Annex I

ACTIVITIES IMPLEMENTED JOINTLY
REVISED UNIFORM REPORTING FORMAT (URF 01)

A. Governmental acceptance, approval or endorsement

- Date of this report: 15/03/2006

- This report is a *(please underline)*:
  - First report
  - Interim report (Seventh report. First report was submitted 1997)
  - Final report

- Please indicate here which sections were modified since the last report
(e.g. B.2, E.2.4, F.2): Report is newly completed on the Revised Uniform Reporting Format.

B. Summary of AIJ project

B.1 Title of project

Viljandi, Fuel conversion at ESRO Ltd Heating Plant

B.2 Participants

Please describe briefly the role(s) of the main participating organization(s) and provide detailed contact information in annex 1:

- The donor country is Sweden, represented by a governmental institution – Swedish Energy Agency (STEM).
- The host country local organisation, which owns or operates the facility, where investment is made is DH company ESRO Ltd.
- The host country primary institution responsible for the Framework Convention on Climate Change and all other climate related issues is The Ministry of Environment.
- The technical assistance during project implementation and follow-up activities were provided by STEM consultants (ÅF-International).
- Projects performance data collection and reporting activities are carried out by Regional Energy Centres in Estonia.

B.3 Activity summary

B.3.1 General description

Viljandi, a beautiful Hansa town, more than 700 years old, with 22000 inhabitants is situated in the middle of Estonia. The town consists of areas built at different times and the newest one is Männimäe. There are several boiler plants and district heating networks in Viljandi. One of the boiler plants in Männimäe area is owned privately by AS ESRO. There was five different types of steam boilers in the plant: one DKVR 4-13, two DE 25-14 and two DKVR 10-13 boilers working on heavy oil. One of the

DKVR 10-13 boilers has been converted to wood chips firing. The converted boiler with 6 MW heat output will be used as the base-load boiler.

B.3.2 Type of activity

Sector	Activity
Energy	Fuel-switching (from heavy oil to bio fuels)

B.3.3 Location (e.g. city, region, state):

Viljandi town, Viljandi County, Estonia

B.3.4 Stage of activity *(Please underline the appropriate option)*:

- Pre-feasibility study completed
- Feasibility study completed
- In start-up or construction phase
  (e.g. ensuring financing, construction of site, purchase of land, installation of new equipment)

B.3.4 Stage of activity (continued)

- In operation
  (e.g. new windmill plant is connected, converted boiler reconnected, etc. and real, measurable and long-term GHG emission reductions or removals by sinks are generated)

B.3.5 Lifetime of AIJ project activity:

- Approval date: 20/11/1994 (Letter of Intent)
  (*Date at which the AIJ project activity was mutually approved by designated national authorities of **all** Parties involved.)*
- Starting date: September 1995 (In operation from)
  (Date at which real, measurable and long-term GHG reductions or removals by sinks will begin or began to be generated.)
- Ending date (expected): 31/03/2005 (loan expire date)
  (Date at which AIJ project activity is expected to no longer generate GHG reductions or removals by sinks.)
- Ending date (actual): In operation
  (Date at which AIJ project no longer generated GHG reductions or removals by sinks or was terminated.)
- Ending of the operational life of the project if different from the ending date of the AIJ project activity: Expected technical lifetime is 15 years which means that the converted boiler is expected to be in operation till 2010.

- Reasons for the choice of lifetime dates *(Describe briefly (up to half a page))*:

The lifetime criteria have been arranged in different groups depending on type of implemented activities. This classification assumes a level of operation and maintenance, which is normal in western countries.

Heat production plants (bio fuel)

25 years	New installation of all main equipment parts (fuel handling system, firing equipment and boiler) and modernisation of secondary equipment.
15 years	Conversion of existing boiler but new installation fuel handling system and firing equipment. Modernisation of secondary equipment.
10 years	Limited installation of new equipment (only one part of the three main parts, normally the firing equipment). Modernisation of other equipment.

Heat distribution systems and sub-stations

25 years	Pre-fabricated pipes and installations using certified contractors and supervisor according to EN norms and applicable district heating practise
15 years	Pre-fabricated pipes and installations without using certified contractors and supervisor
10 years	Modernisation of existing pipes.

