



European Perspectives on the Challenges of Financing Low Carbon Investment: Estonia

Susan Davies and Ingrid Holmes

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1. Background

Estonia is one of eight former Eastern bloc countries that joined the EU in 2004. Since emerging from communist control, successive Estonian Governments have been pro-business and pro-free market – with a primary focus on growing the economy. This had been achieved very successfully: by 2006 the annual growth in GDP had reached 10.6 percent. However Estonia was hard hit during the global financial crisis: GDP fell –13.9 percent in 2009¹, one of the highest rates of contraction seen anywhere in the world. This was due partly to its dependency on foreign trade and foreign direct investment (FDI), which fell rapidly during the recession, but also the impact of the bursting of the local real estate bubble that developed on the back of high levels of growth.

Thanks to decisive public spending cuts and rising exports on the back of strong ties to Scandinavia, economic recovery quickly followed in 2010. In 2010 GDP growth stood at 3.1 percent and is predicted to reach 3.3 percent in 2011². However, while Estonia's GDP per capita is one of the highest among the central and eastern European (CEE) states – at \$14,835.96 (behind Slovenia (\$23,706) and the Slovak Republic (\$16,104) – in 2010 it was still the seventh lowest in the EU³. In absolute terms GDP is around 45 percent of the EU average⁴. Eurostat analysis of 2008 data by purchasing power standard, however, showed that it was at 67 percent of the 2008 EU average by this measure⁵. Unemployment levels are

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¹ International Monetary Fund, World Economic Outlook Database, April 2011

² International Monetary Fund, World Economic Outlook Database, April 2011. However a report in the Economist puts Q1 2011 growth at 8.5 percent - the highest in the EU. Economist (16 July 2011) Estonia exceptionalism

³ International Monetary Fund, World Economic Outlook Database, April 2011, GDP in \$, current prices

⁴ E3G analysis of IMF Database and population data from Demographic Report 2010, Eurostat/European Commission

⁵ Europe in figures, Eurostat yearbook 2010, Eurostat

also high – at around 14 percent as of the Q1 2011⁶ – but this has seen a steep decline from a high of almost 19 percent at the end of 2010.

Estonia prides itself on being the leading CEE country in terms of attracting FDI. In 2010, cumulative foreign investments in Estonia were valued at €12.1 billion (compared to the other Baltic states of Lithuania and Latvia, which saw €10.2 billion and €6.2 billion invested respectively). In Q1 2011, FDI was 70 percent higher than in Q1 2010. Most of this investment came from the reinvested profits of foreign investors already present in the Estonian market, attracted by the favourable tax incentives. Investments have mostly been in electronics and machinery businesses, but also in information and communication technology (ICT) and business services. Sweden and Finland have been the biggest investors (Sweden 35 percent; Finland 23 percent). The main target industries have been finance (31 percent), manufacturing (16 percent) and real estate (12 percent)⁷. Such investment continues the trend in diversification away from Estonia's traditional industries and agriculture. For example in 1990, 50 percent of Estonian GDP came from industry; 34 percent from services; and 16 percent from agriculture. By 2003 this had shifted so that 65 percent came from services; 30 percent from industry; and only 5 percent from agriculture⁸.

Estonia is an Annex I country under the UNFCCC, meaning it must make emissions cuts. Under the European Union's (EU's) burden-sharing agreement it must reduce greenhouse gases (GHGs) by 8 percent over 1990 values between 2008 and 2012. However by 2009, Estonia's emissions reductions far exceeded this and stood at 59 percent below 1990 levels (excluding LULUCF). Within the EU, only Estonia's Baltic cousin Latvia has delivered greater emissions reductions (at 59.7 percent)⁹.

Energy supply in Estonia is dominated by the two energy companies: Eesti Energia (electricity) and Eesti Gaas ('Eesti' meaning 'Estonia'). Eesti Energia is the largest employer in Estonia. It is 100 percent owned by the state and shareholder rights are exercised by the Ministry of Economic Affairs and Communications. It has recently received large loans from both the European Investment Bank (EIB) and Nordic Investment Bank. Its share of the open electricity market was 87 percent at the end of 2010¹⁰ and it provides 97 percent of Estonian production capacity. Until 2010 Eesti Energia was a vertically integrated company controlling 85 percent of the distribution market and owning the sole transmission operator; as a result customer switching has been low, despite some liberalisation¹¹. Eesti Gaas is the sole gas supplier and controls 100 percent of the market as well as 100 percent of the transmission

⁶ Statistics Estonia, accessed May 2011: <http://www.stat.ee/main-indicators>

⁷ Enterprise Estonia, June 2011

⁸ Estonia's Economic Development: Trends, Practices, and Sources, Working Paper no.25, The International Bank for Reconstruction and Development/The World Bank on behalf of the Commission on Growth and Development, 2008

⁹ Annual European Union greenhouse gas inventory 1990-2009 and inventory report 2011, European Environment Agency, 31 May 2011

¹⁰ https://www.energia.ee/en/investor/start/-/asset_publisher/H9gF/content/modalwindow/417336, 31 January 2011

