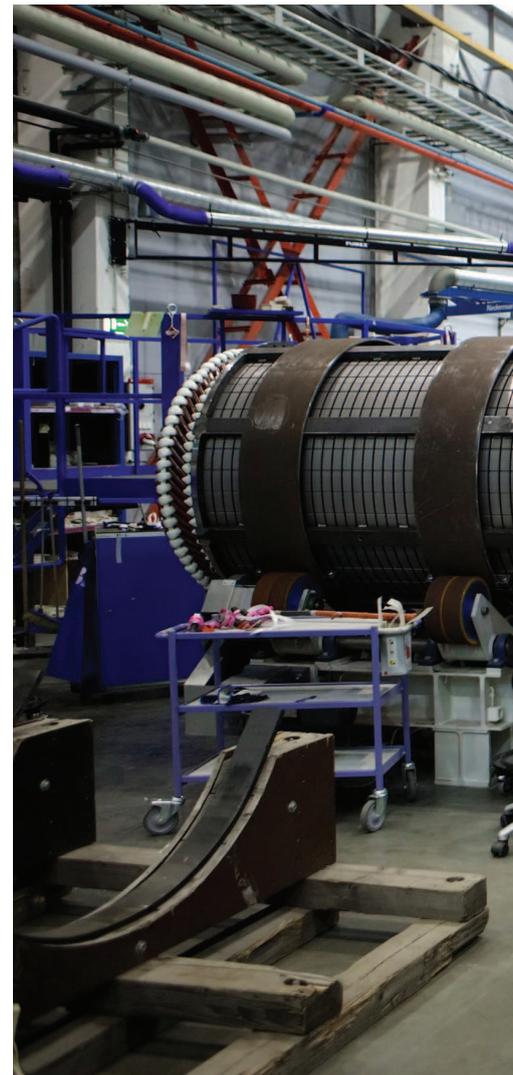
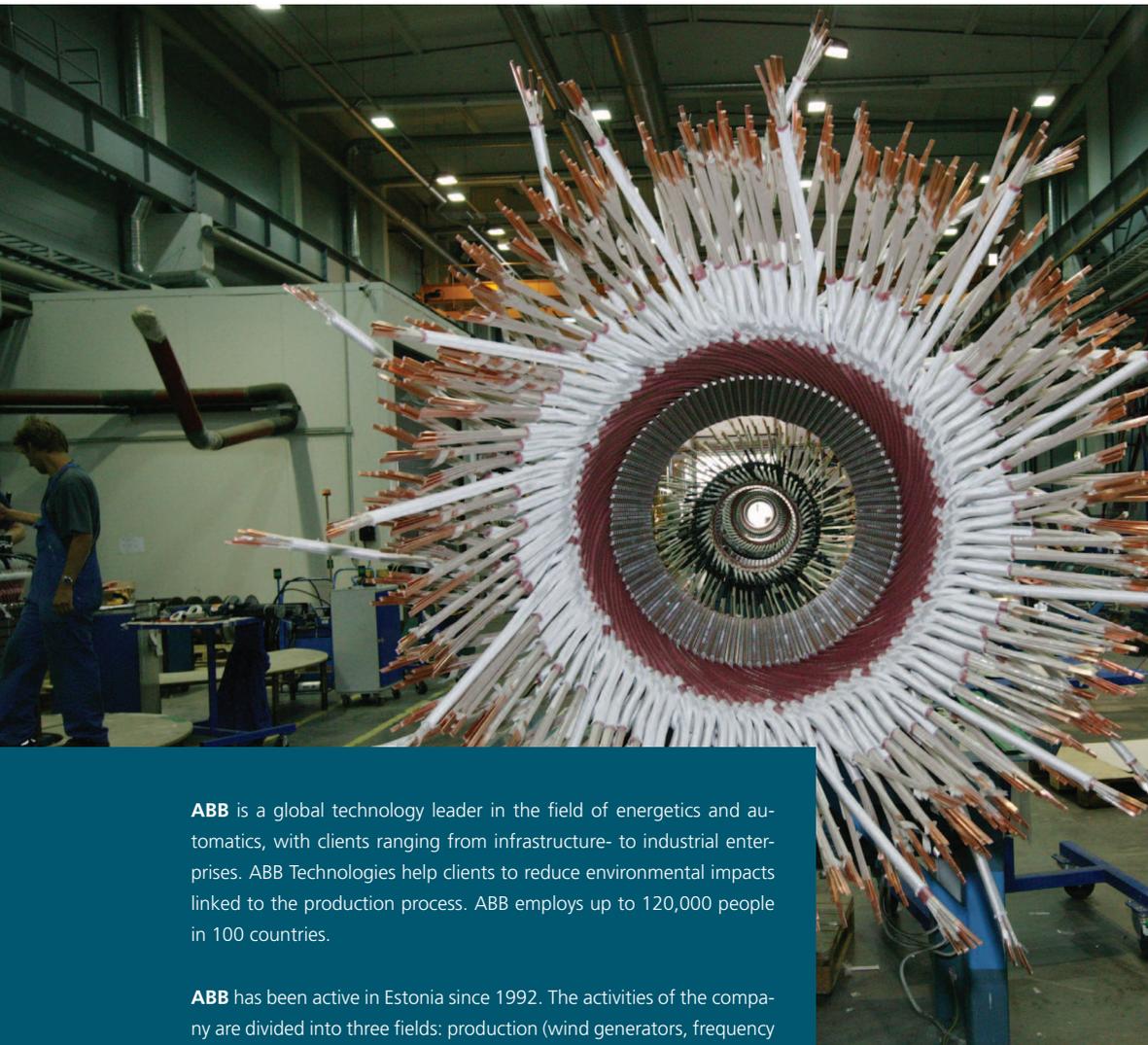


ABB is a global technology leader in the field of energetics and automatics, with clients ranging from infrastructure- to industrial enterprises. ABB Technologies help clients to reduce environmental impacts linked to the production process. ABB employs up to 120,000 people in 100 countries.

ABB has been active in Estonia since 1992. The activities of the company are divided into three fields: production (wind generators, frequency converters, electrical cabinets and compact secondary substations); sales (projects in the field of transmission and distribution, complex projects on a turnkey basis, medium- and low voltage products, automation systems and robots) and maintenance services for industrial clients. On three occasions (2007-2009), ABB has won the 'Foreign Investor of the Year' prize given out by Enterprise Estonia and, once (2008), the 'Enterprise Award', given to the best company in Estonia.

ABB has been producing wind generators for years in Jüri, close to Tallinn. How did it come about that this plant was opened in Estonia?

Pekkarinen: ABB first began to produce megawatt-class wind generators in 1997 in Finland. But the machine factory there could not cope with the rapid demand. In 2002, we decided to add a production branch to the Tallinn factory. For a few years, we manufactured the main components of generators, stators and rotors here and final assembly was done in the Helsinki factory. Since 2007, complete generators have been manufactured in our plant.

Henriksson: There wasn't much know-how in Estonia before, only in our service workshops, which were subcontracting for the Helsinki factory. Matti had to build almost everything from scratch: find more people, train them and do a thousand other things.

Pekkarinen: At first, the factory was 3,600 square meters. Today the size is 22,000 square meters and we employ 350 people. Our top year was 2008, when we produced almost 2,000 generators, but now the financial crisis has led to quite a drop. The warehouses of customers are full at the moment, but the demand can grow quickly.

How standardized are the products made in Jüri?

Pekkarinen: There are no universal generators; everything is done in cooperation with the customer. ABB has its product development branch in Helsinki – there is only production in Jüri. Usually the lifetime of a product is roughly seven or eight years. In 2009, ABB finished producing its first type of generator, which we began to produce in Helsinki in 1997.

Technology has changed extremely quickly. The first generators were the 'fixed-speed' generators, which only operated at one speed. When the speed dropped, the engine capacity disappeared. Then there was the double-speed type, which varied between two different speeds on the basis of wind speed.

One problem with generators is that we can never foretell how fast the wind is going to blow. Today ABB is promoting the 'permanent magnet' generator, where the generator is connected to a network by a frequency converter. This makes it possible to adjust generator power.



President Ilves during his visit to the ABB factory in Jüri, near Tallinn, in 2009.

Where are the generators produced in Estonia used?

Henriksson: The generators used in the Aulepa wind park were partially produced in Jüri and assembled in Helsinki.

Our large clients are the leading global producers. Purchased goods go through a customer's warehouse to different sites worldwide. Hence we can say that our generators are used all over the world: the USA, Europe and Asia. It is difficult to be more precise.

Why was the decision made to produce generators in Estonia of all places?

Henriksson: Even in the early 1990s the stators for different electrical machines for Finnish factories were wound in Estonia. Certain skills existed here already. Besides, the relations between Finland and Estonia are great and the two countries are very close to each other.

Facts about Estonian wind energy: with its long coastline, south-westerly winds from the Baltic Sea, and its sparse population, Estonia is a great area for the production of wind energy in the European context. Theoretically, Estonia could cover most of its electricity needs with wind power.

At the end of 2009, there were 67 working wind-mills in Estonia, with a total capacity of 142MW.

In order to fulfil the European Union's aims for 2020, Estonia needs to enlarge its wind energy capacity to 900MW, in other words by 600%. This target is set in the Long-term Public Fuel and Energy Sector Development Plan, adopted by the government in February 2009.

However in the field of European wind energy, and considering its own potential, Estonia remains an insignificant player. For example, in Denmark, which has a smaller area than Estonia, there are already wind parks with a capacity of 3,465MW.

The biggest producer of wind energy in the European Union is Germany: 25,777MW (at the end of 2009). Estonia is still the leader among the Baltic States – in Lithuania there are wind parks with a total capacity of 91MW, and in Latvia it's only 28MW.

In terms of the growth in capacity, the last year was undoubtedly the best – 64MW were added in Estonia; hence, the production capacity of wind energy almost doubled.

The year 2010 will not bring completely new wind parks, but the construction of some projects is about to commence. Three of those are quite large: joint projects by Nelja Energia OÜ and Eesti Energia Paldiski (52MW), the Päite-Vaivina project of the Spanish developer Fersa (60MW) and the Aseri project of Nelja Energia OÜ (24MW).

By 2018, the Public Fuel and Energy Sector Development Plan foresees wind parks with a capacity of 400MW and sea wind parks with a capacity of 500MW.

Source: Estonian Wind Power Association



Bo Henriksson, the Baltic Manager of ABB, sees rapid growth in wind capacity at least until 2020.

The research and development work of ABB has taken place in Helsinki, but what part of it could be moved to Estonia in the future?

Henriksson: It takes a long time to acquire know-how in this technology. In Finland, the factory was opened in 1889! The more the world buys wind generators and the more they produce them in Jüri, the more know-how will accumulate there.

Pekkarinen: Certainly, at some point, there will be a development team in Estonia. As the products are constantly improved upon, this team could be linked to the lifecycle engineering of the products. During the production process, we discover things which can be improved. For example, changing the cooling system of the ventilation or placing the connection boxes somewhat differently. Such product revisions are organised a few times a year.

Henriksson: Everything starts in school. There is a need for skilled teachers in vocational schools and universities. They need to teach production technology and how to raise productivity.

ABB has a system of scholarships in cooperation with the Tallinn University of Technology. We have also sent Estonian engineers to study in Finland.

What is the role of the Jüri factory in ABB's global structure?

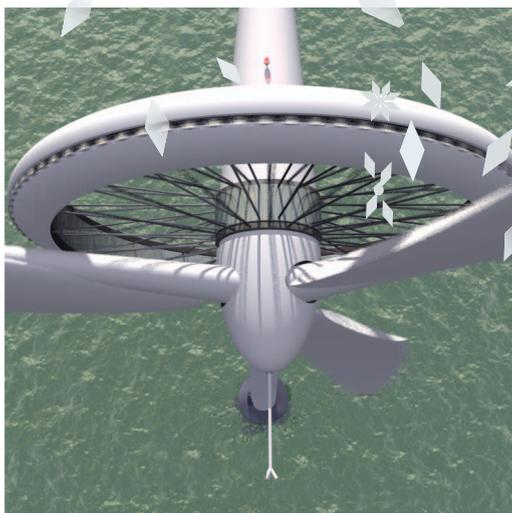
Henriksson: ABB also has electrical machine factories in Finland, Sweden, Italy, India, China and South-Africa. In 2008, the factory in Jüri was ABB's only one manufacturing wind generators, and in its own market segment it had 20-30% of the market share.

Today, in addition to the Estonian factory, the factories in India and China also manufacture wind generators, mainly for the local markets. The Jüri factory covers the European and the global market.

What are the prospects of the Jüri factory?

Henriksson: We see rapid growth at least until 2020. If only half of the wind parks which are being planned today materialized, that would be awe-inspiring growth and we could not meet such a demand. Whereas today about 9,000-10,000 generators are produced annually, there are plans to produce 16,000 in 2020.

Pekkarinen: At the same time, the optimal production capacity of one plant is 2,500-3,000 mainstream generators. If the volume exceeds that, it makes sense not to expand more – it would be better to open a new factory.



A new and optimised electromagnetic solution allows the construction of simpler and lighter wind turbines which will be able to generate electricity at prices some 15-20 per cent lower than the wind turbines used today.

Estonian company develops an enhanced wind power generator

As a result of the investment of 3.9 million kroons made by the Estonian Development Fund, an international business project has been implemented under the guidance of Lars Mach in Estonia. The idea of a new generator developed by Ed Spooner, a professor of Durham University, will be implemented by GOLIATH Wind OÜ - a company which was established two years ago.

The goal of GOLIATH Wind is to develop a wind turbine generator which will be cheaper to run compared to the solutions which are currently available,

while remaining reliable and efficient, and leading to a decrease of up to 20% on the price of wind-generated electricity.

'Most conventional wind turbines contain gearings, which is sadly the weakest link of their construction. However, wind generators with live transmissions would be extremely massive and high in the consumption of materials,' explains Margus Dintšenko, a member of the management board of GOLIATH Wind OÜ.

