Esivere and Virtsu II Wind Power Developments
Project Design Document (PDD)

Prepared by

ECON Analysis,

For OÜ Roheline Ring

Final Version

Updated 8th March 2005

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A General Project Description

A 1 PROJECT IDENTIFICATION

Title of the project activity : Esivere and Virtsu II Wind Power Developments

Applicant: OÜ Roheline Ring

Date of submission: 8th March 2005

A 2 GENERAL INFORMATION

A 2.1 General information	
Project name	Esivere and Virtsu II Wind Power Developments
Project type	Reduction
Description of the project activity and its purpose	The proposed project activity is the development of a 8 MW installed capacity (4 turbines at 2MW each) wind power project at the Esivere location in Hanila municipality of Estonia. A separate development is proposed at Virtsu close to the existing turbines operated by OÜ Roheline Ring, composed of 6MW installed capacity (3 x 2MW turbines). Based on the measured wind data, net annual energy production of the Esivere project is estimated at 20 659 MWh and the Virtsu II project at 15 978 MWh. The renewable electricity produced by the wind power plants will displace carbon intensive electricity produced from fossil fuel sources in the Estonian grid.
Description of the background to the project	The two wind power projects have been under development for several years and they rely on the experience and operational synergies of Roheline Ring gained from the development and co-ownership of the nearby Virtsu 1,8 MW Wind Farm. The latter was commissioned in autumn 2002 in cooperation with national electricity utility Eesti Energia AS and with financial support from the German government and has remained the only modern wind power plant in Estonia as of today. The project supports Estonia's goals under the Long Term Development Plan for Estonian Fuel and Energy Sector for the promotion of the renewable energy sector. In line with the EU RES directive Estonia's goal is to reach a 5,1% share of renewable electricity in final electricity consumption by year 2010. This is assisted by the Electricity Market Act, adopted in early 2003, that sets out the framework for further harmonisation with EU market such as ongoing liberalisation and wider use of renewables incl. an obligatory purchase of electricity generated from renewable sources The wind energy sector in Estonia is small but showing signs of some growth. However, due to the principal barrier being the low rate of return due to the low feed-in tariff, no large scale projects have been developed in Estonia without the JI intervention. As Estonia has a favourable investment climate, and a support mechanism (albeit insufficient for a commercial return) there has been some interest in developing wind

	projects. However, it is unlikely that future projects will proceed without further financial interventions such as Joint Implementation (JI).

A 2.2 Category(ies) of project activity	
Project category	Construction (or retrofitting) of generating plants operated with renewable energy sources (especially wind power plants, biogas or biomass combined heat and power plants as well as hydroelectric power plants);

A 2.3 Greenhouse gases	
Greenhouse gases reduced by the project	x CO_2

A 3 PROJECT PARTICIPANTS

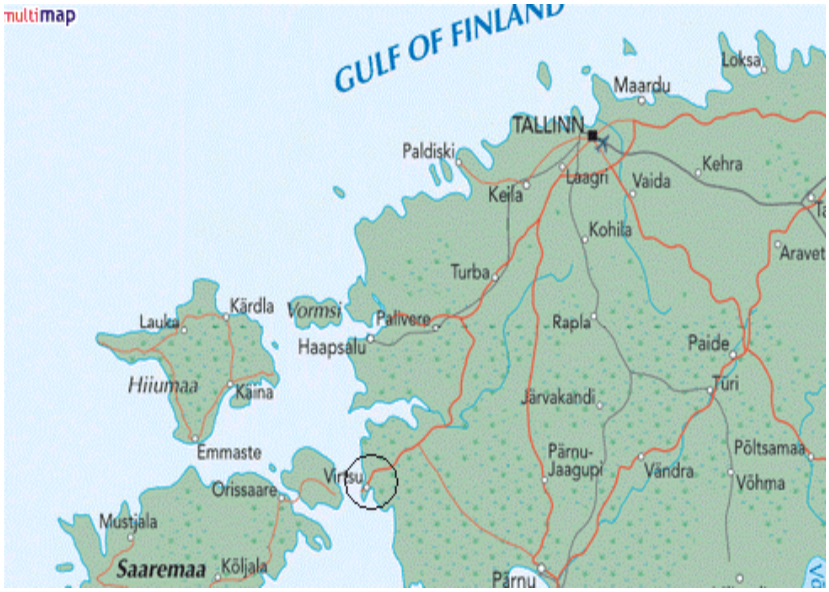
A 3.1 Applicant	
Name	OÜ Roheline Ring
Type of organisation	Private enterprise
Other functions of Applicant within the project	Sponsor
Main activities, knowledge and experience	Wind power project development, operation and management.
Address	Ringtee 14, 93815 Kuressaare, ESTONIA
Phone/fax	Phone + 372 45 21084 Fax + 372 45 21081
E-mail	Tullio.liblik@tt.ee
Contact person	Tullio Liblik, Member of Management Board

A 3.2 Project developer	
Name	As above

A 3.3 Other project participants	
Name of the project participant	ECON Analysis a.s. is retained as a technical advisor to the project, and is not formally a project participant.
Type of organization	x Private enterprise
Function within the project	x Technical consultant (environmental finance advisor)
Name of contact person	Ash Sharma, Project Manager
Address	18 Rue de la Perle, 75003 Paris, FRANCE
Phone/fax	Tel +33 1 44 61 97 24, Mob +33 6 60 79 55 00 Fax +33 1 48 87 44 82
E-mail	ash.sharma@econ.fr

A 4 LOCATION OF THE PROJECT ACTIVITY

A 4.1 Host Country	
Host Country Party(ies)	Estonia
Region/State/Province etc.	Hanila Municipality
City/Town/Community etc.	Esivere and Virtsu

A 4.2 Location of the project activity	
Detail of physical location, including information allowing the unique identification of this project activity	The projects are located at the western coast of Estonia at Hanila municipality, shown in large scale above and in relation to the national grid in the Appendix. The sites meet all prerequisites for successful wind power generation – good wind conditions, nearby technical infrastructure (grid, roads, port) and no environmental or other restrictions. 
Is the location in a nature reserve?	x Yes (Virtsu 2 is Natura 2000 area, see chapter on EIA for further details) (Esivere is not located in a nature reserve)
Will the project have effects on residents?	See EIA sections.