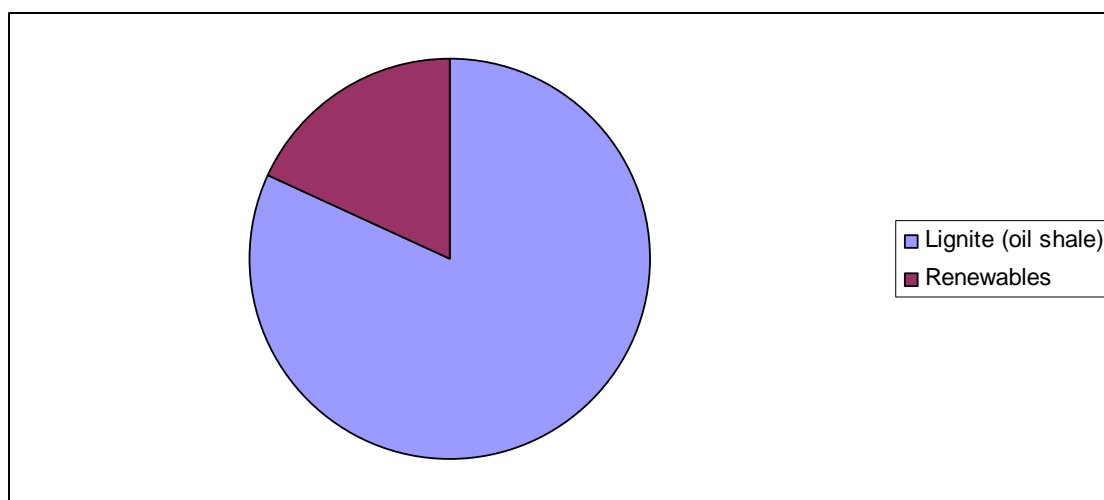
¹¹ In early 2010 the transmission operator Elering was unbundled and is now owned by the State

and distribution network via subsidiaries¹². Eesti Gaas is 37 percent owned by Gazprom; 34 percent by E.On Ruhrgas International; 18 percent by Fortum Heat & Gas; 10 percent by Itera Latvija; and 2 percent by other shareholders¹³.

Internal networks for both electricity and gas were originally developed under the Soviet system and while there are good connections to the other Baltic States and Russia, links to the EU were poor. However, new cables to Finland have improved connectivity for electricity and Estonia is now one of the most interconnected Member States within the EU.

Estonia is somewhat unusual in the EU in having no significant coal, oil or natural gas resources – but it does have the world’s highest dependency on oil shale deposits¹⁴. Energy dependency was 23.8 percent in 2008, falling from 35.6 percent 10 years previously; it is below the EU average of 54.8 percent. However, Estonia is 100 percent dependent on natural gas imports¹⁵. Primary energy production is therefore heavily fossil fuel reliant. According to Eurostat data in 2008 82 percent came from lignite (oil shale)¹⁶ and 18 percent from renewables (see Figure 1).

Figure 1. Primary energy production in 2008.



¹² Estonia internal market factsheet 2007, http://ec.europa.eu/energy/energy_policy/doc/factsheets/market/market_ee_en.pdf and discussion with the Estonian Renewable Energy Association

¹³Data taken from its website relating to December 31 2005 <http://www.gaas.ee/index.php?page=97&>

¹⁴Of the 15,000 barrels per day (15 kb/d) of oil shale processed into oil globally, Estonia processes 4kb/d (27 percent): World Energy Outlook 2010, International Energy Agency

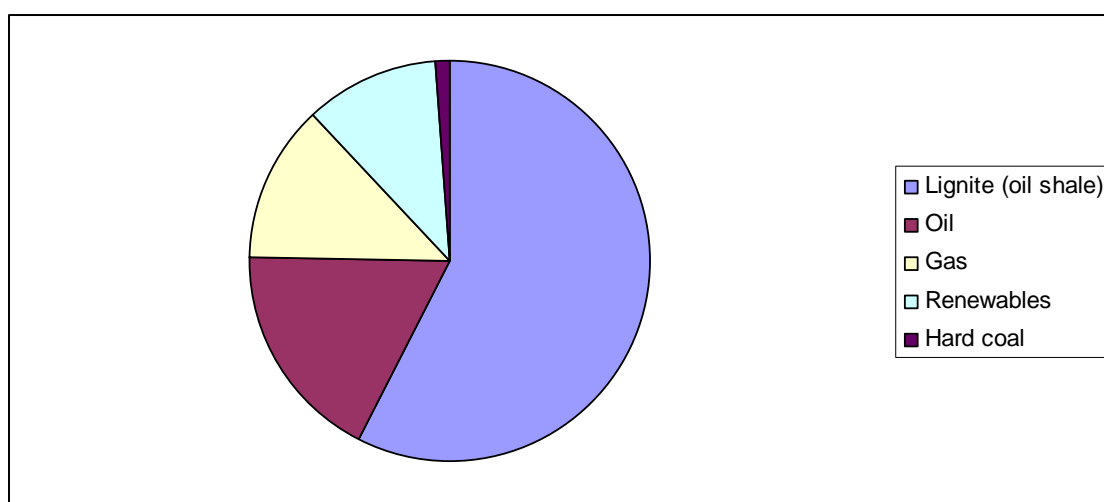
¹⁵Energy, transport and environment indicators, Eurostat, 2010 edition, February 2011

¹⁶Eurostat provides data for comparative purposes across the EU using standard definitions. However, it is assumed that lignite in this instance refers to oil shale as there is no doubt that oil shale is the primary generation source.