One wind turbine can power a computer for 1620 years

- The theoretical maximum energy that a wind turbine can extract from the wind is approximately 60% of the energy encountered.
- Due to the fact that the fuel is free, the efficiency of wind power should be calculated differently. The main concern is not efficiency for the sake of efficiency itself, but an increase in productivity by means of decreasing the price of wind energy.
- One 1.8 MW wind turbine which is installed on a suitable site is capable of producing more than 4.7 million electricity units a year. This is sufficient for the needs of more than a thousand households or for keeping a computer running for more than 1620 years.
- The working principle of a wind turbine is exactly the opposite of that of a ventilator. Instead of using electricity to create wind, turbines use wind to generate electricity.
- Almost all wind turbines used for the production of electricity have rotor blades which rotate around a horizontal axle. This central axle is connected to a gearbox and a generator in the machine room. The machine room is located at the top of a tower and it includes all the electrical components in the system.
- Most wind turbines have three rotor blades facing in the direction of the wind which makes the blades rotate. The blades turn the axle which is connected to the generator that produces electricity.
- A generator is a machine which produces electricity from mechanical energy, contrary to a motor, which works the other way around.

According to Lars Mach, CEO, the capacity of wind generators has increased over the course of the last few years, which in turn has led to the construction of larger and heavier generators. At the same time, the generator's gearbox remains a bottleneck, as its maintenance costs increase the overall price of wind energy. 'I believe that the future will be dominated by gearbox-free wind power generators,' says Mach.

Problems related to the construction and transportation of the new generator should be solved during the installation stage. For example, the generator of a 6 MW gearbox-free wind turbine manufactured by a competitor involves a massive wheel with a diameter of 12 metres. The weight of the head of the wind generator alone, complete with hull and rotor, amounts to some 508 tons. The transportation and installation of such a turbine at its final site of operation in one piece definitely creates some serious problems. However, the generator which GOLIATH Wind OÜ plans to build is approximately two and-a-half times lighter and it can be transported and installed in several stages.

Indrek Kelder, an investment expert with the Estonian Development Fund, says that GOLIATH Wind has a good chance of achieving its goals. 'We decided to invest in GOLIATH Wind because the authors of this idea of a new wind-powered generator are involved in the company, and the technological audit shows that the invention is feasible and economically profitable. In addition, the company has an international background, as its key personnel have worked on the development of projects for Rolls-Royce Marine and the British Ministry of Defence, for example. If the prototype proves to be operational, producers from China, as well as from several European countries, have already expressed an interest in the new solution,' he says, describing the project's investment background.

This project is co-financed by a company called PowerDrive OÜ, which is investing 3.9 million kroons in GOLIATH Wind for the same reasons as the Development Fund.

Specialists from the Tallinn University of Technology played a major role in the evaluation of risks involved in the project of developing the new wind turbine, as they helped to assess the risks of the project and, after the assessment, they essentially agreed to participate in the process of solving the problems related to the project. The processes of designing the turbine prototype, finding the most suitable electromagnetic solution and testing the turbine are being carried out in cooperation with the team of Jaan Järvi, the head of the Department of Fundamentals of Electrical Engineering and Electrical Machines at the Tallinn University of Technology. 'By the end of this year, a full-scale ring generator prototype of 3 MW will be completed in Estonia. This machine will be tested and put on a wind turbine next year, providing an attractive commercial product for the wind power market,' says Lars Mach.

Lars Mach, CEO, you mentioned that GOLIATH Wind is running a second generator and is preparing to build a third one. What exactly do you mean by that? Is it like a test phase, during which you measure the sustainability and efficiency of this technology? How long will this period last and what will be the next step?

GOLIATH Wind has completed a second machine of 4.4 metres in diameter. We have built it to demonstrate easy segmentation, a unique feature: we are able to ship our generator in handy components.



We are currently building a modified version of this small machine in order to perform optimizations, namely by simplification. We have learned a lot from the second machine's assembly in this respect, which we would like to see put into practice. Electrical measurements on the current machine have started and their results will also be used in the optimization process. Then our full scale 3 MW ring generator will be constructed after the summer.

When and where do you plan to start mass production?

As mass production would be connected with our targeted product, a full wind turbine generator, we will at first complete a commercial ring generator of 3 MW by the end of 2010 and then build the actual wind turbine prototype by the end of 2011. Hence, production and regular sales will commence in 2012. At that point we will focus on the production of turbine nacelles (ring generators with mechanical and electrical components) in Estonia and purchase towers and blades from European suppliers. In the next stage, we might decide to produce rotor blades in Estonia, too.

What feedback has GOLIATH Wind received from all over the world for its technology thus far? Who is interested, and from which countries, and what might be a possible commercial outcome of these contacts?

Wind farm developers and operators have approached us, suggesting co-operation in order to cover their future needs for wind turbines. We are indeed very much open to co-operation that will ensure an order pipeline for serial production in Estonia.

Typically, Iberian and other western European wind farm operators have acquired wind farm project portfolios from all over Europe and elsewhere.

China is a potentially very big market for GOLIATH Wind. What is your take on China and Asia in general?

Indeed, China is a very attractive market, but a challenging one. Whoever is looking for successful market entry in China ought to find appropriate local partners. GOLIATH Wind has been approached by Chinese producers of machinery, and we have engaged a local representative from the wind industry to assist in evaluating the right future partners. Regional markets, such as South Korea, could be included through such co-operation: High shipping costs of cumbersome components, such as rotor blades, will require local (regional) production.

How does GOLIATH Wind plan to commercialize the technology - will you sell licenses or produce the turbines by yourself?

At first we intend to produce vital components like the generator ourselves; however, with a view to growth opportunities and limited resources, licensing is an option for particular markets. China might be one such market. Besides licensing or wholly-owned production, there are other options, such as joint-ventures.

What problems does GOLIATH Wind face at the moment and how do you plan to solve them?

While there are no general problems, we have to cope with day-to-day issues, as any business does, e.g. ensuring quality of supplied components, and finding ideal ways to have new engineers trained while not delaying product development – we have to find the right balance between buying external engineering services and extending our own engineering capacities



Estonian companies develop the concept of smart and sustainable buildings

Yoga races to the world market with intelligent buildings

The Estonian technology company Yoga, which has developed the concept of smart and sustainable buildings, will build intelligent model offices in San Jose, Mumbai and Abu Dhabi in 2010. In comparison with regular offices, Yoga's models save significantly more energy, they can be managed comfortably and they are just really cool.

Tammsaare Business Centre in Tallinn. Home to the brand new Yoga offices. Cables are still being connected and the company has yet to move in. The intelligent showroom is still a work in progress. But board member Preet Vimberg is scrolling on the screen of his iPhone. He uses his mobile phone to turn on the lights in the office loos and to dim them to the appropriate level of brightness.

But he could also be dimming the lights of loos thousands of miles away from the same phone screen, for example in India or Arabia, if they were linked to the Yoga smart building system. We are talking not only about loos, but also about any climate, lighting- or security system in all homes or offices equipped with smart building technology.

Yoga, a company which is developing the complete smart building concept, is rising from the ashes. Having basically gone bankrupt in 2008, the company has learned its lesson and has new owners – the business duo Juhani Kolk and Urmas Past. Today Yoga is planning to expand into the markets of the USA, India and the Arab Emirates. According to Yoga's vision, by 2015 Yoga should be a world-known brand, and the turnover of the company will reach a billion dollars!

Text: Toivo Tänavsuu, *Eesti Ekspress*, TigerPrises.com

Photos: Yoga, Rauno Volmar, *EPL*

A former top banker in the Baltics joins the team

Since last autumn, the Council of the company has included Indrek Neivelt, the former Manager of Hansapank, the former largest bank in the Baltic States. He sees the company's potential but says, 'it is too early to boast about it. The main emphasis has to be on sales and the further development of the product. The biggest challenge is to convince buyers that they can trust a brand which is not world-famous, as the competitors out there are well-known companies.'

The year 2010 has been declared a year of major sales activity in Yoga. But let us go back a few steps. Before Kolk and Past bought into the company, Yoga had suffered from under-financing for years. The idea was considered to be a good one, but there was no money to develop it. The company, which formerly only developed access systems, went along with the big trend – from the Estonian viewpoint it was ahead of the trend or even leading it, focusing more and more on the energy efficiency of buildings. 'Pointless!' was the comment in Estonia in 2005 when Yoga first started out. Now energy is the number one topic throughout Europe.

'As businessmen, Raivo Raiestik and I have survived very rough times,' says Vimberg. There were two choices: to sell the whole development plan or to keep on working. Before the new investors turned up, people had been doing completely unpaid development work in Yoga for several months. Salaries were paid only when the money started moving again.

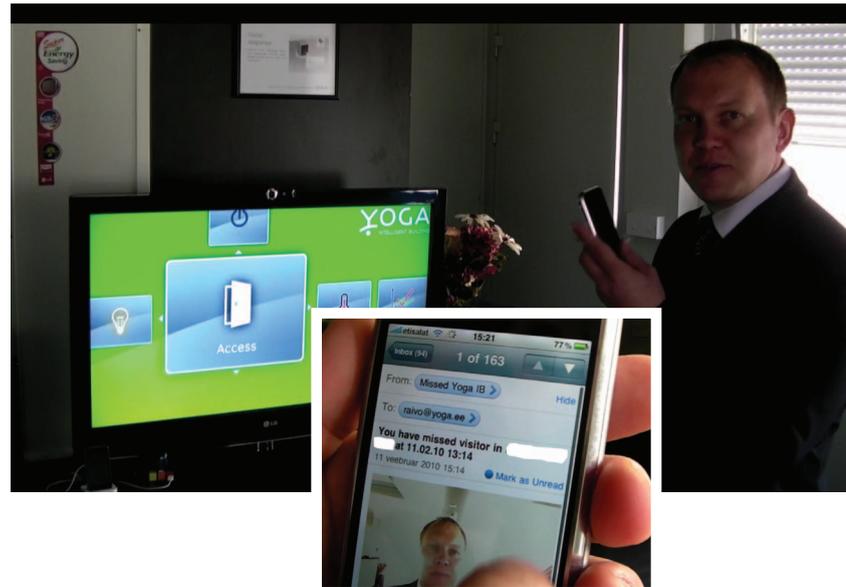
The premium villa package costs 34,000 Euros

According to Vimberg, the primary version, called Yoga IB 2.0 (Yoga Intelligent Building Control System), was completed last summer. This confirmed that access lighting, climate and security systems were all centrally manageable and the system was installed for the company's key client, Tammsaare Business Centre. The next version, Yoga IB 2.1, is meant for foreign markets and it is much easier to install. Version 2.2 will come to the market in June.

Yoga IB is a symbiosis of hardware and software, and consists of a 'brain' and as many modules as necessary for a particular situation. It is possible to build up the system from various parts like a Lego set, but it is also sold as a package – for example, the average package for an apartment costs between 2,800-3,900 Euros, depending on the number of bedrooms, and for a villa 8,800 Euros. The complete or Premium Package for an apartment costs up to 15,600 Euros and for a villa 34,000 Euros.

The minimum package contains a lot of exciting functions: one can manage lighting, access, security systems and climate. For example, you can lower the temperature if nobody is at home, or turn off the lights in empty rooms. The house calculates energy measurements itself and, if necessary, sends them to the house administrator, and it is also manageable via a mobile phone (at the moment only iPhone, but soon from other smart phones as well), as well as via PC. 'I, for example, haven't bothered to carry my keys with me for some time now, I unlock the door with my mobile,' says Vimberg.

The pricier Premium Package includes the management of audio-, video- and other home technology devices. In addition to a mobile phone or a computer, you can use a television to manage your household – in the middle of watching a movie, you can turn on the sauna or brew a cup of coffee. The television screen can also show the image from the front door camera – you can interact with guests on the intercom without getting up from the sofa.



Skype video calls via your television soon a reality

One noteworthy opportunity which is not available yet, but which was recently tested by Yoga in Abu Dhabi, involves video calls from a television screen. The 'TV-videophone' idea was developed in 2008 by a company called Inkspin1, which is an incubator company of the investment group Ambient Sound Investments. Yoga is now cooperating with the company.

Inkspin1's purpose is to make Skype video calls available to all home users via a television screen, and Inkspin1 is trying to convince the producers of TV sets to integrate the necessary software. Connecting your computer to your television screen is not really rocket science anymore, but it may prove to be too difficult for your average home user because the process is uncomfortable or there is a problem with compatibility. Yoga and Inkspin1 create an attractive symbiosis for each other. Most importantly, it really works and you can really make your video calls on your television screen!

Nowadays, an attractive product is one which you can buy in the shop and put together yourself at home in three easy steps. One factor which may slow down the sales of Yoga IB is the fact that, even though the intelligent building system is meant for average home users as well as large business clients, the system cannot be installed by the average person – you need to call in an electricity specialist.

Vimberg says that the Yoga sales team therefore targets new and renovated buildings. Actually, they focus on large housing areas and office complexes where there are many modules for one building. Despite the challenges which need to be faced in installing the Yoga system, the advantages for the customer are clear: simplicity, comfort and security.

In Abu Dhabi, where one of the three Yoga intelligent office models will be opened soon, the company cooperates with licensed installers. 'We train and offer support, while they do the installation,' says Vimberg.

The new investors have set the wheels of the Yoga machinery in motion. The environment is open to new crazy technological ideas of how to manage buildings, and the sky is the limit where such ideas are concerned.

Vimberg admits that there are loads of new ideas around. Everything in a building is somehow controllable.



A person will be his own ID in the future

The 'self-learning' ability of the Yoga system, which is based on the technology of artificial neural networks, or the ability to draw conclusions on the basis of human movement and to give feedback on such movement, is already old news. Today there are fresher ideas around.

For example, you can issue commands for the control of lighting, i.e. when to have lights on and when to turn them off. But you can also arrange the lighting to remain at the same level regardless of how light or dark it is outside.