A 5 SCHEDULE

A 5.1 Schedule	
Starting date of the project activity[1] ***(CDM-PDD C.1.1.)***	Expected construction activity to commence Q2 2005 for Esivere, and Q1 2006 for Virtsu II project.
Construction period	6 months
Construction phases	See Business Plan for milestones.
Date of commissioning	October 1 2005 (Esivere) , June 1 2006 (Virtsu II)
Expected operational lifetime of the project activity	20 years

A 5.2 Choice of the Crediting Period	
JI projects	Starting date of the Crediting Period (Esivere) : 1st October 2005 Duration of the Crediting Period: 7 years, 3 months

[1] The starting date of a project activity is the date on which the implementation or construction or real action of a project activity begins.

A 6 TECHNICAL DESCRIPTION OF THE PROJECT

A 6.1 Technology to be employed by the project activity	
Project technology used and listing of all measures	The projects foresee erection of 4 units of ENERCON E-70 2000 kW at Esivere site and 3 units of the same ENERCON E-70 2000 kW at Virtsu II site. Both sites are located at the western coast of Estonia at Esivere municipality and they meet all prerequisites for successful wind power generation – good wind conditions, nearby technical infrastructure (grid, roads, port) and no environmental or other restrictions. See location maps and layouts of the wind farms enclosed to PDD. The project will employ state of the art wind turbine technology from one of the world's foremost equipment suppliers, ENERCON. The E70 2000 kW wind energy converter has 85 m hub height steel tower and a 71m rotor diameter designed for high wind speeds. For further information on the technology please refer to the technical data sheet attached. For further information on the supplier and the E70 product, visit www.enercon.de The chosen wind turbines are well suited for the site's wind conditions as they enable to maximise the green electricity output from the site and to benefit from economies of scale as ENERCON is also servicing three E-44 wind turbines at the nearby Virtsu I site. In order to determine the best possible location for the wind turbines within the site, computer programme WindPRO has been used to optimise the location, taking determinants such as wind speed distribution, wind turbine characteristics, terrain characteristics as well as noise and shadow limits into consideration. An energy production estimate has been completed by ENERCON based on long-term wind measurements at site (at two locations) and detailed modelling using computer software WindPRO. Also operating experience form the existing Virtsu I wind farm provides additional security for the energy production estimate. Wind conditions of the site can be compared with the wind conditions of good wind sites in other European countries. Based on the measured wind data, net annual energy production of the Esivere project is estimated at 20,659 MWh and the Virtsu II project at 15,978 MWh. Conditions for grid connection to a nearby 110 kV substations have been agreed with Eesti Energia Main Grid business unit. According to law Eesti Energia is obliged to provide grid interconnection if adequate capacity exists on the grid. Rights to grid interconnection and sales of electricity will be secured in accordance with legislation and by conclusion of the following agreements with Eesti Energia: Grid Connection Agreement, Network Agreement and Power Purchase Agreement. Negotiations with ENERCON for the delivery of wind turbines have been finalized. The wind turbine supplier will be contracted to construct the wind turbine generators on a fixed-priced basis, according to an EPC contract. Local civil construction companies will be sub-contracted for construction of project infrastructure. Technical operation and maintenance of the wind farms will be taken care of by ENERCON in cooperation with OÜ Roheline Ring. The expected technical lifetime of the wind turbines is 20 years.

A 7 ECONOMIC AND LEGAL ASPECTS

A 7.1 Economic aspects	
Public funding of the project activity	A grant of EEK 5 million has been secured from the Estonian Environmental Investment Centre (EIC). EIC is a public body with the following main activities: - Using the money gained from the usage of environment to the development of national environmental projects, - Filling the assignment of the Implementing Agency for the European Union ISPA (Instrument for Structural Policies for pre-Accession) funding, - The arrangement to give for environment sub-loans that have already been taken by the Republic of Estonia from foreign banks. For more information see www.kik.ee
Economic viability	Not for public disclosure – see Business Plan.
Indicative offer price for emission reductions (ERUs/CERs)	Not for public disclosure – see Business Plan.

A 7.2 Legal aspects	
Status of the official approval process in the Host Country	Estonia has signed and ratified the Kyoto Protocol

B Ecological, Socio-Economic and Development Aspects

B 1 Ecological Effects of the Project during Construction

B 1.1 Environmental effects during construction	
Environmental effects during construction	There may be some environmental impacts relating to noise and dust emissions due to the construction works at the site and transportation, but these are likely to be small given the scale and the short time of the activity. No significant waste, water or pollution impacts are anticipated. All construction activity will be carried out in accordance with local environmental regulations.

B 2 Ecological Effects during the Project Lifetime

A full-scale Environmental Impact Assessment (EIA) has been carried out for both projects in 2003-4. The following paragraphs give an overview of the legislative framework for EIA and main environmental effects and mitigation measures of the Esivere and Virtsu2 wind farm projects.