Energy efficiency in buildings

25 years	Additional insulation roofs walls etc. with Scandinavian technology. New installed heating systems.
15 years	Renovation and balancing of heating systems including thermostat valves.
10 years	Weather stripping windows, doors etc.

* if a combination of measures is done a reasonable lifetime for the project have to be calculated.

B.4 Determination of the baseline

B.4.1 Date of completing the baseline determination: 1997 (first report)

B.4.2 Carried out by (name): STEM/ÅF-International
(Please provide detailed contact information in annex 1)

B.4.3 Type of baseline methodology applied and described in detail in section E.1
(Please underline the appropriate option(s))

- Project-specific by**:**
  - I. Simulating a likely situation that would have existed without the project
  - II. Taking an actual reference case project
  - III. Other (*Please specify (insert lines as needed))***:**

- Multi-project by using *(please specify briefly)***:**

B.4.4 Describe the scope of the project boundary *(Please summarize briefly the related information provided in section E. 2):*

The project activity is heat production in the ESRO Ltd boiler house and this includes emissions from in-site combustion of fossil fuels and bio fuels. The project and baseline heat production activity is assumed to be equal. This means that the emission reduction from the project is based on the difference in fossil fuels consumption before and after the implementation of the project activity.

B.4.5 Describe the degree of aggregation of the multi-project baseline *(Please summarize briefly the related information provided in section E. 1):*

C. General compatibility with and supportiveness of national economic development and socio-economic and environment priorities and strategies

Describe briefly, to the extent that information is available (up to one page) and refer to documents, decisions and laws, as appropriate:

The project meets the following objectives in the Act on Sustainable Development, Estonian National Environmental Strategy, Estonian National Environmental Action Plan, the Long-term Development Plan for the Estonian Fuel and Energy Sector, District Heating Act, Electricity Market Act and Energy Saving Programme:
- efficient and sustainable use of energy resources;
- to provide the sufficient and stable fuel and energy supply in conformity with the required quality and with optimal prices for the consistent regional development;
- to provide the political and economical independence of the state by the fuel and energy supply as a strategic branch of economy;
- to increase the share of renewable energy sources in the primary energy supply from present (2000) 10.5% up to 13% - 15% to the year 2010;
- by 2010 indicative target to produce 5.1% of gross consumption of electricity from renewables (including bio fuels);
- to reduce the environmental damage arising from fuel and energy production, transport, conversion and distribution;
- to create the reliable energy conservation system stimulating the implementation of energy conservation measures by consumers;
- creation and usage of energy efficient technologies, fuel/energy consuming and diagnostic equipment;
- stimulation of environmental awareness and environmentally friendly consumption patterns;
- to attract foreign investments for projects which ensure better use natural resources as well as environmental improvement;
- to develop co-operation between Baltic, Nordic and Central European countries

D. Environmental, economic and social and cultural impacts

D.1 Environmental impact (positive and/or negative)

The environmental impact for the project activity is mainly positive. Reduction on mazout consumption will considerably reduce the local pollution of SO_2 and NOx and the emission of CO_2 as shown below:

- Annual emission reduction:

Projected:	Actual 2005
9966 tons CO_2	12087 tons CO_2
160.6 tons SO_2	194.8 tons SO_2
13.0 tons NOx	15.8 tons NOx

- Emission measurements have been carried out on 1994

D.2 Economic impact (positive and/or negative)

- Decreased fuel costs per energy production approx. 3 EUR/MWh (compared with natural gas price).
- Decreased import fuel costs approx. 109000 EUR per year.
- The economic impact issues are also including in the following reports:
    - Viljandi Town Energy Plan, 1999

D.3 **Social and cultural impact (positive and/or negative)**

- More stable energy supply, specially DHW supply in the summertime
- Improved working conditions, increased motivation
- More employment (new fuel and service companies)
- Improved trade balance
- More stable heat price for consumers
- The social and cultural impact issues are also including in the following reports:
    - Viljandi Town Energy Plan, 1999

E. Calculation of real, measurable and long-term environmental benefits related to the mitigation of climatic change, that would not have occurred otherwise

E.1 Assumptions and characteristics of the baseline

E.1.1 Assumptions of the baseline
(Describe (up to 1 page)):

The project based status quo baseline had been assumed to be static for the project. The key parameters for the used baseline are:

- Baseline fuel – heavy fuel oil (mazout);
- Baseline efficiency of the fossil fuel boilers;
- Total heat production of the boiler plant before boiler conversion.