Even in the very early days, it was realised in Yoga that there was no need for another remote control to manage your household (after all we already have too many remote controls at home). This is how the user interfaces for TV and mobile phones, which we carry with us anyway, were born. In the future, Yoga wants to concentrate on biometrics: you will only need yourself in order to identify yourself! This means that you will go home, and the door will open. You leave your house, and the door will close. When you are standing at your garden fence, your house will recognise you, turn on the lights, put on the kettle and turn on your favourite music. It will say hello and ask about your day.

In the field of biometrics, Yoga is cooperating with a Swiss company, in order to enable the home to recognise people by their faces, eyes, mimicry, voice or other such characteristics.

Whereas today the intelligent building needs a lot of cabling, in the future a leap forward will be taken with a wireless system. The only thing which will still work on the basis of cables will be the security system.

'If scientists invent an appliance which is able to read a person's thoughts, we will make sure that it is integrated into the Yoga system,' says Vimberg, with a smile.

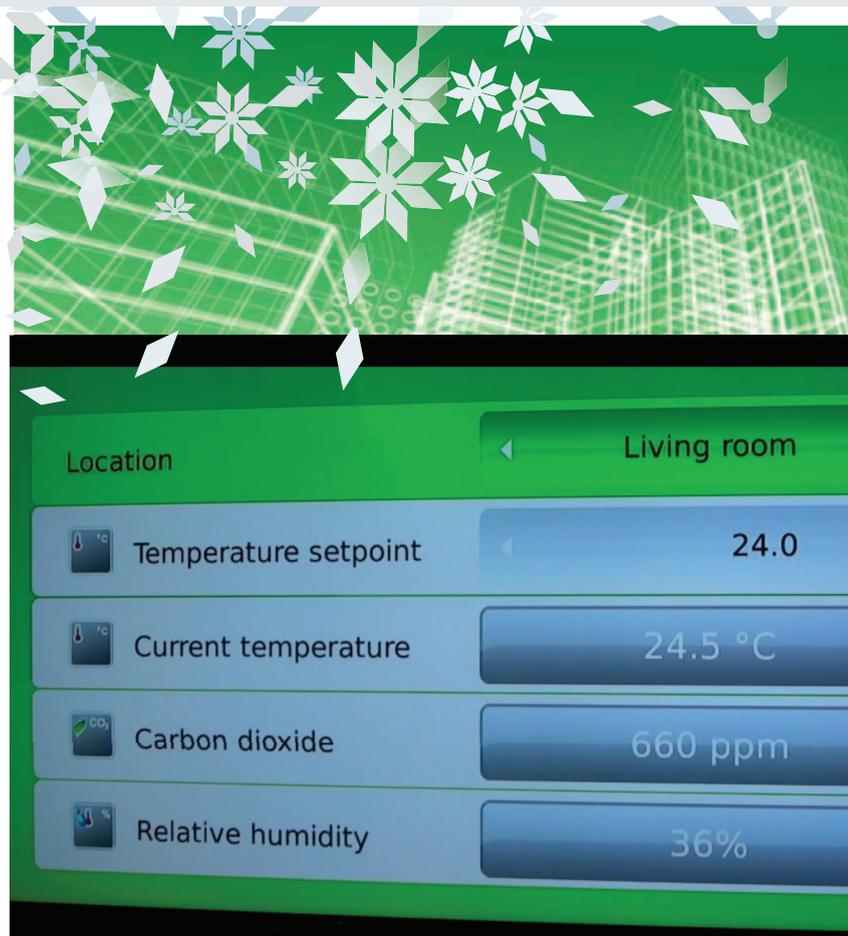
Why those markets?

Why is Yoga developing sub-companies and model offices in Mumbai, Abu Dhabi and San Jose of all places? What about the European market, which should be fruitful thanks to the EU's tough climate policies?

Those places were selected due to personal contacts. 'I convinced investors to put up almost a million kroons in order to go to the Abu Dhabi World Future Energy Summit in January 2009. In addition to the Arab Emirates, this opened doors to India as well,' explains Vimberg.

In the meantime, the network has grown and Yoga is now also said to be welcome in China and other places. There are also some European contacts emerging, but it is a very scattered market. Also, there is no practice in Europe of building a whole city at once, as is done in the Middle-East and Asia.

Yoga is focusing on large markets and rich developers, and in order for business to grow, large numbers are necessary – that means home users. There are opportunities available with both business and residential customers.



Smart office saves 60 per cent on electricity

What then is a smart building? Some of the main pillars of the Yoga system are:

Climate control – the opportunity to adjust temperature from one room to another on the basis of whether a room is occupied. For example, it is possible to lower temperature by a couple of degrees when there is no one at home or in a conference room. When the temperature in a room declines even by one degree, it saves 3-8% on heating costs. Ventilation also does not have to work at full power in an empty room.

Lighting control – the opportunity to regulate or programme lighting from one room to another or according to the needs of the people present. Turning off unnecessary lighting in offices can yield electricity savings of up to 60%.

Access control – perfected control of people in the rooms and the opportunity to provide different people with different rights of access for different periods of time.

Security system – a remotely managed complex system which combines various sensors: for example, motion-, gas-, glass breaking- and smoke sensors.

Remote reading – gives the user multifaceted information on the consumption of electricity, water, gas and other energy and, if necessary, sends the information on to the service provider.

UltraKUB builds energy efficient houses



Those who want to emphasize energy efficiency from the time they begin the process of building their houses and those who are worried about the ecological footprint created in the process of house building will find that the Estonian company UltraKUB offers a solution.

UltraKUB designs and builds sustainable and environmentally friendly houses. The company believes that a proper house uses little energy, and is compact, comfortable and independent. It is healthy, efficient and simple to buy and to maintain. This is why they have created a new type of module house called *Elumaja*, which meets the standards for passive houses.

Elumaja is equipped with a renewable energy system and functions so that its maintenance does not require more energy than the building itself can generate. The use of sustainable technologies means that living costs and the building's ecological footprint are as small as possible. Building a module house is similar to building with Lego blocks.

It is possible to order *Elumaja* from UltraKUB in four different sizes, ranging from 45 to 180 square metres. Whereas with regular buildings the annual heating cost is 150 kWh/m² or more (and much more in the case of older houses), the annual energy expenditure needed for a passive house does not exceed 15 kWh/m². A big plus of *Elumaja* is the good and healthy interior climate, an evenly stable temperature in the rooms and air moisture in the range of 40-60%. Only natural materials are used in the building process, such as wood, clay plaster, natural oils, and clay- and casein paints.

Several sustainable energy packages to choose from

When you buy *Elumaja*, you get to choose from several different but combinable sustainable energy packages.

The base package ensures that the house complies with the passive house standard, which includes ventilation with a heat-recovery element. The house is heated with electricity by heating up air, which is then directed into the building. The necessary hot water is produced by an electric boiler.

The solar package integrates the devices for the production of heating, ventilation and hot water, ensuring that the system yields maximum productivity with the minimum use of resources. The equipment contains a compact device which includes ventilation, heating and hot water that is controlled by indoor and outdoor climate parameters. This also links to the solar collectors needed for producing hot water. For the heating of the building and everyday water consumption, it is possible to use either tank gas (heating cost of about 33 litres per annum, consumption for production of hot water about 77 litres per annum) or a small co-generation plant.

The power package makes it possible to build a house in a location where a connection to an external infrastructure network is not possible or is more expensive than with an independent solution. This also ensures that the house corresponds to the criteria of a zero energy house. The package includes a solar power station with a production capacity of 1.56 kW, a battery pack - 19.2 kW, inverter - 2.2 kW (max 5.7 kW), automatically triggered backup generator/co-generation plant - 3kW, and a control panel with visual output. Depending on the location, it may be reasonable to include a wind generator in the system and, in this case, the package is modified to accommodate the wind energy source.

The water package provides independence from water and wastewater networks. The solution includes rainwater collectors, a water purifier and a separating and composting toilet. The building is provided with drinking water from a 180-litre tank. The capacity of the water purifier is a maximum of 200 litres per day. The minimum average amount of rainwater collected is 30 m³ per year.

The smart package includes automation and a communication system which makes it possible to centrally monitor and manage the equipment that operates the building. Among other things, the building can be switched to stand-by mode and the whole building can be remotely controlled (via SMS or PC).

Interest in Denmark and France

The initiator and Acting Director of UltraKUB, Mihkel Pukk, says that, to date, their main focus has been on sales, raising awareness of the market and preparing showcase objects in Estonia. But there is also a development project in an early phase in France, where they are designing, on a special contract, a 300-square-metre dwelling. There has also been serious interest expressed by Danish real estate developers.

The first showcase objects in Estonia should be completed in the second half of the year. 'We presented our concept last summer, which was not the most convenient time for house building. We are happy with the sales activity so far,' says Pukk. The company is mainly targeting environmentally self-aware customers in the Scandinavian and Central European markets.

The concept of the UltraKUB zero house, created by the architect Rene Valner, is one of the first ones in the whole region, which is why you can consider the people behind the company pioneers of green housing. 'We have the whole package of know-how and experience necessary to build a modern, efficient and quality house,' says Pukk.

Pukk is convinced that the kind of wasteful building which has predominated to this day is about to see its last days, as the general lack of resources and high expenses put buyers and builders into a situation where it is more useful to build in a sustainable way. The European Union has also charted a clear course to energy efficiency: beginning in 2020 all buildings must comply with high energy efficiency requirements and be able to locally produce renewable energy.



All of the comfort fittings of ZEV Seven have been removed from the basic model to keep the price low. Teet Randma (on the right) says that the first model has been deliberately made with certain features as optional extras.

Text: Toivo Tänavsuu, *Eesti Ekspress*, TigerPrises.com / Photos: ZEV Motors

The First Estonian Electric Roadster – ZEF Seven

The Estonian company ZEV Motors is striving to develop one of the most efficient electric cars in Europe and to sell at least 50-100 of them in Europe over the next couple of years. Although skeptics scoff at this ambitious plan, the arrival of the “e-cars” is only a matter of time, according to the enthusiastic owners of ZEV, Teet Randma and Meelis Merilo.

“It’s difficult to make a breakthrough with electric cars in Estonia, because to Estonians the car is a status symbol, and not the most economical means of transportation,” Randma says. “But in a few years the price of a liter of petrol will be 2 euros – then attitudes will change!”

The first prototype of the Estonian electric sports car, the ZEV Seven, was launched in 2008.

A pioneer in Estonia

A pioneer in the electric car industry, ZEV has taken the initiative, aiming to become the representative for many internationally known brands, as well as boldly developing its own products – in other words, the Estonian e-car industry!

The first prototype of the Estonian electric sports car, the ZEV Seven, was launched in 2008. In early November this year, Randma and his business partner Merilo, who owns the legendary electric Pobeda, presented the Seven at the 2009 Electric Motor Show in Helsinki. Different transportation solutions were presented there, from e-bicycles and e-scooters to the few electric cars currently sold on the European market. The Estonians' Seven, which is yet to go into production, was (remarkably) one of only three cars to leave the show powered by its own engine. The other two were the Tesla Roadster (co-funded by Estonian venture capitalist Steve Jürvetson) and the Norwegians' Th!nk City. All the others were "pushed" out of there. While the renowned Tesla Roadster costs upwards of 64,000 Euros (plus taxes), the ZEV Seven basic model comes in at a third of the price.

Not a family car

The Seven is not a family car, but a kit car. The controller (or brain) of the five-gear manual two-seater vehicle is manufactured in the USA and the basic model uses eight lead batteries, which take about eight hours to charge when connected to a standard 220V plug. Depending on the speed at which you drive, the batteries last for 50-90 kilometers and the journey hardly costs a thing (in the city the energy cost is 10 cents/km). It can even reach speeds of 120 km/hr. So a trip by Seven from Tallinn to Tartu can't be done yet on a single charge cycle – that would require expensive lithium batteries with a higher energy capacity and a quick recharge – because it's unthinkable to recharge the batteries during that journey, as it would take a full 24 hours. An extension cord should always be carried in an electric car – you could ask to plug in the cord when stopping at a cafe, for example. Yes, that does sound a bit stupid.

But it is already possible to acquire a version of the Seven that uses lithium batteries – it costs about 40,000 euros and it runs up to 600 kilometers on one charge cycle.

Lotus 7 clone

The men from ZEV have done all the electric work, but the bodywork was created by Valter Teppan's company, Võidusõidutehnika AS. The body is similar to that of the Lotus 7, designed by Colin Chapman in 1957. When designing the chassis of the car, the specifications given in Ron Champion's book *Build Your Own Sports Car for 250 Pounds* were used to make the car more comfortable for the driver, and more sporty.

Many Russian Lada parts have been used in the Seven prototype, including the tachometer, swivels, steering shafts and brake discs (all new, not from a junk yard!). The yellow leather trim may be flashy, but the assembly quality is poor, to say the least. All of the comfort fittings have been removed from the basic model to keep the price low.

No orders from Estonia thus far

Randma says that the first model has been deliberately made with certain features as optional extras. "First and foremost, it is a driver's car; additional accessories will be added according to the client's wishes." For example, a sun-roof, extra batteries, trunk space, stereo etc. can be ordered.

The first ZEV Seven will probably be sold to the Road Administration Museum in Põlva County.

The first "real" order will most likely be delivered to Finland, because in Estonia the number of genuinely interested people can be counted on the fingers of one hand. At the moment, people are more interested in converting internal combustion motor vehicles to electric power. No electric cars are offered in Estonian car dealerships, since the market for the Tesla, Th!nk, Reva or other electric cars is too small.





Urmas Roosma, an Estonian farmer who produces and sells electricity from his hydroelectric plant in the district of Halliste, is ready to pay ZEV almost 10,000 euros to convert his Volkswagen Golf to run on electricity. This would enable him to commute to his workplace in the town of Viljandi, 25 kilometers away, almost free of charge. "Oil supplies will come to an end," he claims. "In five years, there will be many electric vehicles in Estonia."

Adaptation to EU standards in progress

The adaptation of the ZEV Seven to European standards is in progress: the first step is registration in Estonia, followed by the acquisition of a European certificate.