Both EIAs were carried out by an independent expert company OÜ Vetepere in 2003 for the Esivere project and in 2004 for the Virtsu2 project. The EIA-s have been approved by Lääne County Regional Environmental Department which is a competent authority responsible for performing the duties of environmental supervision and post-project monitoring.

Legislative framework

In accordance with the Estonian Environmental Impact Assessment (EIA) and Environmental Auditing Act (adopted in 2000), the EIA Directive (85/337/EEC as amended by 97/11/EC) and the Decree no. 25 of the Minister of Environment of 10.05.01 "Specified list and extent of activities from which a higher environmental risk occurs" planning of wind farms does not require a mandatory Environmental Impact Assessment. A full-scale EIA is required only when predicted environmental impacts are significant - may exceed the environmental capacity of a location, cause irreversible changes to the environment, endanger directly human health or property. The Estonian EIA Act is in full conformity with respective EC Directives.

If full-scale EIA is not carried out, a specific environmental chapter of Detailed Land Use Plan or project design documentation is required, where further environmental requirements and mitigation measures should be stated according to the Planning Act. All general requirements for construction works, building materials, construction products, building design documentation and construction works, construction supervision etc are regulated by the Building Act. All construction works shall be designed and carried out according to good construction practices and pursuant to legislation concerning construction and construction design documentation, and shall not be a threat to the life, health or property of persons or to the environment. The construction works shall not be a threat to life, health or property of the occupants or other people or to the environment. The spread of noise or emission to humans, pollution of the water or soil and solid or liquid waste related to the construction works shall also be prevented.
In accordance with paragraphs 4 and 6 of the Estonian EIA Act, the local municipality may demand that a full-scale EIA is carried out for the projects.

§ 4. Scope of environmental impact assessment
(1) Environmental impact shall be assessed if construction works, use of a structure or changes in the use of an existing structure are intended which would result in a significant environmental impact and require an application to be made for the right to exploit natural resources or for a permit for release of pollutants or waste into the environment, or amendment of an existing permit.

§ 6. Significant environmental impact

(3) In addition to the provisions of subsection (2) of this section, the decision-maker is required to analyse the environmental impact in each specific case and, if necessary, declare the impact significant on the basis of the following characteristics of the activity:
1) the extent of the likely environmental impact;
2) the site and its environmental conditions;
3) the technological level, volume of waste and energy demand;
4) the probability, duration, frequency, irreversibility and effect of the likely environmental impact;
5) the extent of the possible risk.

Relying on the above paragraphs, also the municipality at which both sites are located (Hanila Municipality) considered it necessary to assess the environmental impact of Esivere and Virtsu2 wind power projects. The competent authority responsible for performing the duties of environmental supervision and post-project monitoring is Lääne County Regional Environmental Department.

A summary of the EIA reports and comments of the Lääne County Regional Environmental Department is presented in the following section.

Esivere Wind Farm

The EIA paid special attention to an impact of wind power generation to people, incl. impact from noise, visual and shadow effects. EIA also relied on the results of an EIA carried out in 2002 for a near-by Rõuste wind farm development project. The main conclusions of the EIAs are:

Wind power generation is environmental friendly as it reduces the use of non-renewable oil-shale for electricity generation and thereby reduces the emission of CO2, NOx and SO2 into atmosphere.

There are few negative impacts associated with the activity and they do not influence the environment significantly. These include:

- Some of the existing flora is destroyed,
- The rotating blades cause danger to birds,
- Temporary banning of movement in the area during wind farm construction,
- Impact on people due to noise and shadow,
- Limitation to planning of new residential areas due to noise,
- It is recommended to design the wind farm area as a low vegetation (wind) park open for the public.

Lääne County Regional Environmental Department has approved the EIA and made the following recommendations:

- In accordance with the Environmental Monitoring Act surveillance of birds prior and after the construction of the wind farm is recommended to be carried out during a period of min. 3 years in order to obtain more data on basis of which it can be decided whether mitigation measures should be taken to reduce the death of birds.

Virtsu2 (Linnamäe) Wind Farm

The EIA paid special attention to an impact of wind power generation to people, incl. impact from noise, visual and shadow effects, and to the fact that the site is located at a Natura 2000 area with limitations to economic activity.

The EIA also relied on the results of an EIA carried out in 2002 for the near-by and now existing Virtsu1 wind farm project, an EIA carried out in 2002 for the Rõuste wind farm development project, and an EIA carried out in 2003 for the Esivere wind farm project.

The main conclusions of the EIA for the Virtsu2 project are the following:

- Wind power generation is environmental friendly as it reduces the use of non-renewable oil-shale for electricity generation and thereby reduces the emission of CO2, NOx and SO2 into atmosphere

- It is recommended to design the wind farm area as a low vegetation (wind) park open for the public.
- Despite of the fact that it is a Natura area (valuable area of junipers) there is no need to block establishment of the wind farm due to reasons of vegetation protection as the micrositing of wind turbines has been carried out to minimize the impact on vegetation
- Due to the fact that the preliminary bird surveillance data indicates that there exists no negative environmental impact on birds, it is possible to erect turbines at the Linnamäe site but only on a condition that the surveillance is continued. If negative indications occur during surveillance specialists should be consulted who would give concrete recommendations for e.g. stopping of wind turbines at special cases
- The given Natura 2000 area is more suitable as a 'preservation' area (not 'protection area') as utilization of wind power is in line with the principles of sustainable development that are also foreseen in the 'preservation' area strategy
- The activity results in a few environmental impacts and they do not influence the surrounding nature significantly
- Possible locations of wind farms are foreseen in the General Plan of Hanila Municipality that should be followed when planning new wind farms
- Wind power at the Western coast of Estonia requires a development plan and theme planning. This also presupposes start of surveillance of the biological diversity (esp. birds) at planned wind farm areas.