It has been assumed that these parameters used for baseline will not change during whole period. The numerical data are presented in section E.1.4.

On 1996 the mazout was replaced by natural gas. The baseline is not revised due to the use of the natural gas.

E.1.2 Describe the baseline
(Please describe the baseline as well as leakage effects (up to 1 page)):

The project baseline is status quo baseline (total boiler plant heat production and emissions in the period before the conversion to renewable fuel). The most important factor in calculation baseline emission is the annual efficiency of fossil fuel boilers. Baseline efficiency of the fossil fuel boilers has been derived from available heat production data, boiler house energy balance, technical specifications or expert judgement.

There was not assumed any indirect effects outside project boundary and leakages in the baseline emission calculation.

The project baseline boundary includes direct in-site (boiler plant) emissions, i.e. emissions from in-site combustion of fossil fuels. Emissions related e.g. to the transport of fuels to the project site are not included.

E.1.3 Reasons for selecting a baseline and its methodology
(Describe (up to 1 page)):

The project specific baseline as status quo case has been initially selected to start reporting on AIJ with the future plans to re-evaluate chosen baseline at pre-determined intervals in order to account for developments in the heating sector and indirect effects.

E.1.4 Calculation of values reported in 'Baseline scenario' in table E.5.1 column (A):

CO_2 emissions values are calculated according to the Regulations No. 94 of 16 July 2004 of the Ministry of Environment "The method of determination of the volume of emissions of carbon dioxide". Estonian Regulation is based on the IPCC Guidelines (1996). Carbon Emission Factors (CEF) are used to calculate CO2 emitted during fuel combustion. There is presented a table in the Regulation to calculate CO_2 emission (M_{CO2}). Instead of the table calculation it is possible to present a formula for this calculation as follows:

$(M_{CO2})_b = (Q_{fb} \times K_c \times 3,6 \times 44 \times q_c)/\eta_b \times 12 \times 1000)$ tons/year,

were,

Q_{fb}– boiler(s) heat production, MWh/year,
K_c - fraction of carbon oxidised,
q_c - carbon emission factor, tC/TJ,
η_b - annual efficiency of boiler(s), i.e. baseline efficiency of fossil fuel boilers.

Documentation box *(Please provide numerical data referred to in this section):*

The following data are used for calculation of the baseline scenario CO_2 emission reductions:

Total heat production of the boiler plant before boiler conversion – 48000 MWh/y
Baseline efficiency of the fossil fuel boilers – 83%
Carbon emission factor for heavy fuel oil – 21,1 tC/TJ
Fraction of carbon oxidised – 0,99

E.2 Assumptions and characteristics of the project scenario

E.3.1 Assumptions for the AIJ project activity and its boundary

The project activity is heat production in ESRO Ltd boiler house and this includes emissions from on-site combustion of fossil fuels and bio fuels. These emissions are under control of the boiler house staff. The project and baseline heat production activity is assumed to be equal.

E.3.2 Describe the project scenario
(Please describe the project scenario as well as effects occurring outside the project boundary (up to 1 page)):

The project scenario activity is heat production on bio fuels using converted boiler with 6 MW heat output as base load boiler. The annual heat production of the wood fuel boiler is projected to be 30000 MWh. The peak load will be covered with existing fossil fuels (mazout) boilers. The climate conditions and minor heat load changes do not influence significantly wood fuel boiler heat production. Indirect effects are not taken in to account in the emissions calculations. No direct leakage of any significance has been identified.

E.3.3 Please explain why the AIJ project activity would not have taken place anyway *(Describe (up to 1 page))*:

As a party to the Climate Convention, Estonia has started to facilitate the transformation toward an ecologically sustainable energy system as subject to the conditions of the Convention. Several factors have been restrained implementation AIJ projects:

- Lack of investment capital for renewable energy sources and energy efficiency projects, allowing financing at reasonable costs as long-term loans at reasonable interest rates;
- Lack of sufficient institutional responsibility for implementation AIJ projects;
- A weak local tradition using wood waste from industry and from forest as a fuel in the boiler plants and applying an up to date technology for energy saving. The local technology for the wood fuels firing has largely been missing;
- Lack of wood fuels firing know-how.