"Once we obtain this, the European market will be within our reach," says Randma, who believes that the certificates for sale and production can be realistically acquired during 2010.

This is because the car is classified as a four-wheeled motorcycle, which means the costs of the tests required are significantly lower than those for cars. The empty weight for these vehicles must be below 400 kg for passenger transport, and below 550 kg for cargo. Both vehicle classes are planned for production.

Have they lost touch with reality?

Skeptics agree that the enthusiasts behind ZEV may be part of the "engine of progress", but they feel that, with their ambitious plans, they may have lost touch with reality. How can they compete with major manufacturers who are investing hundreds of millions of dollars in development? Also, the Estonians are going to have a hard time procuring batteries in an already insufficient market.

Electric cars in Estonia number less than a dozen at the moment. There are believed to be no more than six or seven cars powered 100% by electricity in the country. However, the men from ZEV Motors believe that it's only a matter of time before e-cars come into mass use.

From the point of view of electronics, some challenges have been overcome, but others are yet to be resolved. A personal electric car can be charged at home, in the garage, with a 220V plug, but for longer journeys, so as not to "become stranded", a recharging network needs to be developed, with equipment that enables fast charging (about 30 minutes).

Countries have grand plans regarding networks

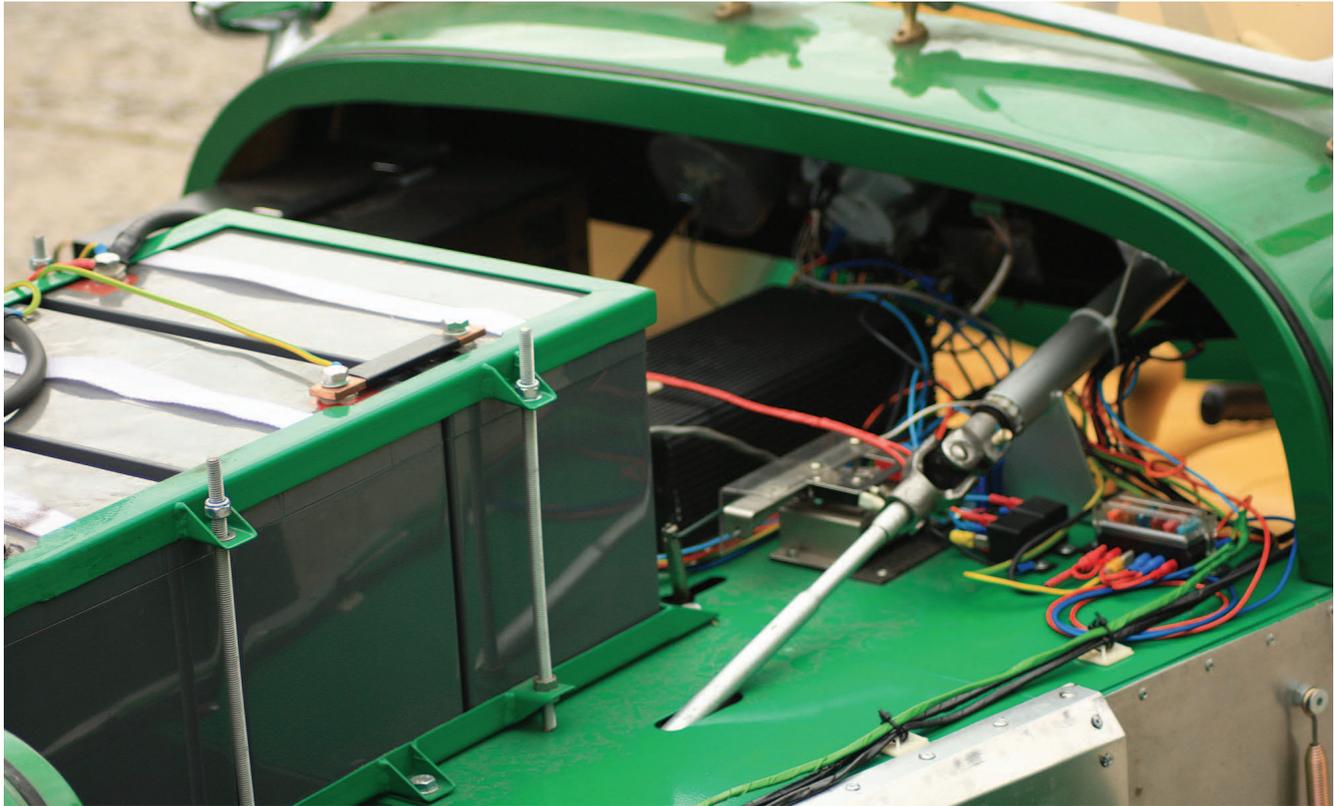
Car manufacturers are seeking national support for the development of a recharging network. Sweden is the front-runner in the field, with many established 400V recharging stations. In Portugal, there are plans to install numerous recharging stations along the Lisbon-Porto highway by 2011.

Lead batteries are slowly being replaced by the more resilient and more quickly rechargeable lithium batteries, which make longer journeys possible. They also cost more (four times as much as lead batteries, though their lifespan is also four times longer) and, after 100-150 kilometers, the danger of "becoming stranded" still remains. The opportunity to exchange batteries, instead of recharging them, is still quite unlikely for private users, because this requires a substantial investment. However, this may be possible in industries which use fleets of cars (e.g. taxi companies).

Another serious argument for postponing the purchase of an e-car is the poor selection. New electric cars are not widely available and most have two seats and little trunk space.

Current e-cars are too small and expensive

Older manufacturers, such as Nissan and Mitsubishi, are still showing concept cars. The "pioneers" – the Tesla Roadster and Th!nk City, presented at the Helsinki Show, as well as the electric Smart car and the British hit Reva – are not suitable as family cars because they fall either into the category of extremely expensive sports cars or very small, even tiny cars. Tesla is launching a five-seater family car, the Tesla Model S, which is going into production



in 2011. This will be a step forward because the car can cover 480 km on one charge and doesn't cost over 60,000 euros like the Roadster, but half the price (about the same as an E-Class Mercedes-Benz).

The 30,000 euro Th!nk City, which is popular in Scandinavia, is barely big enough to fit a grown man behind the wheel. Rear seats are entirely absent. This vehicle is a city car through and through.

Electric cars are 50-100% more expensive than the average car. Still, Randma claims that the investment in an e-car will pay for itself in six years. This is mainly because it is very cheap to drive – to travel 100 km it costs about 0.6 euros, which “translates” into 0.7 liters of petrol per hundred kilometers. Randma claims, “Compared to a car with an internal combustion engine, an electric car is two times cheaper to drive and its exploitation time is many times longer.”

The propagation of e-cars in Estonia is being held back by commercial banks, which do not offer lease options for them.

Estonia - probably the worst market for e-cars in Europe

Teet Randma says that Estonia is probably the worst market for electric cars in Europe. The only benefits are free parking in Tallinn and permission to drive in the pedestrian areas of the Old Town. And, unfortunately, there is only one recharging station, located next to the Tallinn City Council building. The situation is different in other countries, such as Norway, which offer tax benefits, subsidies, the use of public transport lanes etc.

In addition, the Estonian market is small and lacking in incentive schemes. The sale of new electric car brands in Estonia is an unlikely prospect. The producers of small “e-cars”, such as Th!nk, are focusing on Great Britain, France and other bigger markets, where the demand is higher.

ZEV Motors already sells electric scooters and ATVs and is trying to break new ground in the European market with both its own models and Chinese electric cars. One of them – a small vehicle called the ZEV Smiley – Randma drives himself. On a single charge, it can drive 85 kilometers (35 during the winter) and its top speed is only 55 km/hr. It's likely that, in the near future, such vehicles will be available in Estonia for less than 6,000 euros. China also has a European certificate for its new model, permitting unlimited sales in the European market.

ZEV fully supports the ambitious but rather utopian “Electromobile Estonia 2020” plan developed by the Ministry of Economic Affairs, according to which in 11 years 100,000 electric cars could be “zooming around” Estonia.

“Everyone wants to drive big expensive cars, but oil is running out and the environment is polluted, so what are the alternatives?” asks Randma.

Cars that drive on liquid gas? The price of gas is linked to the price of oil, and gas is also a limited resource; it is slightly more environmentally friendly, but still causes CO2 emissions. There is still a very long way to go before a solar-powered car becomes a reality. A hydrogen car is basically an electric car which runs on hydrogen heating elements instead of batteries. And a car that runs adequately on nuclear power has yet to be invented. What we are left with is electricity...

“It is a question of priorities: it should be a priority for Estonia at present to keep as much money as possible in the country, but highway transport takes billions out of Estonia in fuel costs each year, causing significant damage to the economy on top of the health damage created by pollution,” says Randma.



Text: Kaire Talviste, *Hei*
Photos: Reuters

Electric cars to save Estonia from hanging on to oil pipeline

The very first electric cars were slow and required long periods of recharging before they could even make a trip around the block. Even so, very soon one could seriously consider buying an electric car - provided that it buzzed silently - which was powered by its lithium-ion batteries that had a performance output equivalent to a vehicle with a 1.6 litre petrol engine, looked nice, and was quick, convenient and cheap to recharge.

How likely is it that we'll be seeing electric cars in Estonia? 'We can't use the term "likely" when discussing the advent of electric cars; "inevitable" would be more appropriate. The situation with mobile phones can be used as an example,' Jarmo Tuisk, a spokesman for the Elektromobiilne Eesti (Electromobile Estonia) 2020 project says, with conviction.

A visionary, Shai Agassi, said years ago that the establishment of a service station for charging these vehicles would be an excellent opening gambit for launching the sales of electric cars. This would allow the use of the cars in making trips beyond the newsagent next door. At that time, he was hardly paid any notice - oil was cheap, and petrol-guzzling pick-up trucks ruled the streets. Vehicles running on alternative fuel were just a niche product, intended for consumers thinking green.

However, today the attitude has changed considerably: practically all of the biggest car manufacturers worldwide now believe that the electric car project will work, and are willing to invest billions in creating competitive vehicles. Everyone is looking for a breakthrough in the evolutionary process of the electric car.

Agassi has contributed largely to this faith, making plans that reach as far into the future as 2020. His company, Better Place, has been able to raise billions from venture capital companies to develop networks for charging and exchanging batteries. Better Place is negotiating with many countries to

this end; co-operation agreements have already been concluded with Israel, Denmark, Japan, Australia and Canada, and the US state of Hawaii and the San Francisco Coastal Cities Alliance of nine cities have followed suit.

Estonia's plans

Estonians are always willing to make new technology work for them and, therefore, Jarmo Tuisk believes that electric cars will come to Estonia sooner rather than later. 'There are three snags affecting the launch of electric cars in Estonia: consumer awareness, the availability of electric cars themselves, and the infrastructure,' he says.

These are also the aspects which are mostly being dealt with within the framework of the Elektromobiilne Eesti 2020 project. The goal is to create a pilot infrastructure for recharging electric cars in Tallinn by 2010, and by 2020 a fifth of our traffic flow should consist of vehicles which are run by electricity.

'Our plans are definitely becoming better defined. We have a vision, a strategy, and an action plan which identifies what we should offer to different interest groups: power suppliers, car dealers, information communication technology and electronics companies, but also the state and consumers. We intend to launch the action plan in the middle of this year. By that time we also expect to have an explicit overview of those who are willing to team up with us,' he adds.





A visionary Shai Agassi's mission has launched the biggest revolution experienced by the car industry over the last few decades.

Approximately 15-20 million Estonian kroons will be needed to establish loading docks and stations in Tallinn, plus the information technology solutions which administer the whole system. Those business concerns which hope to become electric car service operators in the future should be interested, above all, in funding the pilot project. 'The experience which we've gained from all over the world shows that energy sector companies most definitely have the ability to be investors; however, newcomers with no dealings with energetics, such as Better Place, are also welcome,' Tuisk says. 'Now we have to ask the key question: which Estonian company will be the first to sniff out the chance of creating the new Q-GSM.'

The bigger plan

Jarmo Tuisk has worked in the fields of marketing and Internet use, and is currently employed by the Technology and Innovation Division of the Ministry of Economic Affairs and Communications. He has no direct experience with electric cars. 'All of the big things in the world are backed by someone's personal vision and feeling of mission,' Tuisk explains. 'If the timing is right and the mission can be implemented, the right people, companies, organisations etc will be willing to join in.'

Tuisk has observed the progress of Agassi's mission for a while. In the beginning, Better Place was not a business, but a task, picked up by Agassi in an international meeting of young businessmen, where he promised to suggest solutions to the global climate problem. Shai was expected to find solutions to reduce carbon dioxide emissions from conventional car exhaust.

Being an individual who is committed to innovation, he did not look for new technologies but, with a critical eye, he studied the existing alternatives and business models. Today, two years later, his mission has launched the biggest revolution experienced by the car industry over the last few decades.

'In Estonia, approximately ten billion kroons is spent on car fuel annually, amounting to 7,500 Estonian kroons per capita (from babies up to the elderly). 'This money is pocketed by oil tycoons. Why should we pay them if some smart planning is sufficient to allow us to use domestic energy to make all our journeys?' Tuisk asks.

In Europe, investments amounting to billions of euros are currently planned in order to develop electric car infrastructures. Only a limited number of European and American companies are, however, supplying the loading docks and suitable IT systems. 'The infrastructure required for electric cars is definitely not rocket science. We have strong engineering traditions in the sphere of electricity and electronics, and this know-how can be easily combined with our strong information technology traditions, therefore allowing us to develop fully competitive solutions,' Tuisk believes. 'Devising a real growth vision for the economy through domestic saving and strong export potential - this is our motivation.'

Read more about the Elektromobiilne Eesti 2020 project at ee2020.wordpress.com

When painted by Malle Leis, a gooseberry has a taste and a potato is pretty. By painting such boldly lifelike plants, the artist has often faced criticism. After all, to some people real art is something that the audience cannot comprehend. But let's admit it - a painted bloom is not always 'just' a picture of a flower.