Lääne County Regional Environmental Department has approved the EIA report at the following conditions:

- During wind farm construction and operation it is strictly prohibited to damage in any way the growth area of the Orchis ustulata plant (protection class II plant)
- Protection class III plants (harilik käoraamat) at the foundation and temporary construction site of the left wind turbine at Risti-Virtsu highway should be replanted at the same land-unit to another suitable location. If necessary the help of relevant specialists should be used and replanting should be based on the relevant governmental decree
- The wind farm roads and underground cables should be designed in a way not damaging the plants that are under protection
- The roads network should be designed in a way to facilitate usage of the wind farm as an open nature park. Also directional movement of people should be guaranteed if possible by using the existing roads.
- The area should be taken care of by mowing carried out at least once a year or by cattle at the site. Mowing can be carried out starting from July.
- Bird surveillance should be carried out. If negative indications occur during surveillance ornithologists should be consulted who would give concrete recommendations for solving the problem and if necessary stopping of wind turbines until the emergency situation has passed.
- Construction of wind turbines and roads can start only after the end of the bird migration and nesting period

All documentation concerning environmental impact assessment (in Estonian) and noise and shadow calculations of both wind farms is available upon request.

B 3 SOCIO-ECONOMIC AND DEVELOPMENT ASPECTS

Creation of new jobs by the project	An experienced service team consisting of 3 -4 skilled electrical and mechanical personnel some of which already taking care of the Virtsu I ENERCON turbines will be used also for the two new projects The service team consists of ENERCON specialists from Germany and Latvia and local specialists hired by OÜ Roheline Ring. The local service personnel will obtain further training at ENERCON's facilities and on site training guided by experienced ENERCON personnel. Additionally, in the construction and commissioning phase, more significant employment creation is expected through sub-contract opportunities for local firms.
Other Impacts	See Section B4.2

B 4 ADDITIONALITY AND SUSTAINABILITY

B 4.1 Additionality	
Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances	Additionality of the project is shown using the Tool for the Demonstration and Assessment of Additionality as approved by the CDM Executive Board, and as used in ACM0002. Please refer to the Baseline Study for the detailed application of the additionality tool. The Business Plan demonstrates that, given investor requirements and the risks associated with this project, a higher tariff would be required to make the project financially viable if it were not an accredited JI project. This tariff is substantially higher than the feed-in tariff available until 2015, and the gap is even greater compared to potential prices post-2015. (see Business Plan for detail on all costs and revenue assumptions in the financial analysis and sensitivity analysis). Emission reductions generated by this project are as following: Esivere: Total AAUs 2005-2007: 48 579 Total ERUs 2008-2012: 107 953 Total 2005-2012: 156 532 Virtsu II: Total AAUs 2005-2007: 25 047 Total ERUs 2008-2012: 83 491 Total 2005-2012: 108 538

B 4.2 Sustainability	
Summarising description of the project's contribution to the sustainable development of the Host Country	The project meets a number of environmental, economic and social development objectives in Estonia as previously outlined. • In economic terms, the project brings capital investment, tax income, technical skills and technology transfer to the region. • The project offers the opportunity to diversify away from Estonian reliance on fossil fuels, thereby meeting its international climate change obligations and increasing security of local energy supply. It is fully consistent with the National Fuel and Energy Development Plan, National Environmental Strategy, Electricity Market Act etc. • The further development of modern wind farms would also enable the reduction of network losses and improve the quality of electricity in rural areas of Estonia • It will contribute to the improved understanding of cost reduction opportunities in the wind sector with a consequent impact on international research and development in this sector. • As the project is 100% Estonian owned, it is a demonstration of Estonian business acumen and entrepreneurship. • The environmental benefits have been outlined in terms of global impacts through climate change mitigation, local air pollution impacts in Estonia through displacement of polluting fossil fuels. Other environmental impacts can be mitigated. • In social terms, the project offers reduced risks to human health for Estonian residents and skilled job creation.

C Stakeholders' Comments

Stakeholder comments have been invited and compiled in accordance with all local planning legislation as outlined below.

Legislative framework

According to the Planning Act (effective since January 2003), the planning system in Estonia is four levels – National planning, County planning, (Municipal) Comprehensive planning and Detailed planning. On the one hand the planning system is hierarchical, i.e. the more detailed plan has to observe the more general plan. On the other – it is interactive, i.e. in case a more detailed plan requires modification of a more general plan, the necessary change comes into effect with enforcement of the more detailed plan.

The planned wind farms are in full compliance with the Comprehensive plan of the Hanila Municipality.

A Detailed plan is a plan that is prepared for a smaller part of a town municipality and is the basis for building activities in the short term. The local municipality organises the production of the plan and communication with the public during the planning process. The municipality can transfer organisation and financing of detailed planning to the owner of the land under planning or to a person interested in plan preparation with conclusion of a contract. That is common practice and this is also the case with Esivere and Virtsu2 wind farms where the Council of Hanila Municipal Government has authorized and entered into a contract with OÜ Roheline Ring and OÜ Harnington to prepare Detailed Land Use Plans for the establishment of wind farms at the chosen sites.

The preparation of the Detailed plan is public. It has to be produced in cooperation with the owners of immovable property and inhabitants of the area as well as other stakeholders. Preparation of the plan includes minimum one public discussion and a two-week public display after the adoption of the plan by the local government. In addition, the plan requires approval of corresponding sectoral authorities. Any written suggestions and comments during the public display will be answered by the local municipality, which in this case will also organise a new public discussion. Possible planning disputes will be settled by the county governor. If no objections to the plan arise during the public display, the plan will be enforced by the municipal council.