Energy use per capita is 20 percent higher than the EU average¹⁷ while final electricity consumption is about 10 percent lower than the EU average¹⁸. Reflecting its high dependency on oil shale – which is very energy intensive to extract – Estonia’s energy intensity is 3.5 times the EU average¹⁹ and its emissions per capita are the third highest in the EU²⁰, exceeded only by Luxembourg and Iceland²¹.

Of gross inland consumption 58 percent came from lignite (oil shale); 18 percent from oil; 13 percent from gas; 11 percent from renewables; and 1 percent from hard coal²² (see Figure 2).

Figure 2. Gross inland energy consumption in 2008.



Gas usage is relatively low because it is used primarily for heating and by industry rather than for electricity generation. Most heating is provided through district heating.

Estonia’s dependence on oil shale and use of peat in co-firing contribute to its high emissions. Table 1 summarises the relatively high carbon content and CO₂ emissions from combustion of oil shale and peat compared to other more common forms of power generation²³. These figures also exclude emissions from extraction and environmental destruction, which are particularly acute from these sources.

¹⁷ 4.36 toe compared to the EU average 3.62 of toe
¹⁸ 5,214 kWh per capita compared to an EU average of 5,738 kWh per capita. Energy, transport and environment indicators, Eurostat, 2010 edition, February 2011
¹⁹ 571 kgoe/1 000 EUR’00 compared to the EU average of 167 kgoe/1 000 EUR’00. Energy, transport and environment indicators, Eurostat, 2010 edition, February 2011
²⁰ At 15.1 tonnes GHG per capita
²¹ Analysis of United Nations Statistical Division: http://unstats.un.org/unsd/environment/air_greenhouse_emissions.htm, 2 March 2011
²² Energy, transport and environment indicators, Eurostat, 2010 edition, February 2011
²³ 2006 IPCC Guidelines for National Greenhouse Gas Inventories

Table 1. Carbon emissions by fossil fuel energy source.

Default values	Carbon content (kg/GJ)	Effective CO2 emission factor (kg/TJ)
Oil shale	29.1	107,000
Peat	28.9	106,000
Lignite	27.6	101,000
Coking coal	25.8	94,600
Natural gas	15.3	56,100

Estonia has a target for renewables to provide 25 percent of final energy use by 2020 and by 2009 it had reached 19.6 percent²⁴ (above the 2008 EU average of 10.3 percent²⁵). Renewables provided 11 percent of primary energy in 2009²⁶. However, renewables contributed only 6 percent of electricity in 2009 against a target of 8 percent for 2015²⁷. Only 149 MW of wind energy had been installed by the end of 2010, although this represented 3.5 percent of total power demand²⁸.

In the last couple of years, however, renewable energy has expanded considerably. Renewable energy production increased by 50 percent in the year to March 2011 reaching 254 GWh. Three new wind developments were added to the grid, which brought total capacity to almost 157 MW. Electricity generated from wind increased 70 percent over the same period to contribute 102 GWh; the amount from waste and biomass rose by 38 percent to 145 GWh; and hydro increased 48 percent to 8 GWh. In 2011 the total renewable energy share of electricity consumption is expected to be 11.4 percent, up from 10 percent in 2010²⁹. Developments continue apace: in June 2011, Eesti Energia announced it will invest €33 million in a new 22.5 MW windfarm with GE Energy as a developer³⁰.

2. Financial overview

The International Monetary Fund (IMF) commended Estonia for its prudent economic and fiscal policies that enabled it to return to growth in 2010 and to join the Euro in January

²⁴ Analysis by the Estonian Renewable Energy Association using data from http://pub.stat.ee/px-web.2001/Database/Majandus/02Energeetika/02Energia_tarbimine_ja_tootmine/01Aastastatistika/01Aastastatistika.asp This rose to 21 percent in 2010 (data from Estonia's National Renewable Energy Allocation Plan at

http://ec.europa.eu/energy/renewables/transparency_platform/doc/national_renewable_energy_action_plan_estonia_en.pdf)

²⁵ Energy, transport and environment indicators, Eurostat, 2010 edition, February 2011

²⁶ REN21 (2011) Renewables 2011: Global Status Report

²⁷ This rose to 10 percent in 2010 (discussion with the Estonian Renewable Energy Association)

²⁸ Global Wind Energy Council, accessed May 2011:

<http://www.gwec.net/index.php?id=9&L=pddbrgfhvnlx>

²⁹ Discussion with the Estonian Renewable Energy Association

³⁰ <http://news.err.ee/economy/052dbd30-c162-4d7f-8e5a-6e80b93aad31>

Energy efficiency is a high priority for the Estonian Government: 60 percent of housing in Estonia was built between 1960 and 1990 and, unusually, around 95 percent is privately owned and 75 percent of the population live in multi-apartment buildings. Most of this housing has poor standards of energy efficiency³⁸. It is for these reasons that Estonia's public financing institution KredEx has a primary focus on developing financial products that support retrofit of apartment buildings.