Malle Leis.

Flora as pure art

Text: Anneliis Aunapuu

Photos: Ingmar Muusikus, private collection

The genuineness of the plant portraits painted by Malle Leis is breathtaking. This does not, however, explain her popularity, which went far beyond Estonia and the large prison called the Soviet Union in the seventies and eighties. What is the secret of her paintings?

Painted for the most part on a dark background, the composition is very clear and solid. Malle Leis emphasizes the graphic allure of plants, yet at the same time she is an absolute virtuoso in watercolour. She maintains a watercolour-like treatment even in oil paintings: the colours calmly diffuse into one another, not jumping to the beat of the paintbrush. One colour smoothly becomes another in a steady, thoroughly sensed line, which is reminiscent of colourful Japanese graphic art. There is also some affiliation to pop-art, vis-a-vis her bright box colours and 'photo-realist' clarity.

Yes, the drawing is precise, even botanical, but at the same time it carries a deep inner generalisation. The portraits do not depict a single sweet pea plant or tomato, but seem to represent all flora, sometimes to the point of becoming philosophical.



The series of graphic images titled 'Võrumaa', from the year 1979, seems to convey a really deep sense of awareness. It relays a feeling of the roots, the history and the striving for spiritual freedom of our peasantry, as well as the concern for the future. Upon studying those images, it seems that, although you can hear the quiet solo of a flute, there is the breath of a whole orchestra in the background. Throughout the years, her paintings have been like pieces of an epic masterpiece – part of her creation which, on one hand, bows deeply to the inner freedom of nature and, on the other hand, to the human sense of vision and the ability to portray.

Plants, people, plants

It doesn't matter to Malle Leis whether she portrays the bloom, the stem or the roots of a plant. She sees the beauty of creation in everything, observing it with a sharp and aesthetizing eye. The objects have not been placed in a space as a still-life, but float about freely, weightlessly. Often the blooms in the painting seem to have been scattered on flowing water, gliding past us in slow motion.

Occasionally a person or a child has been placed among the plants - for example the portraits of Milvi Torim and the art historian Boris Bernstein. At the same time, even in portraits the plants play at least the role of partner. Are her works more graphic art or painting, coloured drawings or drawn paintings? Leis cannot be easily placed in any art school. She has arbitrarily selected the advantages of several streams and brought them together into her own unique world-view.

The works of Malle Leis cannot be considered out of the context of their time and, unfortunately, not even outside geography or politics, even though it seems that there cannot be anything further from politics than a painting by Leis...



Botanical I
Edition 2/40 | 53 x 53cm | 1988

Art as a reservoir in the midst of the empire of lies

Malle Leis was born in the first Republic of Estonia, but grew up in the socialist camp, in deep isolation, knowing that what she was doing had nothing to do with what was going on in the rest of the world. Yet art in this society had a relatively good position. After all, support for the arts was part of the rhetoric of socialism. And although we remember that during those fifty years there was a lack of everything – materials, paints, paintbrushes, rooms, travel and choices – we have to admit that the arts scene back then was very creative, complete and independent. It was one of the few areas of life where the prevailing regime did not prescribe everything. Even a certain degree of freedom of thought was allowed, as there is no creativity without freedom of thought.

This is how a very vigorous and unique arts scene developed on this side of the Iron Curtain, completely in isolation from the movements and processes of art in the rest of the world. During half a century, a huge amount of vibrant art was born, with the sad destiny of remaining in isolation, in storage. Together with the new winds that were blowing about two decades ago, the society started to wolf down everything coming from outside and to redefine everything local. Richness of art was taken for granted, without realising that creativity is like a house-plant which needs water, air and soil. Even sunshine.

Malle Leis with the Estonian art critic Boris Bernstein at the opening of her art exhibition.
Photo: Kalju Suur

Serigraphs are born

Besides watercolours and oil paintings, Malle Leis is loved for her screen printing designs, called serigraphs. This is where the graphic quality of her work truly blossomed. We should mention one true partnership here. Malle Leis' husband Villu Jõgeva—whose educational background is in electronics—was always able to assist with preparations of his wife's paintings, but with the silkscreen prints he also took on a large part of the work process itself. Back then, the technique of screen printing was gaining popularity throughout the world. Previously well-kept secrets were thoroughly studied, domestic aids perfected and a completely unique *modus operandi* developed.

Graphic sheets were created on the basis of watercolours, sometimes even various versions in different colouring. Malle Leis was involved in all the intermediate stages, of which there were many. This is how serigraph series, which gained a special place in the Estonian arts scene, were prepared.

Every sheet of serigraphs was born slowly, layer upon layer. After one layer was printed, the artist came with a brush in her hand and adjusted the image on the mesh, preparing it for printing the next colour. Each time, the gaps on the mesh grew smaller. In the end only a single stripe or dot remained for the final layer of paint. In total there were often over ten layers of paint in the pictures. Sometimes an additional layer of white was printed under each tone in order to brighten the colours. In order to guarantee the long life of the pictures, casein tempera originating from Russia was used. Getting hold of the materials was a scientific exercise on its own, and the most difficult part was getting hold of a quality mesh.

The family itself calls the second half of the eighties the golden period of silkscreen printing. The local material- and arts market was booming, and this made it possible to experiment and to create. Once they even organised a special 'one-picture-exhibition', where separate layer prints of one picture were displayed. The sheets were hung framed separately on the wall, labelled with the paint- and layer numbers. The row ended with the completed picture.

The fact that each layer of the silkscreen was shaped by the artist's hand turned the whole technical process into a creative one. Such a practice is unique in the world and it will probably not be repeated, as nowadays there are technical solutions available which involve much less hands-on work. However, they are far from being as creative...





Botanical II
Edition 6/10 | 50 x 50cm | 1988

Spreading through the Iron Curtain

Back at home, the art audiences awaited Malle Leis's pictures, at regular spring and autumn exhibitions, with great interest. Somehow, this interest also spread through the Iron Curtain. Half covertly, some exhibitions took place in the eastern part of Europe and Leis became especially well-known in Poland, where life was freer and more Westernized than back in Estonia. One secretly organised exhibition in Warsaw (1975), where both silkscreen prints and watercolours were on display, almost led to the political repression of the artist, but the scandal was fortunately stifled. On the contrary, the exhibition led to a very big and significant contract. Leis became acquainted with a Polish interior designer who, at the time, was working on the renovation of a Polish Baroque castle. She decided to order silk prints framed in round frames from Malle Leis for three halls in the castle. This was a huge undertaking, eight compositions in three different colourings, each one with ten to twelve layers of paint. Leis and her husband printed almost 250 sheets. Their first child, Sandra (1976), had just been born and this period turned out to be very stressful for the family. At the same time, such a huge contract provided a lot of self-assurance. In 1979, their son Henrik was born, and they had to divide their time between the children, work, home and workshop.

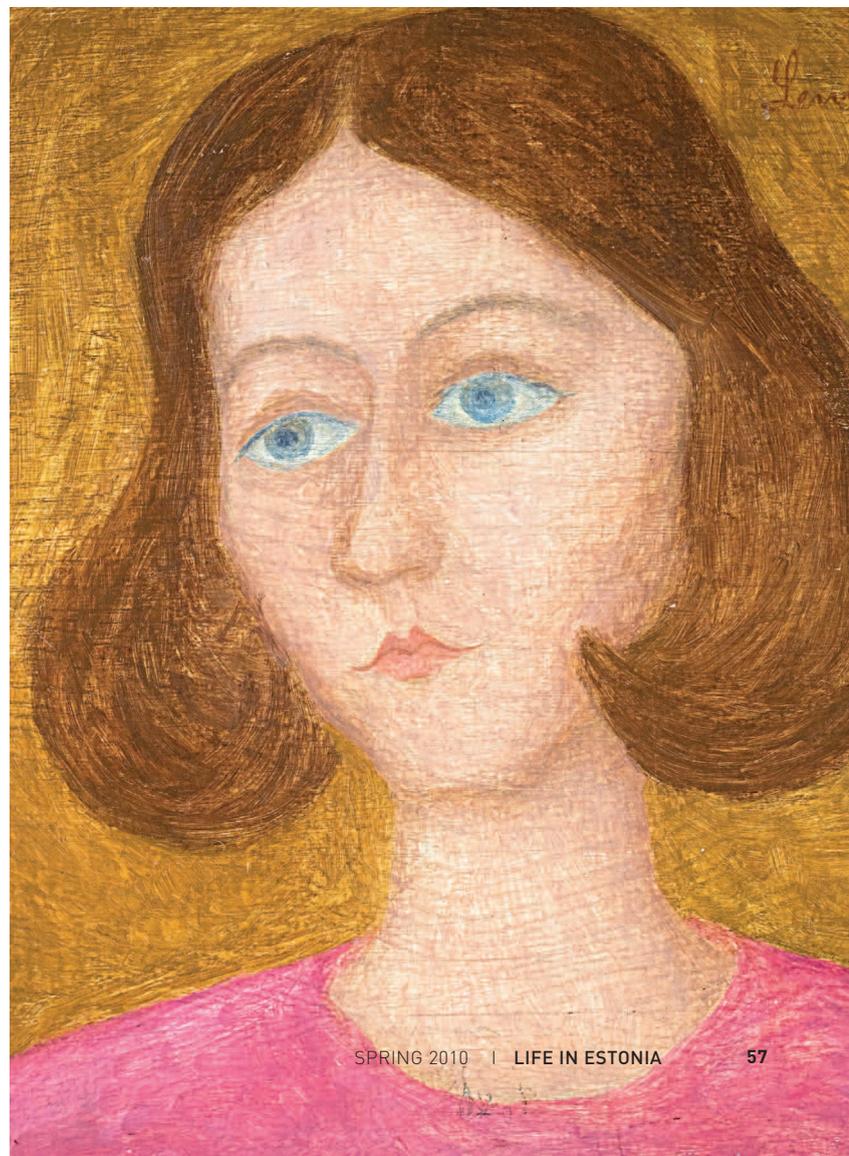
The relationship of Malle's works with the outside world was also influenced by the arts policy of Moscow, in all its beauty and pain. An organisation which mediated Soviet art abroad became interested in the unique paintings of Malle Leis. The first experiences were negative – the wheels of the dim machinery of the art bureaucracy turned very slowly and only scraps of the profits made from selling the paintings reached the artist. At the same time, links to colleagues became more frequent and Leis became acquainted with the currents of the half-underground art scene of Moscow.

Quite unexpectedly, Moscow sent Malle Leis and her works to a painting biennial in the already-fermenting Poland, together with one Latvian academic and our own art historian Boris Bernstein. Bernstein has described this unbelievable event in his exciting memoirs *Old Well*: '...at the critical moment, someone decided that it would be politically incorrect not to participate, but we should also participate carefully: let us this time send artists from the Baltic States which, as it was known, were a shop window of the Soviet region, a simulation of a human face. Malle Leis was selected, she who was so well-known and much-loved in Poland...'

For Malle, one memorable encounter with the art trade of the wider world was a Sotheby auction held in Moscow in 1988. Such an amazing event created a huge buzz in the local half-underground art scene. The only works from Estonia to go to the auction were two paintings by Leis – and they were actually sold.

From that event, some interesting foreign contacts, which were extremely rare back then, were born. Those culminated in exhibitions in the USA, organised by the local Russian gallery owner Jelena Korneitšuk. Malle managed to go to the opening of the last exhibition (1989) herself. Then came the political breakthrough – perestroika – and the collapse of the empire. Although there had been rumours that the exhibition had more or less sold out completely, the only proof was that only three pictures out of sixty made it back home.

Lembit Sarapuu.
Portrait of Malle Leis | 1967





Flowers LXXVI.
Edition 1/55 | d52cm | 1978



Flowers XL.
Edition 10/22 | d49cm | 1975

Freedom is not necessarily creative freedom

Society followed its own path of development. The freedom which arrived in the early nineties changed all relationships in society. After a while, the life of artists started to yet again resemble Parisian garret life. The official art life turned its back on classical painting, starting to search for new media. The exhibitions changed their profile; the art market gradually froze...

The leading artists worked hard at hiding their disappointment. From going full speed ahead, they were suddenly forgotten, but comforted by the joys of martyrdom and the hope that some day they would be declared saints... The sole consolation was that in the Western world things had been like this for a long time.

Due to several factors, there was also a change in the silkscreen printing technique created by Malle and Villu – they started printing pictures with the single motif of grass. The pattern was replayed over and over again on the surface of the picture with a different colour and thus a completely different type of art was created. More rational, conceptual, but somehow more dried up. This series and actually the whole silk-print period culminated, in 2000, in a joint exhibition titled 'Horizons and Voices', which was held at the Tallinn Arts Hall. The twelve metres of the back wall of the exhibition hall were covered in Malle's grass pictures, above which there hung a row of Villu's voice-kinetic objects.

Malle Leis continues to paint on a daily basis. Still sometimes in oil, and sometimes in watercolour. The growing, blooming, ripening, vital world remains her motif. Her works are always surprising in their choice of patterns and the angle from which she sees them and, of course, in their technical perfection.

The leading theme of the recent exhibition in Haus Gallery (2009) was poppies, painted in oil and from nature as always. There were two new principal themes. First, there was an intense summer-sky-blue backdrop to the bright red of the poppies. Secondly, it was the first time in the forty years that Malle has been painting that there was a picture with flowers neatly arranged in a vase. Or, actually, in a pickle jar...

Malle Leis is about to open another exhibition in July in the gallery of the Tallinn Arts Hall. Huge watercolours are about to be completed - painted, believe it or not, on black paper! And once again the images are full of life and freshness, the surface (remember, on black paper!) still wonderfully watercolour-like. Various plants have struck harmonious poses – the onion poses with the pineapple, the strawberry with a huge red bloom. All of this to enable the audience to enjoy the beauty created by nature and presented by the artist.

I would like to share my conviction which was born while I was writing this article: art truly endures longer than life. I say this because once I saw a plant on the drawing table of the artist, in the middle of the process of being painted. The next time I saw it the model was withered. But, in the painting, it will live forever.