Arrangement of public discussions has to be pre-announced in the newspaper selected for official announcements by local municipality. Public meetings related to EIA and detailed land use planning can be held at the same time.

Virtsu2 wind farm stakeholder consultation

The first public discussion of the Detailed Land Use Plan was held in July 2004. The participants included Mr. Tanissaar and Mr. Peksar from local municipality, Mr. Ink from Roheline Ring OÜ, Mr. Kaseorg from Ösel Plan OÜ, and 6 private persons. Mr. Ink introduced the draft detailed land use plan of the wind farm. At first the plan was to erect 4 wind turbines but taken all demands into consideration there is room only for 3 wind turbines.

Noise and shadow calculations have been carried out. EIA is under preparation. Mr. Ink introduced technical parameters of the wind farm. No specific relevant questions were asked.

The second combined public discussion of the Detailed Land Use Plan and the Environmental Impact Assessment was held on November 18 with the following
participants: Mr. Tanissaar and Mr. Peksar from local municipality, Mr. Ink from Roheline Ring OÜ, Mr. Kaseorg from Ösel Plan OÜ and Ms. Piirsoo from Lääne County Regional Environmental Department.

No specific relevant questions were asked at the meeting.

Neither the Detailed Land Use Plan nor the EIA received any relevant comments during the public display that was arranged at the local municipality after the second meeting.

Esivere wind farm stakeholder consultation

The first public discussion of the Detailed Land Use Plan and Environmental Impact Assessment programme of Esivere Wind Farm was held in September 2003.

The meeting was attended by the wind farm developer Mr. Ink, author of the detailed land use plan from OÜ Ösel Plan Mr. Kaseorg, an EIA expert Mr. Kuusik, representative of the Lääne County Regional Environmental Department Ms. Piirsoo, representatives of the municipal government (Mr. Tanissar, Mr.Vepsi) and a self-employed wind power developer Mr. Tormis.

At the meeting Ms. Piirsoo raised concern of the depth of wind turbine foundations in relation to the limestone layer and of whether her comments to the EIA have been taken into account. Mr. Ink said that the foundation will not reach the limestone layer which was also the case with Virtsu1 wind farm. Mr. Kuusik said that they have taken the comments of Ms. Piirsoo into full account. Mr. Ink stated that wind turbine electronics registers the collision of birds with wind turbine blades and that until today no collisions have been registered or dead birds found. Experts agreed to all comments and the EIA report was accordingly supplemented.

Mr. Tanissaar stated that the airport at the wind farm area was established during World War II not World War I.

The second public discussion of the Environmental Impact Assessment report was held in October 2003. The meeting was attended by the representatives of Hanila municipality (Mr. Peksar, Mr. Tanissaar), an EIA expert Mr. Kuusik, Mr. Ink from Roheline Ring OÜ and Ms. Piirsoo from Lääne County Regional Environmental Department. Mr. Peksar informed no comments were received to the EIA during public display, interest was shown by a local person and Estonian Environmental Fund. Mr. Kuusik introduced the results of the environmental impact assessment. Ms. Piirsoo proposed that employees of North-East Estonia industrial area should not be considered as project stakeholders and that the EIA report should mention the worsening of quality of drinking water due to the activity of AS Nordkalk. Experts agreed. Ms. Piirsoo also proposed to add the site plan of the wind farm to the EIA report. Mr. Ink agreed.

Neither the Detailed Land Use Plan nor EIA of the Esivere project received any relevant comments during their public display.

All minutes of public meetings related to stakeholder consultations are available upon request.

D Baseline Study

D 1 General Information

D 1.1 Baseline information	
Name and address of person(s)/entity(ies) determining the Baseline resp. Baseline Study	ECON Analysis a.s. is retained as a technical advisor to the project, and is not formally a project participant. Author of Baseline Study – Randall Spalding-Fecher ECON, 8 Empire Avenue, Hout Bay 7806, South Africa Tel: +27 82 857 9486, Fax: +27 21 790 2584 email: spalding-fecher@tiscali.co.za
Date of completion of the Baseline Study	8 March 2005
Further detailed Baseline information	Please refer to the attached baseline study. It is not proposed to update the baseline during the life of the project.

D 2 Baseline Methodology and Scenario

D 2.1 Baseline methodology	
Is an existing Baseline methodology used or adapted for the project?	Yes: ACM0002 Consolidated baseline methodology for grid-connected electricity generation from renewable sources
Description of the selected methodology and justification of the choice of the methodology and why it is applicable to the project activity	The relevant applicability conditions of ACM0002 are as follows: "Applies to electricity capacity additions from…Wind sources… "This methodology is not applicable to project activities that involve switching from fossil fuels to renewable energy at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;" "The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available" All of these conditions are met in the case of the proposed Esivere / Virtsu II wind power development.