Since the Electricity Market Act (2003) Estonia has also offered feed-in-tariffs (FiTs) to support renewables investment³⁹. A single-rate FiT was introduced that does not differentiate between technologies. The current FiTs last 7–12 years and the financial rewards are set relatively low compared to those available in other EU countries⁴⁰. This regime is due to end in 2015. The latest subsidy system was introduced under the revised Electricity Market Act (2007) when the subsidy was raised 42 percent to the equivalent of €0.0735/kWh under a purchase obligation i.e. an obligation on suppliers to purchase a fixed amount of renewable electricity. At the same time a feed-in premium worth the equivalent of €0.0537/kWh was also introduced for renewable energy suppliers wishing to sell to the grid outside of the purchase obligation⁴¹.

The purchase obligation was abolished early 2010, but FiTs continue. However, limits have now been placed on the amount of wind capacity that can be installed. The revised Electricity Market Act states that a windpower producer may receive support up to a total amount of 600 GWh; after this cap is reached, suppliers must sell electricity at market price⁴². In late 2010 the Economy Minister led calls to reduce FiTs by up to half, driven by concerns about rising costs to consumers. However, in April 2011 the new Government (elected in March 2011) announced it would be retaining the subsidies but reviewing the appropriate level at which they should be set⁴³.

Other measures to support investment in renewable energy include a biofuel obligation; capital subsidies and grants; and tax credits⁴⁴. The previous Government had also developed strategic plans for various low carbon investments including biomass and innovative energy technologies. These are likely to be revised under the new Government, which has already introduced a new roadmap for smart meter deployment⁴⁵ and launched a large EV trial.

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³⁸ Energy Investment in Housing – Estonia, Mirja Adler, Head of Housing, KredEx, 21/5/2010

³⁹ REN21 (2010) Renewables 2010: Global Status Report

⁴⁰ Estonia Renewable Energy Factsheet, 23 January 2008, European Commission

⁴¹ IEA policies and measures database:

<http://www.iea.org/textbase/pm/?mode=re&id=4262&action=detail> currency converted from EEK 27 July 2011

⁴² IEA policies and measures database: <http://www.iea.org/textbase/pm/?mode=re&id=4262&action=detail> and discussion with the Estonian Renewable Energy Association

⁴³ <http://www.bloomberg.com/news/2011-04-26/estonia-plans-to-retain-green-energy-subsidies-analyse-effects.html>

⁴⁴ REN21 (2010) Renewables 2010: Global Status Report

⁴⁵ Discussion with Estonian Renewable Energy Association

EU funding

For the period 2007–2013 Estonia was allocated €3.4 billion via EU Structural Funds – almost double what it received in the previous EU budget period. These funds will be allocated to four priority areas: environment; transport infrastructure; research and development (R&D) and innovation; and training and education. The environment is the main priority – receiving €1.2 billion of the total funds. R&D and innovation will receive over €822 million, which includes spending on energy and environmental protection. In addition to these priorities, small and medium-sized enterprises (SMEs) will receive €194 million. Since ICT is so well developed in Estonia it will only receive €74 million Structural Funds⁴⁶. Of particular interest is the fact Estonia has pioneered the use of some of these Structural Funds for energy efficiency investments in households.

Kredex

Overview of structure – Estonia does not have a public bank. It does, however, have a state-owned credit and export guarantee fund KredEx – which was founded by the Ministry of Economic Affairs and Communications in 2001. It was established as a foundation governed by private law and operates in the public interest according to State policies. KredEx is a not-for-profit entity, however under the State Support of Enterprise and State Loan Guarantees Act, sureties and guarantees issued by KredEx are backed by a full and explicit State guarantee⁴⁷. Its main purpose is to:

- > Enhance the credit-worthiness of Estonian companies and assist them in raising finance;
- > Support Estonian companies expanding into overseas market; and
- > Support the upgrade and renovation of domestic housing including energy efficiency.

It does this through a self-sustaining guarantee fund which provides: business loan guarantees; mezzanine financing; long term funding for commercial banks; housing financing and loan guarantees; and export guarantees.

As of 1st July 2010, the export guarantee side of KredEx was spun off to form a new company: KredEx Credit Insurance Ltd. This has allowed it to expand the range of services it offers. This change was initiated in response to the financial crisis. During this time international insurance companies were withdrawing from providing political and credit risk insurance for investment in Estonia to focus on core markets that they perceived to be less risky. As a state foundation, KredEx was not able to offer guarantees to exports from Estonia purchased within the EU – which represented 70 percent of the market. KredEx Credit Insurance Ltd was set up to fill the gap and provide broader export guarantees: demand has

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⁴⁶ European Cohesion Policy in Estonia, 2009

http://ec.europa.eu/regional_policy/sources/docgener/informat/country2009/et_en.pdf

⁴⁷ Unless otherwise stated, information in this section from KredEx Annual Report, 2010

been high. As a fully licensed commercial organisation KredEx Credit Insurance Ltd has more operational freedom than Kredex itself – but because it was set up by the State, its guiding principle for operation remains the long-term interests of Estonia. Since 2001, export insurance by KredEx was 3.2 billion kroons (€204.5 million), whereas in the first 6 months of operation KredEx Credit Insurance Ltd provided 1.9 billion kroons (€121.4 million).