PORTFOLIO_MALLE LEIS



Summer day.
Serigraph | Edition 3/20 | 61 x 61cm | 1974



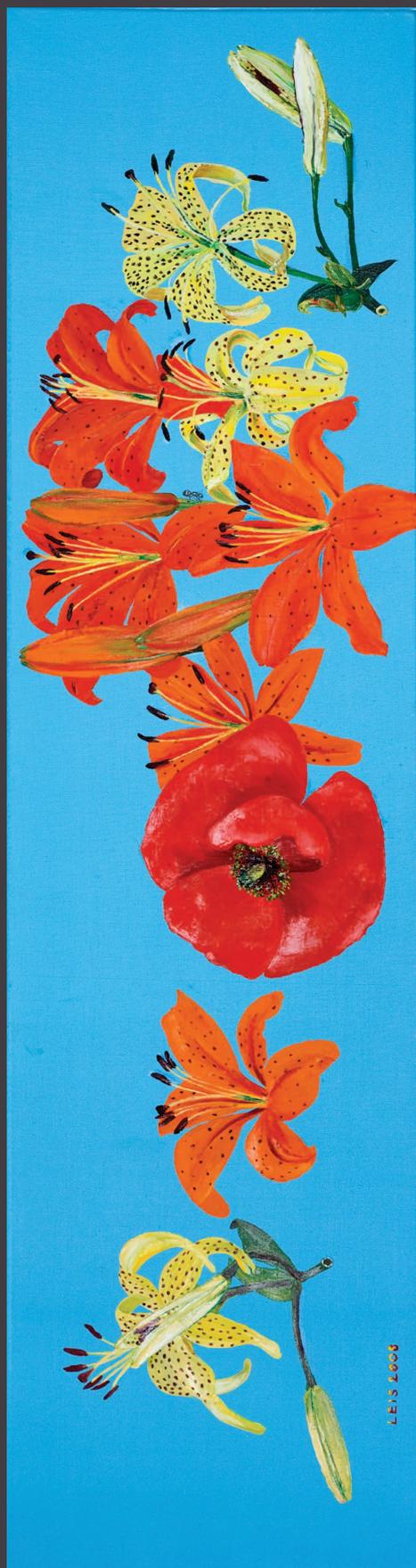
There are things in the night I.
Watercolour | 74 x 112cm | 2009



There are things in the night II.
Watercolour | 74 x 112cm | 2009



Variations in blue I.
Oil on canvas | 35 x 140cm | 2008



Variations in blue II.
Oil on canvas | 35 x 140cm | 2008



Flowers LIX
Serigraph | Edition 4/8 | d52cm | 1977



Flowers LV.
Serigraph | Edition 3/8 | d52cm | 1977



All spring holidays in one
Watercolour | 53 x 73cm | 2010



Come and see beautiful Estonia!

Answer 12 simple questions about Estonia, pack your things and board a plane. You will have a wonderful summer holiday.

The Estonian Ministry of Foreign Affairs is happy to announce that its new Estonia Quiz 2010 is open! You will find the quiz at quiz.mfa.ee

The quiz is in two languages, English and Russian. It consists of 12 multiple-choice questions covering different aspects of Estonian life. With the help of the different Internet links provided on the quiz page, it should be fun and easy for everyone to discover something new about Estonia.

The grand prize is a free trip to Estonia for two, including airfare, accommodation, meals, city tours and more. Other prizes include tour packages in Estonia.

The quiz will officially close on 31 May and the winners will be announced on 4 June.

This quiz is the Ministry's fifteenth Estonia-themed quiz. Interest in the quiz has constantly risen: almost 6000 people from 88 countries took part in the 2009 Estonia Quiz.

The main prizes of the Estonia Quiz 2009 went to Kazimierz Poplawski from Poland and Natalia Furso from Russia.

Some impressions from Kazimierz Poplawski, who visited Estonia during the Song and Dance Celebration last summer:

'There is no other word to describe the country than "amazing". I have never seen such a folk-style colourful place, and so much happiness and devotion, as during the Song and Dance Celebration. Both the dance and song performances were wonderful. Estonia gave me many, many unforgettable moments. I'm so happy that I had this great opportunity to see the Festival and that I spent these beautiful days in Tallinn and Pärnu.'



Foreign Minister Urmas Paet drawing the winners.

Special thanks to all the sponsors of the Estonia Quiz 2010:

Estonian Air; Antonius Hotel; Bern Hotel; Dorpat Hotel; Karupesa Hotel; L'Ermitage; Kalev Spa Hotel and Water Park; Maria Farm; Meriton Conference and Spa Hotel; Metropol Hotel; Nordic Hotel Forum; Pirita Top Spa Hotel; City Hotel Portus; Reval Hotel Olümpia; Sagadi Manor Hotel and Restaurant; Savoy Boutique Hotel; Scandic Palace Hotel; Schlössle Hotel; Sokos Hotel Viru; Strand Spa and Conference Hotel; von Stackelberg Hotel Tallinn; St Barbara Hotel; Tallink Hotels; Three Sisters Hotel; Hotel Telegraaf; Hotel Victoria Grand Hotel; Vihula Manor Country Club and Spa; Viinistu Hotel; Hotel Ülemiste; Restaurant Gloria; Restaurant Maikrahv; Restaurant MEKK; Restaurant Olde Hansa; Restaurant Ribe; Restaurant Vertigo; Restaurant Ö; Art Museum of Estonia; Baltic Silver Tours; Citybike; Estonian Open Air Museum; Estravel; Tallinn City Tourist Office & Convention Bureau; Tartu City Government;

Good luck and see you in Estonia!
Additional information: vminfo@vm.ee



Dear reader,

In our recent issues, we have been introducing you to the best restaurants in Estonia, based on the first list of the top Estonian restaurants compiled in 2008. The list was put together on the basis of assessments by the key personnel of Estonian restaurants and by journalists. Head chefs, sommeliers, restaurant managers or owners compiled their own lists of the top five restaurants. Each restaurant which was named among the best also got the opportunity to express its opinion. This kind of evaluation is democratic and honest: everyone gives their assessment according to their conscience and nobody is allowed to vote for their own restaurant. And they know their competition pretty well.

Opinions differed widely. There were real gourmet restaurants and simple eateries offering homelike grub next to each other on the lists. This again shows that what is considered good and tasty differs from person to person. However, opinions about the top of the top were similar. At the moment, they are considered the best. Everything could be turned upside down tomorrow, as life changes quickly.

Fortunately, it can be said that there are many good and unique places to eat in Estonia. It is worth coming from far away to eat in Estonia, and the number of such visitors is increasing year by year. In addition to the capital, it is worth driving around Estonia and dining in restaurants which are a bit further away. Your stomach will thank you for it.

In this issue, we bring you the next five restaurants in Tallinn that all have a little twist to them – in milieu and service, cosmopolitan flair, gastronomic experimenting or innovation.

The Top 50 Estonian restaurants can be found at www.flavoursofestonia.com. If you want to have a say in which is the best eating place in Estonia, go to the above-mentioned webpage and vote - your opinion also matters to us.



Text and photos: Magazine KÖÖK

Best Estonian restaurants





Head Chef: **Nikita Tsunihhin**

MUSEUM

old dressed as new

Old traditions are a part of a museum!

Museum is located in the centre of Tallinn, in the old Fire Brigade Museum. It is easily accessible from all sorts of public transport stops. One thing is certain – you should try out the drinks with your food and, therefore, should leave your car safely at home.

At first sight, the menu is colourful and truly international. There is no emphasis on the Estonian ingredients and tastes which are so popular, and also necessary, at the moment. Museum takes the best from everywhere.

‘We have taken the best bits of European and Japanese cuisine and this is what we offer. You may opt for one style today and another tomorrow, as the choice is big. Everything is simple and tasty,’ says the Head Chef.

The most interesting dishes are the various kinds of sushi on offer at Museum, ranging from the usual cold Japanese rice snacks to warm sushi. The latter is fairly rare, but definitely worth a try. All this is complemented by salads and warm dishes, which are not the largest but, nonetheless, are aptly filling for the average diner. The chefs have really thought through what goes on the

plate, so as not to overload it. And everything on the menu is really good. It is a selection of the best trends in the world. The food is cosmopolitan in the best sense of the word.

The interior in this lounge-type restaurant is contemporary and relatively minimalist. The wow-factor in the lounge is created by huge round copper lamps. Sitting underneath one of them is a fantastic feeling. For bigger groups, the restaurant has curved sofas with round tables, which are slightly uncomfortable to get out of, but this is compensated for by the pleasant and professional service and delicious food.

Museum is meant for trendy young people, stylish businessmen and groups of friends, or just as a meeting place. There is something for everyone, as is appropriate in a museum.

Location: Vana-Viru 14, Tallinn
Telephone: +372 6460 901

www.museum.ee





When word got out that Alan Yau was going to be involved in a new restaurant project in Tallinn, the local gourmet circles started buzzing. After all, he is a world famous chef whose aim is to re-shape Asian cuisine using ideas from Europe, and to look for the exclusive in Chinese food.

You has triumphed in taking the best from the East and the West and combining those elements. Hence the menu in Chedi is Asian food with a European touch, which is well worth a try. An exciting experience is guaranteed. Such Asian cuisine can only be found in such major cities as London. Perhaps there will be new places soon, as Yau sold his majority share in his London flagship Hakkasan and is now working on new projects.

Work on the concept of Chedi went on for two years. There is no sense, after all, in opening a restaurant without a clear idea of what will be on offer. Hence, they thought the restaurant through thoroughly and accomplished their goals to the smallest detail. When Chedi was opened, it was complete. Just the way it ought to be.

The décor of the restaurant is elegant and stylish. There is no place here for paper lanterns or plastic table covers. The design is modern and harmonizes with the food on the menu. The food and the interior complement each other. The menu is decent but not overly long. As the staff is professional, they give a simple explanation of each dish. The dim sum is definitely worth a try. There has been equal praise for the grilled sea bass with champagne and Chinese honey. It is worth keeping in mind that the menu has been created specifically for Chedi and it is not a copy of other Yau restaurants.

Chedi is not the cheapest restaurant in town but, as a place that one will not visit every day, the experience is worth the expense. This place is worth a visit, guaranteeing enjoyment, accompanied by a sigh.



Chef de Cuisine **Chong Chee Loong**

CHEDI

modern Asian fine dining

Location: Sulevimägi 1, Tallinn
Telephone: +372 646 1676

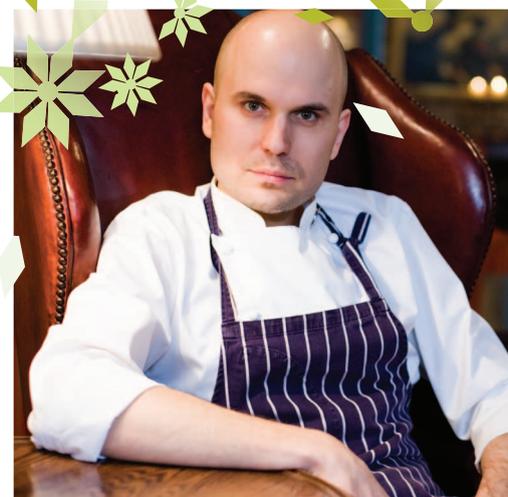
www.chedi.ee



KOLM ÕDE

established, yet new

Executive Chef **Tõnis Siigur**
Food & Beverage Manager **Renaldo Rannala**



Kolm Õde (Three Sisters) is one of the flagships of the Tallinn restaurant business. Its hotel is where the recent visits by the royalty of Great Britain, Holland and Japan have stayed on their visits. 'Cosy comfort' is the best way to describe the hotel.

Since this January, the restaurant of Kolm Õde has had a new Executive Chef, and this can be seen and felt. Unfortunately, at the time of the ranking of restaurants, the new menu had too little time to offer its exciting dishes! Hopefully, the restaurant will continue to surprise and take its rightful place among the best restaurants in the next ranking exercise. And that will be a much higher position than it currently holds. The Executive Chef Tõnis Siigur says, 'I aim to earn a Michelin star – this has always been my dream.' The owner of the restaurant, the Dutch businessman Johannes Wientjes, has set the goal of getting a Michelin star by the end of this year.

Siigur's other objective is to turn Kolm Õde into an eating place which always offers the freshest Estonian raw materials in food that has been prepared at the highest possible level of quality. 'Food is essential, but also every little detail counts: bread, butter, sweets, and even the assortment of types of sugar. We need to establish stability in quality and taste. I am here until the last customer leaves – this is the only way to receive a Michelin star,' comments Siigur. The new menu will be ready in February. As Kolm Õde is a popular place to hold private parties, the new head chef also wants to revive special offers and develop a catering service.



Location: Pikk 71 / Tolli 2, Tallinn
Telephone: +372 6 306 300

www.threesistershotel.com



KORSAAR

pirate ship with flag at full mast



If the wow-factor is what you're after, visit Korsaar and you will not regret it. What boy has not dreamt of sailing on a pirate ship or of other sea adventures? Korsaar is designed for grown-up boys and offers something for all the senses.

Even at the entrance, the thought that you will not be able to leave this ship without paying ransom will hit you. The crew seems tough and plays its part, as in a good play. You sit at the table and realise what you have got yourself into. It is a true pirate ship rocking on a stormy sea. There are so many amazing details which you can't miss. They have truly thought of everything. Let's not even get started on the trip to the restroom... some things should remain a surprise.

However this is not an amusement park, which you might deduce from the interior. Indeed not. You have, in fact, arrived at a true gourmet restaurant. This is not a joke. Order whatever your heart desires and your taste buds are guaranteed a surprise. According to the chefs,

the menu offers a mix of French, African, Indian, Chinese and Spanish cuisine. It is all fresh and served like a piece of art. Make sure you ask for recommendations and bear in mind that there is always a Head Chef in the house, as there are four of them in total. And always he will make an appearance in person to take your order. He will make recommendations and can talk in depth about all the dishes on the menu. He then takes your order to the kitchen where it is prepared. And he may just make the soup right beside your table...