Description of how the methodology is applied in the context of the project activity	Refer to baseline study

D 2.2 Identification of different Baseline scenarios	
Baseline scenario 1	Continuation of current production and operation of Balti and Eesti power plants: This scenario would be to continue full operation of the units at Balti and Eesti power plants as they run currently, without an upgrade of units of closing down any units. This scenario is not credible because it would not comply with pending EU environmental regulation and Estonian government's goal of reducing SO2 emissions, and because the upgrade of the Eesti power plant is complete and of Balti is underway.
Baseline scenario 2	Upgrade and partial closure of Narva power plants: This scenario would include the refurbishing of 200MW units at Eesti and Balti power stations from pulverized bed to circulating fluidized bed combustion (CFBC) technology by 2005/2006, and closing down of units 1-8 at Balti power station. At the Balti power station, the renovated units 11 and 12 will be used for normal operation, while units 9 and 10 will be used for standby. This is the plan stated in the Position Paper – Acceptance of Acquis 2001, Chapter 22, Environment" as part of Estonia's accession to the EU. These upgrades are also contained in the National Fuel and Energy Development Plan, and have already commenced construction, and will allow the plants to meet necessary environmental targets.
Baseline scenario 3	Close Balti power plant and replace with wind power project that is not a JI project. This scenario would include the shutdown of all units at Balti, and the replacement of this power generation with a wind power project similar to the proposed project activity, but without the benefits of JI for the project. Estonia's "Long-term National Development Plan for Fuel and Energy Sector to the year 2015" (including the vision to 2030) has as one of the main priorities to expand the use of renewables for the production of electricity. Balti power station, however, currently provide heat supply to the district heating network of the city of Narva, as well as some industrial enterprises. Closing the station would mean breaking a long term agreement with the Municipality and would require additional sources of heat to be supplied. More importantly, even with a feed-in tariff of EEK0.81/kWh, the cost of wind power generation is much higher than for oil shale fired power (see step 2). This scenario is therefore not credible.
Baseline scenario 4	Close part of Balti power plant and replace with gas fired power: This scenario would include the shutdown of Balti units 1-8 as scheduled and the replacement of this power generation with a new gas fired power station or a retrofit of the Balti plant for gas fired turbines. Currently, around 7% of power generation in Estonia is from natural gas. The main challenge with natural gas is price, because it is an imported fuel, and is much more expensive than oil shale. Converting part of the Balti power station to gas would also require significant capital expenditure. Given the large oil shale resources, the government forecasts that this will continue to be the main fuel used in power production, and political risk with importing gas from Russia, this scenario is not considered credible.

D 2.3 Selected Baseline scenario	
Description of the selected Baseline scenario and justification of the choice	This analysis has shown that the only credible scenario is Scenario 2, as it is the only one able to meet environmental targets set out in local and EU accession legislation, is economically viable, and reflects current renovation projects underway.

D 3 PROJECT BOUNDARY

The Project Boundary shall encompass all anthropogenic emissions by sources of greenhouse gases under the control of the project participants that are significant and reasonably attributable to the project activity.

D 3.1 Project Boundary	
Description of how the definition of the Project Boundary related to the Baseline methodology selected is applied to the project activity	For emissions sources, only CO_2 emissions from electricity generation in fossil fuel fired power that is displaced due to the project activity. The spatial extent of the project boundary includes the project site and all power plants connected physically to the electricity system that the project power plant is connected to. The project electricity system is the Estonian National Grid, because the power plants on that system can be dispatched without significant transmission constraints. The plants and their characteristics are presented in Annex A of the Baseline Study. In addition, the electricity system in neighbouring Russia and Latvia are considered connected electricity systems. Imports from connected electricity systems in other countries are taken as having an emissions factor of 0 (zero), as per ACM0002 requirements.
Justification of the selected Project Boundary	As described by ACM0002 above.

D 4 EMISSIONS

Project emissions

D 4.1 Project emissions within the Project Boundary	
Project emissions within the Project Boundary	Wind power does not create any anthropogenic greenhouse gas emissions in operation, so project emissions are zero.

D 4.3 Development of project emissions	

	Year 1	Year 2	Year 3	Year 4	Year ...	∑
Project emissions (in t CO_{2e})	0	0	0	0	0	0

Baseline emissions

D 4.4 Baseline emissions within the Project Boundary	
Baseline emissions within the Project Boundary	X Emission 1 Source: fossil fuel combustion in power plants on the project electricity grid Type of emission: carbon dioxide
	No emissions within the Project Boundary

D 4.5 Estimate of Baseline emissions within the Project Boundary	
Emission 1	Please refer to baseline study for calculation of baseline emissions using the application of the ACM0002 methodology to the Estonian electricity grid.

Please describe the formulae used to estimate Baseline emissions (for each gas, source, formulae/algorithm, emissions in units of CO_2 equivalent).

D 4.6 Development of Baseline emissions						
	2005	2006	2007	2008	2009	∑ 2005-2012
Baseline emissions (in t CO_{2e})	5,398	29,940	38,289	38,289	38,289	265,070

Leakage

Leakage is defined as the net change of anthropogenic emissions by sources of greenhouse gases which occurs outside the Project Boundary, and which is measurable and attributable to the project activity.

D 4.7 Leakage	
Leakage	No leakage estimate is required in ACM0002 for wind power.

D 5 EMISSION REDUCTIONS

D 5.1 Expected emission reductions						
	2005	2006	2007	2008	2009	∑ 2005-2012
Project emissions (in t CO_{2e})	0	0	0	0	0	0
+ Leakage (in t CO_{2e})	0	0	0	0	0	0
(-) Sum	0	0	0	0	0	0
+ Baseline emissions (in t CO_{2e})	5,398	29,940	38,289	38,289	38,289	265,070
Total emission reductions (in t CO_{2e})	5,398	29,940	38,289	38,289	38,289	265,070

The project emissions and the Baseline emissions (scenario), as well as Leakage, can be influenced by a number of factors. Examples are e.g. the energy policy of the Host Country, raw material prices etc. Factors relevant to the project and their possible effects are to be stated.