KredEx now consists of the two remaining divisions: one focusing on enterprises and one on housing. There is also the Climate and Energy Agency (KENA), which has only recently moved to KredEx from the Ministry, and is also going to be reorganised. In June 2010 the plan was to transfer the strategic element of this agency's work to the Estonian Development Fund since the Fund already has the strategic remit of focusing on determining the broad direction of development that Estonia should take.

KredEx is also involved in developing pilot EV infrastructure: 507 Mitsubishi i-Miev EVs have been sourced as part of a GIS arrangement with Japan. These are to be trialled by local authorities – and Kredex has been tasked with managing the tender process through which the charging infrastructure will be procured⁴⁸.

Operation and role in the financial crisis – KredEx is accountable to the Ministry of Economic Affairs and Communications, which sets its strategic direction according to state policies, but within this broad remit it operates independently. It is a small institution compared to the public banks of Germany, Spain, France or Poland and is run by a Council consisting of five members and a Board consisting of one person – the Chief Executive Officer. The Council includes at least one representative from the Ministry of Economic Affairs and Communication and one from the Ministry of Finance and gives approval for all projects valued over 12 million kroons (~€767,000). As a not-for-profit fund, KredEx receives funding from the State but also from the European Structural Funds.

In order to provide support for Estonian companies, KredEx provides guarantees and subordinated loans as well as providing loans via intermediary banks. From 2009, KredEx widened the range of services it offered to support exporting enterprises – and began to provide subordinated loans and loans via intermediary banks to exporting companies as well. In 2009 it also provided direct co-finance via loans as well as favourable credit lines. Although the credit lines soon ran out, loans have continued; guarantee volumes have risen slightly during 2009–2010 (see Table 2)⁴⁹.

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⁴⁸ Kredex will also manage disbursement of direct 50 percent grants to car purchasers, worth up to €18,000 each

⁴⁹ Presentation by KredEx to E3G – 22 June 2011

Table 2. Guarantees issued by Kredex during 2009–2010.

Guarantees issued (€m)	2009	2010	% change
Business loan guarantees	51.4	67.4	31.1%
Export guarantees	21.4	7.4	-65.4%
Housing loan guarantees	8.2	6.2	-24.4%
Loan guarantees to apartment associations	1.6	2.2	37.5%
Total	82.7	83.3	0.7%

The fall in export guarantees provided by Kredex is largely attributable to the transfer of operations to KredEx Credit Insurance Ltd. A fall in housing loans and rise in business loans is reflects Estonia's economic recovery. The loan guarantees issued to businesses leveraged a further €161 million in loans⁵⁰. The State also increased the limit for enterprise guarantees to 2 billion kroons (€127.8 million) up from 1.5 billion kroons (€95.8 million), due to increased demand resulting from amendment of the State Support of Enterprise and State Loan Guarantees Act.

KredEx also works in cooperation with other international bodies. For example it signed a Memorandum of Understanding in 2007 with KfW Bankengruppe (Germany), BGK (Poland) and Hipotēku banka (Latvia) on the structuring and implementation of large financing programmes to promote energy efficiency in housing for which KfW Bankengruppe provided advice⁵¹. KredEx is also part of the Urb.Energy project – 'a transnational cooperation project' partly financed by the EU as part of the 2007–2013 Baltic Sea Programme. The project was established in 2009 and will run until 2012. Its aim is to promote sustainable energy efficient urban development in residential areas, including modernisation of the energy supply and identification of innovative financial instruments to support the development⁵².

Estonia, like most EU countries, was hit heavily during the recession and KredEx was called on to increase the volume of guarantees and support provided to Estonian companies to carry them through the crisis. The need for such guarantees has continued to increase in 2010 due to the enhanced risk awareness of financial institutions. In 2010, KredEx made its first loss of 6.4 million kroons (€411,000) against a profit of 15.6 million kroons (€994,000) in 2009. It has a balance sheet of 3.6 billion kroons (€232 million), which rose from 3.2 billion kroons (€204 million) in 2009. In 2010 6.7 percent of loans issued to business enterprises were guaranteed by KredEx alongside 10.4 percent of housing loans.

Kredex and climate change – In terms of low carbon finance, KredEx is most notable for the support it provides for energy efficiency retrofits to housing. It provides loans and loan

⁵⁰ Presentation by KredEx to E3G – 22 June 2011

⁵¹ KfW Press Release: Enormous potential: energy efficiency and climate protection in the housing sector in Central and Eastern Europe, 4 July 2007

⁵² <http://urbenergy.net/9.0.html>

guarantees as well as grants towards the costs of renovation, efficiency audits and evaluations.