During the implementation of the EAES Programme in Estonia these barriers have been over-come by transfer reliable wood fuels firing technology and know-how.

E.3.4 Calculation of values reported in 'Project scenario' in table E.5.1, column (B)

According to the section E.1.4 the following is used to calculate CO_2 emission:

$M_{CO2} = (Q_{fp} \times K_c \times 3,6 \times 44 \times q_c)/\eta_b \times 12 \times 1000)$ tons/year,

were,

Q_{fp}– boiler(s) heat production, MWh/year,
K_c - fraction of carbon oxidised,
q_c - carbon emission factor, tC/TJ,
η_b - annual efficiency of boiler(s), i.e. baseline efficiency of fossil fuel boilers.

Boiler(s) heat production Q_{fp} is calculated as:

$Q_{fp} = Q_{fb} – Q_w$ (48000 – 30000 = 18000 MWh).

Documentation box *(Please provide numerical data referred to in this section):*

The following data are used for calculation of the baseline scenario CO_2 emission reductions:

Projected heat production on wood fuel boiler (Q_w) – 30000 MWh/y
Baseline efficiency of the fossil fuel boilers – 83%
Carbon emission factor for heavy fuel oil – 21,1 tC/TJ
Fraction of carbon oxidised – 0,99

E.3 Revision of the baseline for the project

E.3.1 Baseline revisions are planned (please underline)**:** Yes/ No
If yes, please complete the remainder of section E.3.

E.3.2 Revisions are planned at regular intervals (please underline): Yes/ No

- If yes, please specify date of first planned revision and the length of the intervals:

- If no, please explain revision schedule *(up to half a page)*:

The new data are planned to introduce in the baseline scenario, using international rules and guidelines for how such revision should be made. The time schedule is not yet specified.

E.3.3 Information on revisions

- If a baseline (and/or the project scenario) revision is covered by this report, describe briefly the nature of this revision, including parameters changed in the revision as well as the calculation of the new set of values in the column 'Baseline scenario' in a revision of table E.5.1, column (A): *(up to one page)*

- Date of last baseline revision: *(DD/MM/YYYY)*

- Date of next baseline revision: *(DD/MM/YYYY)*

Documentation box *(Please provide numerical data referred to in this section):*

E.4 Scope and performance of the actual project

Provide actual project data (E.5.2. Column B) and the calculations of the actual real, measurable and long-term emission reductions and/or removals as measured against the relevant (original/revised) baseline scenario values

Documentation box *(Please provide numerical data referred to in this section):*

The following data are used for calculation of the actual CO_2 emission reductions:

Actual heat production on bio fuels, MWh/y											
Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Heat production	9860	26769	31130	31577	31771	30849	30732	31389	38184	36577	36383

Other data used for calculations are presented in sections E.1 and E.2

E.5 Tables on real, measurable and long-term GHG emission reductions or removals by sinks (in CO_2 equivalent)

E.5.1 Projected real, measurable and long-term GHG emission reductions or removals by sinks

Projected real, measurable and long-term GHG emission reductions or removals by sinks over the lifetime of the AIJ activity
(Please underline and fill, as appropriate: **This is the initial table** or this is revision __ of this table)
(in metric tons of CO_2 equivalent[a])

Insert rows as needed

Year	**Baseline scenario[b]** *(A)*				**Project scenario[b]** *(B)*				**Projected real, measurable and long-term GHG emission reductions (-) or removals by sinks (+)** *((B)-(A))*			
	CO_2	CH_4[a]	N_2O[a]	Other[a]	CO_2	CH_4[a]	N_2O[a]	Other[a]	CO_2	CH_4	N_2O	Other
1995	15946				11926				-4020			
1996	15946				5980				-9966			
1997	15946				5980				-9966			
1998	15946				5980				-9966			
1999	15946				5980				-9966			
2000	15946				5980				-9966			
2001	15946				5980				-9966			
2002	15946				5980				-9966			
2003	15946				5980				-9966			
2004	15946				5980				-9966			
2005	15946				5980				-9966			
2006	15946				5980				-9966			