D 5.2 Influencing factors	
Legal influencing factors	ACM0002 does not address factors influencing the baseline, as these do not change the calculation of emission factors. The future development of the Estonian power sector, however, is described in the Baseline Study.

D 5.3 Sensitivity analysis	
Sensitivity analysis	n/a

D 6 ADDITIONALITY

D 6.1 Additionality	
Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the project activity	Additionality of the project is shown using the CDM Tool for the Demonstration and Assessment of Additionality as approved by the CDM Executive Board, and as used in ACM0002. Please refer to the Baseline Study for the detailed application of the additionality tool. As previously stated, the Business Plan demonstrates that, given investor requirements and the risks associated with this project, a higher tariff would be required to make the project financially viable if it were not an approved JI project. This tariff is substantially higher than the feed-in tariff available until 2015, and the gap is even greater compared to potential prices post-2015. (see Business Plan for detail on all costs and revenue assumptions in the financial analysis and sensitivity analysis).

E Monitoring Plan

E 1 Development of Monitoring Plan and Methodology selected

E 1.1 Details of Monitoring Plan development	
Name and address of person/entity determining the Monitoring methodology Plan	Randall Spalding-Fecher (see previous details)
Date of completion of the Monitoring Plan	8 March 2005

E 1.2 Monitoring methodology	
Description of the selected methodology and justification of the choice of the methodology and why it is applicable to the project activity *If a national or international Monitoring standard has to be applied to monitor certain aspects of the project activity, please identify this standard and provide a reference to the source where a detailed description of the standard can be found.*	The methodology chosen is the approved CDM methodology ACM0002 "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources" The applicability conditions for this methodology are: 1. Applies to electricity capacity additions from: Run-of-river hydro power plants; hydro power projects with existing reservoirs where the volume of the reservoir is not increased; • Wind sources; • Geothermal sources; • Solar sources; • Wave and tidal sources. 2. This methodology is not applicable to project activities that involve switching from fossil fuels to renewable energy at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; 3. The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available;" All of these applicability criteria are met by the proposed project activity.

E 2 Organisation of Monitoring and Calculation of ERUs

Project emissions

E 2.1 Data relevant to Monitoring of project emissions	
ID number	Wind power does not produce any greenhouse gas emissions in operation, so project emissions are zero

E 2.2 Estimate/calculation of project emissions	
Estimate/calculation of project emissions	Wind power does not produce any greenhouse gas emissions in operation, so project emissions are zero

Baseline emissions

E 2.3 Data relevant to Monitoring of Baseline emissions	
ID number	1
Data variable	EG_y – Net electricity supplied to the grid
Source of data	project proponent
Data unit	MWh
Data quality	Measurement Yes: directly measured with electricity meter, and checked with sales data
Recording frequency	Every 15 minutes
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	Minimum of crediting period plus 2 years.
Comment	Data will be aggregated monthly and yearly and double checked with receipt of sales, with the SCADA system as back-up.

E 2.3 Data relevant to Monitoring of Baseline emissions	
ID number	2
Data variable	EF_y – Emissions factor of the Estonian grid
Source of data	grid operator/utility/government department data
Data unit	tCO_2/MWh
Data quality	Measurement Yes: Calculation Yes: calculated as the weighted average of the operating and build margins, as indicated in the baseline study and methodology.
Recording frequency	Given that three 3 vintage data is used, it is only calculated once at the beginning of the crediting period
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	Minimum of crediting period plus 2 years.
Comment	

E 2.3 Data relevant to Monitoring of Baseline emissions	
ID number	3
Data variable	$EF_{OM,y}$ – Operating margin emissions factor of the Estonian grid
Source of data	grid operator/utility/government department data
Data unit	tCO_2/MWh
Data quality	Calculation X Yes: calculated as indicated in the baseline methodology and study.
Recording frequency	Given that three year vintage data is used, it is only calculated once at the beginning of the crediting period

Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	Minimum of crediting period plus 2 years.
Comment	

E 2.3 Data relevant to Monitoring of Baseline emissions	
ID number	4
Data variable	$EF_{BM,y}$ – Emissions factor of the Estonian grid
Source of data	grid operator/utility/government department data
Data unit	tCO_2/MWh
Data quality	Calculation X Yes: calculated as indicated in the baseline study and methodology, as indicated in the baseline study and methodology.
Recording frequency	Given that three year vintage data is used, it is only calculated once at the beginning of the crediting period
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	Minimum of crediting period plus 2 years.
Comment	

E 2.3 Data relevant to Monitoring of Baseline emissions	
ID number	5
Data variable	$F_{i,j,y}$ – consumption of fuel I by each plant j in year y
Source of data	grid operator/utility/government department
Data unit	mass (tonne) or volume (m_3)

Data quality	Measurement X Yes: _power producers on the grid would measure this data.
Recording frequency	Given that three year vintage data is used, it is only measured once at the beginning of the crediting period
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	Minimum of crediting period plus 2 years.
Comment	

E 2.3 Data relevant to Monitoring of Baseline emissions	
ID number	6
Data variable	$S_{j,y}$ – share of output from plant j that is "must run" in year y
Source of data	expert estimate, based on technology of plant
Data unit	%
Data quality	Estimate X Yes: Assumed to be 100% for small CHP plants, 0% for Eesti plant (condensing only) and 75% for Balti, based on the share of unit 11 production – see baseline study
Recording frequency	Given that three year vintage data is used, it is only estimated once at the beginning of the crediting period
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	Minimum of crediting period plus 2 years.
Comment	