- > Guarantees for household loans, including for retrofits but also mortgages, are used to reduce the amount of equity that individual householders must provide. Guarantees worth up to 75 percent of a loan amount are also provided to entire apartment buildings undertaking efficiency improvements. In 2010, the volume of energy efficiency-related KredEx guarantees was €2.2 million – up from €1.6 million in 2009. Loans equalled €39.9 million in 2010, down from €40.4 million in 2009⁵³.
- > Since 2003 KredEx has also supported energy efficiency through a grant scheme that provided up to 50 percent of the costs of energy audits/technical advice. During 2003–2007 3,800 buildings benefitted and €1.4 million in grants was awarded. Grants were also provided for up to 10 percent of the costs of renovation and supported 3,200 buildings with €11 million disbursed. However funding was limited, only available for single works and the grant only came after payments were made.
- > KredEx also runs well-funded media campaigns to promote awareness of energy efficiency and to encourage householders to invest in such renovations.

In 2010, Estonia became the first country to successfully channel Structural Funds into the renovation of apartment buildings. The Structural Funds supplied 266 million kroon (€17 million); an additional 500 million kroon (€32 million) was provided by the State via a guarantee. This created a fund valued at 766 million kroon (€49 million) that was used to provide low interest loans via two commercial banks – Swedbank and SEB Estonia. Loans from the fund to the banks last for 20 years, with credit risk taken by the banks. Typically loans are used to finance investment in insulation and heating systems. A mandatory energy audit is prerequisite for obtaining the loan to finance the renovations. The advantages of this approach compared to the loans that are traditionally provided are⁵⁴:

- > Maturity is longer at 20 years compared to an average of 11.8 years;
- > Interest rates are lower (typically 4.3–4.8 percent compared to 7–10 percent);
- > Rates are fixed for longer periods (10 years compared to 5 years or variable rates); and
- > Contract fees are lower (0.5 percent–0.75 percent compared to 1 percent).

The scheme began in June 2009 and in June 2011 252 contracts had been signed with multi-apartment buildings to a value of €20 million. Average energy savings were 33.4 percent⁵⁵.

In 2010 Kredex also played a key role in Estonia's first sale of AAUs (carbon emission reduction permits) under a GIS to Luxembourg. This provided an additional 470 million

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⁵³ Discussion with Kredex

⁵⁴ Presentation by KredEx to E3G – 22 June 2011

⁵⁵ Presentation by KredEx to E3G – 22 June 2011

kroons (€30 million) to support housing energy efficiency retrofits. The funds provided grants worth up to 35 percent of the cost of the work, plus low-interest loans. The level of the grant depends on the achievement of specified levels of energy savings. In 2010, six grants to the value of 652,300 kroons (€41,682) were made. The energy audits/evaluations were funded separately by capital sourced from the Structural Funds.

European Investment Bank

During 2006–2010 the EIB provided loans in Estonia totalling €1 billion. Investments in infrastructure and the transport network, supporting important EU cohesion and convergence objectives, were the most significant sectors. The EIB also part-financed major investments in the power grid and electricity generation. The most important EIB projects in Estonia were loans for financing public sector investments in infrastructure, transport, water and sewerage. These loans varied substantially from year to year. The EIB supported the Estlink power transmission cable from Estonia to Finland. It also provided loans for the modernisation and expansion of Tallinn harbour, which involved improving the road network around Tallinn and strengthening the maritime link with Finland through the acquisition of two cargo and passenger-carrying ferries. Loans to SMEs were channelled through commercial banks⁵⁶.

Commercial banks

Since independence most Estonian banks have been taken over by Scandinavian banks: for example, Hansa Bank, the largest bank in the Baltics, was taken over by Swedbank. As a result the banking sector has been fully commercialised and this has helped support growth and development in the economy. The banks work closely with KredEx in areas such as energy efficiency investment: as mentioned, Swedbank and SEB Estonia disburse loans for retrofits (backed by EU Structural Funding and KredEx guarantees). SEB Estonia has also provided around 40 percent of total wind market financing to date and around 50 percent of the financing that has gone to CHP plant.

Other leading banks include the Nordic banks – Danske Bank and DnB Nord Bank – as well as the Tallinn Business Bank and retail focused Eesti Krediidipank, which are both Estonian.

Many of the Nordic financial groups (for example Danske Capital and Swedbank Investeerimisfondid) also have asset management arms active in Estonia. Other investors include Avaron Asset Management and Trigon Capital – a Scandinavian-owned investment bank and asset manager with over \$1 billion under management. The Nordic Environment Finance Corporation (NEFCO) an international finance institution established by Denmark, Finland, Iceland, Norway and Sweden has also financed a large number of environmental projects in the region.

⁵⁶ European Investment Bank website July 2011 <http://www.eib.org/projects/publications/the-eib-in-estonia-in-2010.htm>

from populations that might object to the development of wind farms⁵⁹. (While the Estonian population is small, it is also widely distributed.)

Estonia has significant forestry resources – half of Estonia’s land mass is covered in forest – and a large agricultural sector. Estonia has capitalised on the existence of these natural resources and focused on developing biomass co-firing as a means of reducing emissions from oil shale power generation but also from CHP used for district heating. However, the two main sources of biomass are waste wood products and peat. Use of peat is almost as prevalent as wood. But while wood is carbon neutral and regulations exist to promote the sustainable use of forest resources, peat is not. There have been some attempts to reduce emissions from the capture of ash which traps up to 10 percent of released CO₂, but CO₂ emissions from burning peat are 5 percent higher than from lignite, 12 percent higher than coal and 89 percent higher than gas – even before the additional emissions from extraction and environmental destruction are taken into account⁶⁰. The extraction of peat causes significant biodiversity losses and release of methane. As demand for biomass rises, sourcing it sustainably may prove increasingly difficult.