2007	15946				5980				-9966			
2008	15946				5980				-9966			
2009	15946				5980				-9966			
2010	15946				5980				-9966			
TOTAL	**255138**				**101623**				**-153515**			

[a] *Please convert values into global warming potentials, according to the IPCC (1995) conversion factors.*
[b] *Including effects occurring outside the project boundary (leakage) as described in sections E.1.4, and E.2.4, as applicable*

E.5.2 Actual real, measurable and long-term GHG emission reductions or removals by sinks

Actual real, measurable and long-term GHG emission reductions or removals by sinks of the AIJ activity
(in metric tons of CO_2 equivalent[a])

Please insert values assessed ex post i.e. after measurement. Insert rows as needed.

Year	**Baseline scenario[b c]** *(A)*				**Actual project[b c]** *(B)*				**Actual real, measurable and long-term GHG emission reductions (-) or removals by sinks (+)** *((B)-(A))*				**Values indicated are assessed independently (Yes/No)**
	CO_2	CH_4[a]	N_2O[a]	Other[a]	CO_2	CH_4[a]	N_2O[a]	Other[a]	CO_2	CH_4	N_2O	Other	
1995	15946				**12671**				**-3276**				Yes
1996	15946				**7053**				**-8893**				Yes
1997	15946				**5604**				**-10342**				Yes
1998	15946				**5456**				**-10490**				Yes
1999	15946				**5392**				**-10555**				Yes
2000	15946				**5698**				**-10248**				

2001	15946				**5737**				**-10209**				
2002	15946				**5518**				**-10428**				
2003	15946				**3261**				**-12685**				
2004	15946				**3795**				**-12151**				
2005	15946				**3859**				**-12087**				
2006	15946												
2007	15946												
2008	15946												
2009	15946												
2010	15946												
TOTAL	255138				**64044**				**-111364**				

[a] *Please convert values into global warming potentials, according to the IPCC (1995) conversion factors.*
[b] *Including effects occurring outside the project boundary (leakage) as described in sections E.1.4, E.2.4 , E.3.4 and E.4, as applicable.*
[c] *Values that differ from those in table E.5.1 should be marked in* ***bold****.*

E.6 Mutually agreed assessment procedures

If the AIJ activity provides for mutually agreed assessment procedures, please fill subsections E.6.1 or E.6.2, as applicable.

E.6.1 Assessment procedures that use all or one of the following steps:

E.6.1.1 Initial independent assessment of the project activity:

- Has the project design been subject to such an assessment? *(Please underline)*: Yes/**No**
- If yes, what organization(s) is/are involved: (*Please indicate the type of organization(s) (consultancy, accredited certification body, government body, university, etc.) and provide their detailed contact information in annex 1 to this report).*

Only a set of principles for the selection and verification of projects was worked out by the experts of the implementing agency STEM in Sweden. The host country governmental representatives have had a rather modest role in launching the projects.

E.6.1.2 Monitoring

- Does the project have a monitoring plan? *(Please underline)*: **Yes** / No
- Summarize briefly the key elements of the monitoring plan *(i.e. which parameters are being monitored, with what frequency, providing sampling intensities if appropriate, methods and equipment; associated uncertainties, etc.) (not more than 1 page):*

STEM has continued its assistance in monitoring and reporting the projects in the host countries. Experts from STEM, as well as the Swedish consultancy company ÅF-International provided guidance in methodology. For the regular follow-up activities a special format has been developed to collect performance data from each plant for each heating season. The monitoring activities have continued by local experts for preparing Swedish AIJ reports.
The following monthly data are collected and monitored:

- ✓ Heat production on bio fuels;
- ✓ Heat production on fossil fuels;
- ✓ Total heat production of the boiler house;
- ✓ Bio fuels consumption;
- ✓ Fossil fuels consumption.