E 2.3 Data relevant to	

Monitoring of Baseline emissions	
ID number	7
Data variable	$COEF_{i,j}$
Source of data	IPCC and project proponent
Data unit	tCO2/tonne fuel
Data quality	Calculation X Yes: calculated as indicated in baseline study and methodology
Recording frequency	Given that three year vintage data is used, it is only calculated once at the beginning of the crediting period
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form
For how long is archived data to be kept?	Minimum of crediting period plus 2 years.
Comment	

E 2.3 Data relevant to Monitoring of Baseline emissions	
ID number	8
Data variable	$GEN_{j,y}$ - total annual generation from plant *j* in year *y*
Source of data	grid operator/utility/government department
Data unit	MWh
Data quality	Measurement X Yes: power producers measure this data
Recording frequency	Given that three year vintage data is used, it is only measured once at the beginning of the crediting period
Proportion of data to be monitored	100%
How will the data be archived?	X Electronic X In paper form

For how long is archived data to be kept?	Minimum of crediting period plus 2 years.
Comment	Imports will also be considered as one plant, and imports data will be sources from utility. Data will be double checked with other industry sources

E 2.4 Estimate of Baseline emissions	
Estimate of Baseline emissions	Baseline emissions (BE) are given as, $BE_y (tCO_2) = EG_y (MWh) \times EF_y (tCO_2/MWh)$ See baseline study and methodology for detail on how EF_y is calculcated

Leakage

E 2.5 Data relevant to Monitoring of Leakage	
ID number	n/a – ACM0002 does not require measurement of leakage

E 2.6 Estimate of Leakage	
Estimate of Leakage	ACM0002 does not require any measurement of leakage

Emission reductions

E 2.7 Estimate of emission reductions	
Estimate of emission reductions for the project activity	Because there are no project emissions and no leakage, the emissions reductions are the same as the baseline emissions. Therefore Emissions Reductions (ER) are given as, $ER_y (tCO_2) = EG_y (MWh) \times EF_y (tCO_2/MWh)$

E 3 Monitoring of Ecological, Socio-Economic and Development Effects

No monitoring of major ecological, socio-economic and development effects of the project is proposed.

E 4 Quality and Self-Checking of Monitoring Process

The entire process of data acquisition and processing must be documented. In addition a system for information procurement and processing and quality control must be established. Furthermore, the Monitoring should be capable of self-checking using plausibility checks.

E 4.1 Quality control (QC) and quality assurance (QA) procedures	
Data	1. EG_y
Data acquisition (including measuring methods)	Direct metering of electricity ouput from plant
How is the data transmitted?	Electronically
Uncertainty level of data	The maximum allowed deviation of the meters is 0,5% (at 110 kV) and their verifications has to be carried out at minimum every eight years.
Quality assurance/quality control procedures Explain QA/QC procedures	Data will be directly measured with metering equipment. This equipment will be calibrated and checked periodically for accuracy. In addition, all metered data will be double checked by receipts of electricity sales, with SCADA system as back-up.

E 4.1 Quality control (QC) and quality assurance (QA) procedures	
Data	all others
Data acquisition (including measuring methods)	as discussed in section E.2.3
How is the data transmitted?	as discussed in section E.2.3
Uncertainty level of data	Low
Quality assurance/quality control procedures	This data is all either default data (e.g. IPCC) or from official statistics and publicly available utility and government data that has already been checked for quality. All data sources are well known and reputable.

E 5 Monitoring Responsibilities

E 5.1 Responsibilities	
Operational and management structure regarding Monitoring	The project proponent will measure the electricity output of the plant. All other data is collected at the beginning of the project, and presented in the baseline study and this PDD by the experts listed in section D.1.1 The following management and operational system is proposed for internal audits of GHG project compliance with operational requirements, for project performance and corrective actions. In order to ensure a successful operation of the project and the credibility and verifiability of the ERs achieved, OÜ Roheline Ring recognises that the project must have a well defined management and operational system. The management and operation of the project is the responsibility of OÜ Roheline Ring ie ensuring the environmental credibility of the project through accurate and systematic monitoring of the project's implementation and operation for the purpose of achieving trustworthy ERs. Independent verifiers will audit the operator and his management systems to ensure credibility and transparency of the projects reported ERs and other performance indicators. Data handling: The establishment of a transparent system for the collection, computation and storage of data, including adequate record keeping and data monitoring systems. Quality assurance: OÜ Roheline Ring's competent manager who will be in charge of and accountable for the generation of ERs including monitoring, record keeping, computation of ERs, audits and verification. He will officially sign-off on all GHG Emission worksheets. Well-defined protocols and routine procedures as outlined in the MP Proper management processes and systems records must be kept by the operator as the auditors will request copies of such records to judge compliance with the required management systems. RR recognises that auditors will accept only one set of official information, and any discrepancies between the official, signed records and on-site records will be questioned. Reporting: OÜ Roheline Ring will prepare reports as needed for audit and verification purposes. OÜ Roheline Ring will prepare an brief annual report which should include: information on overall project performance, emission reductions generated and verified and comparison with targets. The report will be combined with the periodic verification report. Reporting will be provided to the auditors and to the Estonian JI focal point. Training: It is OÜ Roheline Ring's responsibility to ensure that the required capacity and internal training is made available to its operational staff to enable them to undertake the tasks required by the MP. Initial staff training will be provided before the project

	starts operating and generating ERs. Verification and commissioning: The management and operational system and the capacity to implement this MP will be put in place before the project can start generating ERs. Corrective Actions OÜ Roheline Ring will periodically undertake performance reviews as part of its ongoing operation and management Where corrective actions are required by the Estonian authorities or the verifiers, these will be acted upon within a reasonable timescale as dictated by relevant authorities.
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