Solar PV and concentrated solar thermal are also challenged by the Estonian environment. The level of solar irradiation – particularly during the winter when the shortest day is 6 hours – is too low to make solar a truly viable option currently, although there are some solar PV pilot programmes running in the south of the country. Finally, the Baltic Sea has a low tidal range, regularly freezes during the winter and so is not suitable for marine power generation.

One foreign investor in Estonia did comment, however, that there were other significant untapped renewable energy opportunities – particularly biomethane from the farming sector. These views were echoed by Estonia’s Renewable Energy Association, which felt that there was a potential for 300–400 GWh⁶¹. Some support for this sector is already available in the form of grants, but biomethane faces significant barriers. Technology costs are high compared to the financial support available and grid reinforcement in rural areas is needed to see this technology take off at scale.

Energy efficiency – Although the renewable energy sector faces significant challenges in Estonia, the outlook for energy efficiency investment is much better. A combination of Estonia’s legacy of old inefficient apartment buildings and extreme winter temperatures means that Estonia’s Government is particularly keen to support energy efficiency retrofitting. KredEx has successfully combined various sources of finance – from GIS, State loan guarantees and EU Structural Funds – to support energy efficiency investment. Current rates of renovation are – in common with many other Member States – low. As previously stated, 3,800 buildings had received grants under the original KredEx grant scheme – and

⁵⁹ <http://news.err.ee/environment/cf3a74b8-6b2f-4383-be09-63fd870ff077>

⁶⁰ Analysis of data from 2006 IPCC Guidelines for National Greenhouse Gas Inventories

⁶¹ Discussion with KredEx

since 2009 252 contracts have been signed with multi-apartment buildings in which 75 percent of the population live. Yet as of the last census in 2000 there were 197,694 buildings of which 21,277 were apartment buildings⁶². Existing renovations therefore cover 1.9 percent of properties, whereas renovation rates need to be over 2 percent per annum to achieve retrofits by 2050. Whilst activity to date has focused on apartment buildings – activity is likely to enter a new phase in 2011/2012 and cover private homes and larger industrial players. Again, renovation rates will need to be high to achieve targets.

Lack of incentive to shift away from oil shale – Like all EU countries, energy security is a key issue for Estonia, especially in an era of rising oil prices. Estonia is unusual in being almost entirely reliant on oil shale for electricity generation. Current oil shale reserves are estimated to provide around another 15 years of power generation. However this is only a fraction of known resources: only half of the full potential of Estonia’s oil shale has been explored⁶³. The State has considered an IPO for Eesti Energia, however, such plans are on hold at present. If it does proceed it seems likely that there would be interest from foreign utilities keen to exploit Eesti Energia’s expertise in oil shale power production – as it owns the world’s largest oil shale power plant. The value of this expertise and the availability of reserves act as powerful disincentives for Eesti Energy to diversify too far away from oil shale – and runs counter to the achievement of Estonia’s low carbon ambitions.

4. Conclusion

Estonia has reaped the benefits of EU membership from modernising its economy in compliance with EU Directives to attracting significant sums of FDI. In contrast to other CEE states such as Poland it has not let its reliance on oil shale prevent it from setting strong emissions reduction and renewable energy targets. It is now working on the full implementation of these targets. But, despite the great efforts made thus far, it will be challenging for Estonia to ensure that the generation capacity that comes offline in 2016 is replaced by fully low carbon generation. Estonia faces some very difficult issues in terms of reconciling energy security and climate change. The increased use of gas for electricity generation would reduce carbon emissions from the sector – but also increase dependency on Russia, something Estonia is not overly keen to do. At present the view seems to be that more efficient oil shale co-fired with biomass represents the least cost option that would reduce existing emissions – a new €1 billion plant of this type was announced in late June 2011⁶⁴. However, this will lock Estonia in to a longer term dependency on oil shale. Carbon

⁶² A new census is underway in 2011 but results were not ready at time of going to press. 2000 data here: <http://www.stat.ee/26266>. See ‘Dwellings and Buildings Containing Dwellings’

⁶³ Discussion with the Ministry of Economic Affairs and Communications, June 2011

⁶⁴ This will be delivered by a consortium led by Alstom that will proceed with the construction of up to 600 MW of new power generation capacity. Despite this, there is uncertainty over how it will be financed: one option being explored is partial financing of new plants by granting Eesti Energia free EUAs in Phase 3 of the EU ETS (2013–2020). Discussion with the Estonian Renewable Energy Association and with Eesti Energia

capture and storage could be considered but is not currently on the Estonian Government's agenda.