Time moves at a different pace in Korsaar... There is no rush here, just the lull of the sea and no place to escape. You are on board a pirate ship.

Head Chefs: **Dmitri Rooz, Oleg Sõtšov, Rustam Tsikalovets and John Charles**

Location: Dunkri 5, Tallinn
Telephone: +372 666 8064

www.korsaar.ee



Head Chef: **Andrus Laaniste**

NERO never boring

Not another hotel restaurant! A spa and conference hotel? No reason to utter another word to non-believers. There is no point, after all, in casting your pearls before swine. Yes, it is a giant 186-seat restaurant called Nero, located in the Tallink Spa and Conference Hotel. No, it is not a diner meant for tourists, but a green, green oasis for true connoisseurs. The colourful and futuristic atmosphere of the restaurant plays off of a few prejudices. After all, you wouldn't expect a gourmet menu in a restaurant which looks like something out of a science-fiction movie. That just doesn't fit...

Head Chef Andrus Laaniste's attitude to gastronomy is just as much the stuff of science fiction as the interior design of the place. For him, everything is possible and the various states of food and the ingredients only offer him the pure joy of the game. Andrus plays around with unexpected and strong tastes excitedly like a boy. The Head Chef loves to try out new things and he is definitely a lover of modern cooking. Dishes which exist on the borderline of tastes offer the joy of discovery to all foodies who no longer find any excitement in simple food. You can try out horse meat or indulge in semolina ice cream.

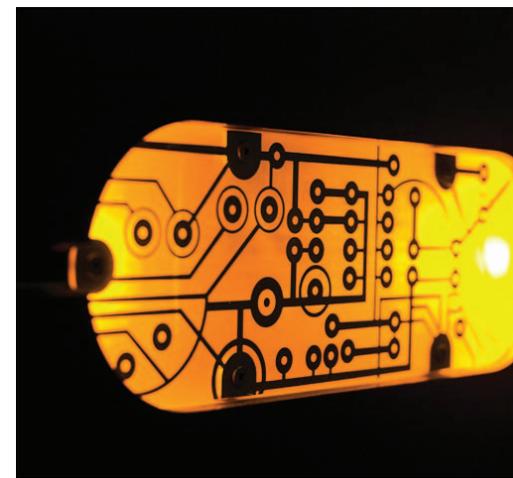
In addition to gastronomic sci-fi, Andrus loves BBQ and all kinds of other slow, low-temperature ways of cooking, because you cannot mess about with raw materials. The strength of Nero, according to Andrus, is the food and the funny design. 'Our food is bold and experimental. We value strong, clean tastes.'

Nero is clearly proof that it is possible to create an exciting restaurant in a large hotel. Or, perhaps, with an exciting Head Chef, it is possible to create a true restaurant out of a not-so-exciting one. A place to talk about, a place to come and enjoy your food.

Nero is innovative and definitely more forward-looking than any other restaurant in the capital.

Location: Sadama 11a, Tallinn
Telephone +372 630 0810

hotels.tallink.com





Andrus Laaniste, Head Chef of the Nero Restaurant at the Tallink Spa & Conference Hotel, is definitely at home when it comes to molecular gastronomy.

Molecular gastronomy brings the knowledge of physics and chemistry into cooking

Text: Ille Grün-Ots, *Hei*
Photos: Marko Mumm, *Päevaleht*,
iStockphoto

You look: whipped cream. You think: yummy, sweet! You taste: it's like fish roe, not sweet at all! Or the waiter places a plate of what looks like carrots in front of you, but it turns out to be ice-cream. An expert will immediately know that it is molecular gastronomy or molecular cooking, or at least a part of it. Most people will, however, be bewildered: sure they've heard of molecular biology, but... cooking?



Science and cooking are not alien to each other

Someone who is definitely at home when it comes to molecular gastronomy is Andrus Laaniste, Head Chef of the Nero Restaurant at the Tallink Spa & Conference Hotel. 'Molecular gastronomy is just the branch of gastronomy which deals with the investigation and practice of the physical and chemical processes of cooking. If we consider science and cooking to be two Martians walking separately in their space suits, all of us will end up as losers,' says the genius Catalan chef Ferran Adrià, who is considered one of the top gourmet chefs in the world. He is admired and seen as a role model, and others seek to emulate the tastes he has created. People travel from all over the world for a meal in Adrià's restaurant El Bulli, which has three Michelin stars and is situated in Roses, on the Costa Brava, on the border of Spain and France. This comes as a response to sceptics who have claimed for several years that molecular gastronomy is just a passing phase in the culinary world: 'The term may be a passing one, but the use of scientifically based methods in preparing food is a logical continuation of the history of cooking,' says Laaniste. The same applies to the term *cuisine nouvelle*, which began being used in the 1980s – the portions on the plate became really small and much effort was spent on the appearance of food. However, there is an eighteenth century cookery book in France which also talks about *cuisine nouvelle*...

Liquid olives at The Bazaar restaurant in Beverly Hills.



The tricks of the molecular kitchen pose no risk to health

Laaniste points out an interesting method: processing food with low frequency sound, in order for it to retain an authentic taste and smell. For example, a person might want to smell and taste the sea where an oyster was grown. Unfortunately, not even the best of restaurants can offer oysters which taste the way they do after they've just been caught in the sea, surrounded by salty winds. At this stage, the process is still a laboratory appliance which will not be put into mass use in the near future due to its cost. 'What could be better for a cook than to thoroughly know his raw material? To know why an ingredient behaves the way it does when processed. What is a potato made of? How does the starch react? How can you keep the colour in ingredients? What do different Ph-additives do and so on and so on,' Laaniste says, explaining the usefulness of physical and chemical knowledge. He emphasises again that the basis of molecular gastronomy is a thorough knowledge of the ingredients (which is referred to by the word 'molecular' – after all, matter is made of molecules). From that point on you can do things to the raw material which have never been done before.

Most people from outside the world of professional cooking who have heard the term molecular gastronomy—and there are not that many out there—are convinced that it just means that food looks like one thing but tastes like something else. 'That is the show effect and it is not an aim in itself, to make a carrot out of a potato,' says Laaniste. 'But the chef must have studied the raw material in depth in order to arrive at such a result.' Laaniste has nothing against such tricks. 'It is quite cool if you take a carrot, put it through really fine filters, thus stripping it of its usual colour, but keeping the taste. Then you can add some spinach colour, which has no spinach taste, to the carrot-tasting liquid,' he says, with a smile.

People are often afraid that the substances used to play around with (or to preserve) food like this are somehow chemical and have been extracted from oil in a test tube. Laaniste claims, however, that most substances which are used to get an unexpected or necessary result are completely harmless and often even useful. Most of the time, the so-called chemistry is just pure nature. He gives examples of substances used in our daily foods which are sold in every supermarket, for example, agar agar – red seaweed, Ovalbumin – egg white powder, Calcium Lactate – milk acid, and Carrageen – from red seaweed. 'Unfortunately, the food industry has sometimes gone the other way and included substances in foods which are not so good for human health in large quantities,' Laaniste admits.

The question remains as to why Laaniste himself as a chef is so up-to-date on molecular cuisine, although he himself plays down his knowledge. 'Well, the Nero Restaurant, where I work, has a playful and joyous design. This encourages my experiments with food,' he says modestly.

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Estonia in brief

| | |
|---------------------------|---|
| Official name: | Republic of Estonia |
| State order: | Parliamentary republic |
| Area: | 45,227 sq kilometres (17,500 sq miles) |
| Population: | 1,356,045 inhabitants: 69% Estonians, 26% Russians and 5% others |
| Population density: | 35 people per square kilometre. Over 70% reside in urban centres |
| Capital: | Tallinn with 405,562 inhabitants (01.09.2009) |
| Other major towns: | Tartu (101,190), Narva (67,752), Kohtla-Järve (46,765), Pärnu (44,781) |
| Administrative divisions: | 15 counties (<i>maakond</i>), divided further into 202 rural municipalities (<i>vald</i>) |
| Official language: | Estonian, a member of the Finno-Ugric group. Russian is widely spoken. Many Estonians speak English, German, Finnish or Swedish |
| Alphabet: | Latin |
| Religion: | Predominantly Protestant (Lutheran) |
| Currency: | Estonian kroon (EEK), divided into 100 sents; 1 euro = 15.65 EEK |
| Driving: | Right hand side of the road. Speed limits in town 50 km/h, out of town 90 km/h. International driving licence required |
| Weights and measures: | Metric system |
| Electricity: | 220 volts, 50 Hz |
| National flag: | Blue-black-and-white |
| National holiday: | 24 February (Independence Day) |
| National anthem: | <i>Mu isamaa, mu õnn ja rõõm</i> (My fatherland, my joy and happiness) |
| National flower: | Cornflower (<i>Centaurea cyanus</i>) |
| National bird: | Chimney swallow (<i>Hirundo rustica</i>) |



Practical information for visitors

Korea, USA, Uruguay, Venezuela. The required travel document for entry is a valid passport.

Citizens of countries not mentioned above require a visa to enter Estonia. Visitors arriving in Estonia with visa must have national passports valid at least 3 months after their planned departure from Estonia.

Children aged 7 to 15 years must have their own passport when travelling to Estonia or, if they are registered in their parent's passport, must have their photo next to the name. Children under 7 years need not have a photo if they are registered in their parents' passports. Persons above 15 years must have a separate travel document with photo.

For detailed information on visa requirements and entry rules, please consult the Ministry of Foreign Affairs website at www.vm.ee/eng.

Regional airports are located in Kuressaare (Saaremaa), Kärdla (Hiiumaa), Pärnu and Tartu; these provide no regular international connections.

By ship: With over 6 million passengers annually, the Port of Tallinn is undoubtedly Estonia's main gateway. Large passenger ferries arrive from and depart for Helsinki and Stockholm regularly. The 85-km Tallinn-Helsinki line is served by ferries that make the journey in 2 hours; hydrofoils and catamarans make the trip on 1.5 hours and operate between April to November or December, depending on weather conditions. Travellers should note that different ferry lines depart from different terminals and harbours. The City Port with its four terminals is a 10-15 minute walk from Tallinn Old Town; the Paldiski-Kapellskär line uses the Port of Paldiski, about 50 km from Tallinn.

By car: Border checkpoints greet travellers entering or departing the country by way of the Estonian-Latvian border points at Ikla (the Tallinn-Riga highway) and Valga, as well as on the Estonian-



For more travel details, please consult the sources below: www.visitestonia.com (Estonian Tourist Board), www.riik.ee/en/.

Tourist information centres are located in all larger towns.

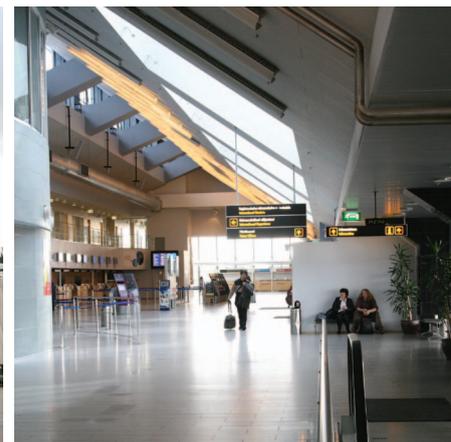
The Tallinn Tourist Information Centre in the Old Town is located at 4 Kullassepa Street - no more than 10 steps from the Town Hall Square (ph.: +372 645 7777, e-mail: turismiinfo@tallinnlv.ee). The Tallinn Tourist Information Centre in Viru Keskus (ph: +372 610 1557, 610 1558), open every day 9 am - 9 pm, is located in the centre of the city. A wide selection of maps, brochures and publications in several languages (largest selection in English) can be found at local bookstores and tourist information centres.

Visa

As of 21 December 2007, Estonia is a part of the Schengen visa area.

Nationals of EU and EEA member states are free to enter Estonia. The required travel document for entry is a national ID card or passport.

Nationals of the following countries do not need visa to enter Estonia, and can stay for up to 90 days in any 6-month period: Andorra, Argentina, Australia, Brazil, Brunei, Canada, Chile, Costa Rica, Croatia, El Salvador, Guatemala, Holy See, Honduras, Hong Kong, Israel, Japan, Macao, Malaysia, Mexico, Monaco, New Zealand, Nicaragua, Panama, Paraguay, San Marino, Singapore, South



Arrival

By plane: Recently renovated, the Tallinn Lennart Meri Airport, just 3 km from the city centre, is welcoming, modern and user-friendly. Among other amenities, travellers have access to a free WiFi area in the transit zone. The airport's 24-hour customer service telephone is +372 6058 888.

The easiest way to get to town is by taxi. A ten-minute ride to the city centre costs approximately 60 Estonian kroons. A hotel transfer minibus meets all incoming flights and takes visitors to downtown hotels for just 25 kroons (€1.60 or \$1.90). City bus #2 connects between the airport, the centre and the harbour. The bus schedule is posted at the bus stops in these places, and tickets can be purchased from the driver (15 kroons, €0.95 or \$1.16 per ride).

Russian border at Narva (the Tallinn-St. Petersburg highway), Luhamaa, Koidula and Murati. On the Estonian-Russian border, all traffic is subject to border formalities both when entering and leaving Estonia.

By bus: Not only is travel by bus the fastest and most convenient mode of international public transportation in the Baltic states, it also offers excellent value for your money. Regular connections service all major cities in the Baltic countries and St. Petersburg. Eurolines Lux Express offers comfortable Riga Airport transfers from Tallinn, Pärnu, Klaipeda, Vilnius, Panevezys, and Šiauliai. Prices start from €15.90. A useful tip: Regular passenger buses have priority at the border checkpoints, so travel is smooth. For more information and timetables, please contact Eurolines at tel. +372 6800 909 or visit their website at <http://www.eurolines.ee/eng/index.html>.