One area where greater investment in renewables may have a very positive trade-off for Estonia is in the development of the smart grid technology needed to underpin scaled up renewables deployment across Europe. Estonia excels in ICT (this grew out of a soviet-era legacy of high number of students proficient in science, maths and engineering). Estonian retail banks, for example, are amongst the most sophisticated in terms of online support services and Skype was developed in Estonia. These technical skills combined with Estonia's small size could make it an ideal test-bed for smart grid technologies. A step in this direction has already been taken as the Government has introduced legislation whereby all businesses must have smart meters by 2013 and all households by 2017. Further localised initiatives are also underway⁶⁵.

Some steps may be made in this direction with EV trials. Estonia's concentrated population centres (the major cities of Tallinn and Tatu hold 28 percent and 7 percent⁶⁶ of the Estonian population, respectively) make it an ideal country in which to test for the role EVs could play in balancing the electricity system as a form of power storage. There will be further technical challenges to overcome, however. While the city of Tallinn will make an excellent pilot area, wider expansion will have to overcome an extremely diverse distribution network with over 40 network operators – a legacy of the privatisation of local collective farms and recent boom in housing development. There are rumours that the Government is to set a target of 10,000 EVs for 2020. While this would be helpful in demonstrating the feasibility of balancing large numbers of EVs on the electricity grid, with the current electricity generation fuel mix this would increase not decrease Estonia's GHG emissions since the lifecycle emissions of EVs would be more than those for the petrol alternatives. Efforts to decarbonise electricity generation must therefore run concurrently with any such initiatives.

But EV's will at best only partly solve the balancing issues – which are significant for Estonia's relatively small electricity grid. Grid balancing was a key barrier identified by one financier to significantly scaling up renewable energy capacity. They noted that at around 400 MW to 500 MW, energy storage capacity in Estonia is much lower than needed to manage the large number of renewables coming onto the system. It was suggested that wind power

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65For example, the island of Vormsi is aiming to become energy independent in the next few years and has launched a 'Smart Vormsi' project for its ~200 inhabitants which would include dynamic demand type technologies. In addition the developers of a €200 million sustainable homes and business development between Tallinn and Rapla – Oxford Park – are intending to include a smart grid with an intelligent grid system and smart meters. These could serve as useful pilots, however, the latter is to start construction in 2011 and will take 10 years <http://news.err.ee/Sci-Tech/1cd980f0-a036-4c08-9741-feccb3102440>
<http://tallinnnews.wordpress.com/2011/04/23/smart-grid-technology-planned-for-240m-oxford-park-community-in-estonia/>

⁶⁶ Analysis of 2000 census data: <http://www.stat.ee/26266>. See 'Population de facto and Usual Resident Population, Location of the Population, Population Sex and Age Structure.' Estonian population: 1,439,197; Tallinn: 400,378; Tartu: 101,160. 2011 update underway but not ready at time of press

generation due to come online in the next few years will only make a return if Estonia builds out further interconnections to Scandinavia.

A further conundrum is around the liberalisation of the Estonian energy industry. Some efforts have been made in this area. When Estonia joined the EU it was required to liberalise prices for some large industrial companies in 2009 and the rest of the market by 2013. Around a third of the market has been liberalised and prices are around 20 percent higher for these customers⁶⁷. Liberalisation affected larger customers only (those that use $\geq 2\text{GWhr/year}$ such as supermarkets and industrial companies). Household prices remain regulated and are low compared to the rest of the EU. For example during Q2 2009 electricity prices for households were the second lowest in Europe⁶⁸. Industrial prices were closer to the average but still relatively low compared to other Member States⁶⁹. Further deregulation of the energy sector and/or liberalisation of energy prices is needed to support new competition which otherwise could not compete with the artificially low prices. However, this would leave Estonia exposed to the significant entrance and influence of Russian players – something the Estonia Government is keen to avoid.

While greater connectivity to Russia could represent a threat to achieving environmental objectives (as Russian generators are not subject to the same carbon constraints as EU-based generators), connection to the Baltic electricity grid and wider European network as it expands could represent an opportunity for Estonia to buy electricity that has been produced and decarbonised elsewhere. Estonia has formally announced its support for a common EU energy market along with the other Baltic states – and Estonia could for example benefit from new low carbon electricity sourced from Lithuanian nuclear plant. But this seemingly neat solution is offset by the downside caused by potential job losses at Eesti Energia – which is the largest employer in Estonia⁷⁰ and a significant exporter of power in the Baltic region.

The Estonian example serves to underline the weaknesses of a fragmented Member State-based approach to implementing policies, and the benefits of taking a Europe-wide approach. But it also underlines the need to financially compensate their Member States for losses to their economic losses in the name of a common European environmental good.

⁶⁷ Discussion with Ministry of Economic Affairs and Communications, June 2011

⁶⁸ 9.2€/100kWh (including all taxes) compared to the European average of 16.4€/100kWh across the EU. Only Bulgarian prices were lower

⁶⁹ For electricity Estonia charged 6.5€/100kWh compared to an EU average of 10.2€/100kWh. Natural gas prices for households were 10.1€/GJ compared to an EU average: of 14.7€/GJ) and for industry were 6.4€/GJ compared to an EU average of 8.2€/GJ. Energy, transport and environment indicators, Eurostat, 2010 edition, February 2011

⁷⁰ See website: <https://www.energia.ee/en/about/work/start>