By train: There are only one international overnight train to Moscow. For further details see www.gorail.ee

Customs

We suggest travellers consult with the Estonian Customs Board help desk (ph.: +372 880 0814 or www.customs.ee) for details. The limit on import of alcoholic beverages from outside the EU is one litre for beverages over 22% alcohol content, and two litres for beverages up to 22%, and four litres for wine. Import of tobacco and tobacco products from non-EU countries is limited to 40 cigarettes or 100 cigarillos or 50 cigars or 50 g of tobacco products. Counterfeit goods, including pirated CDs, video and audio tapes, are prohibited by law. A special export permit is required for specimens of plants and animals of endangered species, protected species and hunting trophies (please contact the Nature Conservation Department, Ministry of the Environment for details). Articles of cultural value produced in Estonia more than 50 years ago also require special permits (please contact the National Heritage Board).

are almost always available even immediately before departure (watch out for special events). For weekend travel or trips to more remote locations with fewer connections, it is advisable to buy tickets in advance. The Tallinn Bus Terminal is located at Lastekodu 46. The timetable is also available online at www.bussireisid.ee/index.php and ticket information is available at telephone +372 6800 900.

Travelling by car

Travellers hoping to see more of the country and the rural areas it would be best advised to travel by car. The roads are quite good and traffic is light. Crossing Estonia from north to south or west to east by car takes approximately three to four hours. All major car rental agencies have offices in Tallinn. It is also possible to rent the car in Estonia and drop it off at a rental agency in Latvia or Lithuania, or vice versa. The speed limit in rural areas is 90 km/h and in cities 50 km/h. In some areas the highway speed limit is increased during the summer months. Headlights and seatbelts (front and back) must be on at all times. Driving under the influence of alcohol or other intoxicating substances is punishable by law.

is no additional charge for ordering the taxi by phone, and it usually takes the cab just five to ten minutes to arrive. All taxi drivers must give you a receipt (in Estonian, ask for "Kvitung, palun"). Locals usually give the exact fare and no tip. As in most major cities, some dishonest drivers attempt to overcharge unsuspecting passengers. If in doubt, note the taxi company and license plate number.

Public transportation: Tallinn has a public transport network of buses, trams and trolley-buses. Other Estonian towns have buses. Schedules are posted at bus stops. Tickets are available at newsstands (the yellow and blue "R-kiosks") and from the driver. A pre-purchased ticket (10 kroons, 0.83) must be validated upon boarding and is valid for one ride. A pre-purchased one-hour ticket costs 15 kroons and two-hour ticket 20 kroons. Check the time schedule for Tallinn bus lines for any bus stop at www.tallinn.ee/eng.



Getting Around Estonia

Inter-city public transportation

Public buses are the easiest, cheapest and most convenient solution for visiting Tartu, Pärnu or any other of the larger towns. Buses from Tallinn to Tartu depart every 15-30 minutes, to Pärnu every hour. On weekdays, seats to these destinations

Local transport

Taxis: Taxis must clearly display their fares, driver's taxi service licenses, and a meter. The initial charge for entering a cab ranges from 20 to 45 kroons. Different taxi companies have different rates, but the average charge per kilometre is 7 kroons. In Tallinn, a short ride within the city centre usually costs around 50 kroons. A ride to the suburbs may cost about 100 kroons. There

Accommodations

All major hotels in Tallinn have been newly built or completely renovation in recent years. Despite annual additions to the number of hotels and rooms, it can nonetheless be difficult to find a hotel room on short notice (particularly over the week-end). For the best selection, we urge visitors to Tallinn and the rest of Estonia to book hotel rooms in advance. For more details, see the Estonian Tourist Board website at www.visitestonia.ee.

Money

The Estonian kroon is pegged to the euro (1 euro=15.6466 kroons; 1 kroon=100 cents).

Most larger hotels, stores and restaurants accept Visa, MasterCard, Eurocard, Diner's Club and American Express. However, it is advisable to carry some Estonian kroons with you.

Traveller's checks can be exchanged in most banks but are less likely to be accepted in shops. Eurocheque is the most widely accepted traveller's check, but American Express and Thomas Cook are also accepted. Banks are plentiful and easy to find in Tallinn. Most are open from 9:00 to 18:00 on weekdays, while some offices are also open on Saturday mornings. All banks offer currency exchange services. Exchange offices can also be found in larger hotels, the airport, harbour, railroad station and major shopping centres. ATMs are conveniently located around town; instructions are in English, Russian and Estonian.



Telephones and Internet

The country code of Estonia is 372. Dial 00 for outbound international calls. Public payphones only accept prepaid phone cards, costing 50 and 100 EEK, which can be purchased at newsstands. As with ATMs, phone instructions are offered in English, Russian and Estonian. The GSM mobile phone system is available; please check compatibility with your operator.

Public Internet access points have been set up all over Estonia. They are located in local libraries and post offices. There are over 100 free **wireless**

Internet zones around the country, many of them in rather unexpected places - beaches, Old Town squares, stadiums, and concert halls.

Emergencies

112 is the emergency number for ambulance, police and fire department. The police can also be reached directly at 110. Emergency numbers can be dialled free of charge and without a phone card from any public telephone. Select pharmacies are open 24-hours-a-day in many major towns. The one in Tallinn is located at 10 Pärnu Road (opposite the Estonian Drama Theatre); the one in Tartu is located in the Town Hall building (Town Hall Square).



National Holidays

Estonians celebrate January 1 as New Year's Day, a rather slow and quiet day as people recover from the festivities. Shops open late and banks are closed. February 24, Independence Day, is celebrated with a parade of the Estonian Defence Forces at Vabaduse väljak (Freedom Square). May 1 is a bank holiday, similar to Good Friday and May Day. June 23 is the biggest holiday of the year as Estonians celebrate Midsummer Eve and the Victory Day in commemoration of the 1919 Battle of Võnnu, and June 24 is St. John's Day (Midsummer). August 20 is the Day of Restoration of Independence (1991). December 24 (Christmas Eve), December 25 (Christmas Day) and December 26 (Boxing Day) are usually spent at home with families.



Food

Traditional Estonian cuisine consists of simple peasant food, such as cottage cheese, potatoes and bread, all of which are still important components of the local diet. The Estonian dark bread is the main staple missed by Estonians abroad. Typical Estonian dishes do not feature prominently on restaurant menus, and traditional home cooking is more likely to appear at small eateries in remote areas. Still, a few establishments have made Estonian specialities their niche; to sample Estonian cuisine, try the Kuldse Notsu Kõrts, Vanaema juures, Eesti Maja, Kaera-Jaan and Kolu Tavern (Open Air Museum) in Tallinn, and the highly recommended Lümända söögimaja on the Island of Saaremaa.

Of meat dishes, pork is the favourite and most common in Estonia; Baltic herring is the most common local fish. A typical, heavy Estonian meal is a pork steak with sauerkraut and potatoes. Soups are also a mainstay in the local diet, with tasty samplings ranging from broth with dumplings and meatballs to delectable vegetable purees.

At local restaurants, appetizer prices start at approximately 50 kroons and main courses start from about 100 kroons. A three-course restaurant meal with coffee will usually cost upwards of 250 kroons. A glass of house wine or beer is usually 40-50 kroons. Cafeterias offer main course for 45-60 kroons and 100 kroons will buy a full meal. Pleased customers usually leave a tip of 10% of the bill.



Drinks

The main drinks in Estonia are beer, wine and vodka. While many young city residents opt for beer or wine, the older generation and rural folk tend to prefer vodka. In the 1930s Estonian vodka made it into the Guinness Book of Records as the strongest vodka in the world (96%). Local brands of beer enjoy a very strong market position in Estonia. The two main breweries are Saku and A. Le Coq. Saku is Tallinn-based, and its corporate colour is navy blue while A. Le Coq is brewed in Tartu and its colour is red. There are also many smaller breweries. A full list of Estonian beers is posted at www.BeerGuide.ee. One glass of beer at bars or restaurants costs 30-60 kroons. A bottle of beer sells at supermarkets for 10 kroons.

Spirits also include some traditional liqueurs. The famous Vana Tallinn (Old Tallinn) has a 45° alcohol content, and is coincidentally made from 45 ingredients - the recipe is known only to a handful of people. Indeed, the legendary 19th-century *kristallkummel* (caraway liqueur) has made its long-awaited comeback.

Estonian wines, made from currants or other local berries, are rather sweet. Wine lovers usually prefer imported wine, of which there is an ever-increasing selection at stores and vinoteks. A very popular and refreshing non-alcoholic drink is *kali*, made of bread, malt, rye or oats flour and yeast; it has a characteristically dark brown colour. It was with this drink that the Estonians forced the Coca-Cola company into submission, or at least into a business deal. *Kali* was enjoying

phenomenal sales, while Coke was not selling up to expectations. It was then that Coca-Cola decided to broaden its horizons by buying one of the local *kali* trademarks in order to make a profit on the stubborn Estonians.

to local and resident DJs, clubs frequently present guest performers from London, the US and other club hubs. For those looking for a more mellow night on the town, Tallinn's streets are brimming with pubs, vinoteks and bar-restaurants, many of



Entertainment

The entertainment scene in Estonia is vibrant year-round, providing visitors and locals alike with a long list to choose from. Concerts, festivals, theatre, street raves, DJ competitions – Estonia has it all. It is not by chance that both Tallinn and Tartu have their own opera and ballet theatre. Tickets are an excellent value for the money; concert tickets start around 150 kroons, and best seats at the opera are yours for as little as 390 kroons. For more information on the concert schedule see www.concert.ee; the programme for the national opera is posted at www.opera.ee. Tickets can be bought at the box offices or via ticket agencies located in all larger supermarkets, or via Internet (www.piletilevi.ee)

Even the most sceptical museum-goer is bound to find something intriguing in Estonia's large selection of museums, which feature everything from history, art, photography to toys, chocolate, musical instruments, even wax figures and many other topics. Most museums are closed on Tuesdays and many on Mondays as well. It is advisable to have cash on hand as many museums do not accept credit cards.

Tallinn is also bustling well into the night with booming and blooming club scene. Clubs are usually open and packed with energised vibes from Thursday to Sunday, with Friday and Saturday drawing the liveliest of crowds. In addition



which offer live music even on weekdays. Rather take in a movie? Films in cinemas are shown in the original language with subtitles.

Shops

Souvenir shops in Tallinn and most other tourist locations are open seven days a week, 10:00-18:00 or 19:00. Big supermarkets and hypermarkets are open seven days a week from 9:00-21:00 or 10:00-22:00. Department stores close a few hours earlier on Sundays or, in smaller towns, may be closed on Sundays. Smaller food shops may have shorter opening hours. Some 24-hour shops can be found as well. Other shops usually open at 9:00 or 10:00 and close at 18:00 or 19:00; they often close early on Saturdays and are closed on Sundays. The majority of shops accept credit cards, with the exception of smaller stores and stores in rural areas.



Souvenirs

Souvenir and shopping preferences vary hugely but there are certain souvenir gifts that have gladdened many a heart. Estonian handicraft comes in many forms. There are woollen sweaters and mittens with local ethnic patterns, linen sheets and tablecloths, crocheted shawls and veils, colourful woven rugs, handmade jewellery and glassware, baskets, and an array of wooden spoons and butterknives made from juniper. Fine and applied art for show and purchase is on display at art galleries around the country, featuring graphics, glass, ceramics, hand-painted silk scarves and leatherwork. Various herbal teas from wild plants are available at pharmacies. Local honey – pure or flavoured, e.g. ginger, is another delicious treat. In rural areas, you may find hand-milled flour. And those who keep coming back swear by the Estonian black rye bread. To bring home local spirits, popular choices include Vana Tallinn or *kristallkummel* liqueur or local beer. And there is no place better than Estonia to buy Estonian music.



Crime

Although common sense is advisable in all destinations, Estonia gives no particular reason to be excessively worried. Do not walk the unlit and abandoned areas alone at night. Do not leave bags or items of value in the car, as not to tempt car thieves or robbers. Pickpockets may operate at crowded tourist destinations in Tallinn, so make sure your wallet and documents are stored safely.

Estonians

Estonians are typical Nordic people – they are reserved, not too talkative and speak rather monotonously, with very little intonation. All this may give one the impression of coldness bordering on rudeness. But rest assured, this is not the case, and the speaker may actually be extremely well-meaning, even excited. There are several well-known Estonian sayings, such as “Think first, then speak”, “Weigh everything carefully nine times before making a move”, and “Talking is sil-



Language

Estonian is not widely spoken in the world, so Estonians do not expect short-term visitors to master the local language. Still, local people are thrilled and pleased to hear a foreigner say “Tere!” (Hi!) or “Aitäh (Thank you) in Estonian. Knowledge of foreign languages is naturally a must for hotel staff and numerous other professions in the service sector. Many people are fluent in English, particularly the younger urban generation, and a great number of people also speak Finnish, due to Finnish TV, Finland’s close proximity to Estonia and the great number of Finnish tourists. German is less widely spoken in Estonia, although previous generations have often studied German, not English, at school. Russian-language use has dropped to a point where older people no longer speak the language well and the younger generation have already chosen other languages to learn at school. Studying French has become more popular over the last few years but the number of people who speak French is still quite small. An English-Estonian dictionary is available online at www.ibs.ee/dict.

ver, silence is gold”. It is, therefore, no wonder that the people are not very good at small talk, do not waste too much time on grand introductions, and usually come straight to the point. This is why Estonians’ English may sometimes sound shockingly direct. There is, however, often a subtle irony involved in Estonians’ utterances - delivered with a serious face and just the slightest twinkle of the eye.

Estonians are relatively individualistic. There is a saying that five Estonians mean six parties. Even though people agree on the final objective, they insist on reaching it in their own ways. Estonians also value their privacy. In the old days, it was said that the neighbour’s house was close enough if you could see the smoke from the chimney. Modern, tight-packed urbanites flock to remote countryside on the weekends to enjoy more space and privacy.

Even though guests at birthday parties and concerts are rather quiet and subdued in the onset, they warm up eventually and turn into a direct opposite of their day-character, as you are likely to see in Tallinn’s clubs.

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