- Is the monitoring conducted by project proponents? *(Please underline)*: **Yes** / No
- If no, which organization(s) is/are involved: (*Kindly indicate the type of organization(s) (consultancy, accredited certification body, government body, university, etc.) and provide their detailed contact information in annex 1 to this report).*

E.6.1.3 Independent assessment of the project performance

- Is the activity subject to such an assessment? *(Please underline)*: **Yes** / No
- If no, is such an assessment intended? *(Please underline)*: Yes / No
- If yes, what organization(s) is/are involved: (*Please indicate the type of organization(s) (consultancy, accredited certification body, government body, university, etc.), and provide their detailed contact information in annex 1 to this report. Indicate the frequency of the assessments, how many assessments have taken*

place to date, and whether the assessment report(s) is/are publicly available if requested).

Projects are followed and evaluated from technical and economic points of view by local experts (Evaluation Report Estonia: Boiler Conversion Projects in Estonia, 1995). In 1995 and 1996 special measurements (emissions) programs and performance tests were carried out of boiler conversion projects. These tests were carried out by Swedish specialists (ÅF-International) with assistance of local staff in the boiler houses. In addition some projects have been studied and reported on by international experts and by students at technical universities in Sweden, Germany, Estonia.

- Summarize briefly the key elements of the assessment activities: *(Please describe issues such as criteria used; the project design; project implementation; key project parameters being verified; the frequency of assessment/surveillance; sampling approach applied by the assessing organization) (up to one page)*:

E.6.1.4 Provision of written statement by an independent entity regarding the performance of the project activity

(Please note that such a statement is not a formal requirement under the AIJ pilot phase (see also the note at the beginning of section E.6). If the project has made provision for such a statement, please indicate the name of the independent body and attach a copy of the written statement(s)).

E.6.2 Other form of mutually agreed assessment procedure *(please specify)*:

Ministry of the Environment of Estonia is a central Estonian authority responsible on reporting of JI projects. This authority assigns a local institution, which is involved in to the evaluation of the climate effects of this project and takes the main responsibility to continue measuring, results collecting for JI-reporting.

E. 7 Cost (to the extent possible)

E.7.1 The cost information is *(Please underline)*:

- Provided below
- Not provided because the data are *(Please underline)*:
  - Not yet available
  - Classified as confidential

E.7.2 AIJ project activity costs

Country		Viljandi/ESRO	1995 0	1996 1	1997 2	1998 3	1999 4	2000 5	2001 6	2005 10
A. Sweden	Investment	1. Loan/debt to STEM	498300	537400	463900	402000	340140	281308	218609	repaid
		2. Added costs	0	39100	12200	0	0	3027	4574	in 2003
	AIJ/JI costs	3.Technical assistance	49000	0	0	0	0	0	0	0
		4. Follow up	0	8200	8500	2200	2267	2139	1265	2852
		5. Reporting costs	0	0	850	2000	744	301	282	810
		6. Administration	53000	0	0	0	0	0	0	0
		7. Difference in interest	4%	21496	18556	16080	13606	11252	8744	
		8.Accum. costs for AIJ/JI	102000	131696	159602	179882	196499	210192	220483	224145
		9.Total costs	600300	669096	623502	581882	536639	491499	439093	

	Investment	1. Investment/Instalment	0	0	85700	61900	61860	61860	67273	0
2. Estonia	AIJ/JI	2. Reporting costs	0	0	0	0	0	0	0	0
	costs	3. Other costs	0	0	0	0	0	0	0	0
		4. Accum. costs for AIJ/JI	0	0	0	0	0	0	0	0
		5. Total costs	0	0	85700	147600	209460	271320	338592	
1 USD=	10	SEK	0							

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F. Financial additionality

*Bearing in mind that the financing of AIJ shall be **additional** to financial obligations of Parties included in Annex II to the Convention within the framework of the financial mechanism, as well as to current official development assistance (ODA) flows (decision 5/CP.1):*

Please list sources and the purpose:

Source and purpose of the AIJ project activity funding *Including pre-feasibility phase* *(One line for each source)*	**Amount** *in thousand US$* (in Swedish crone, SEK)
Loan from NUTEK*	664.4 (SEK 4 983 000)
Grant from NUTEK* for technical assistance	65.3 (SEK 490 000)

1 USD = 7,5 SEK

* From 1 January, 1998, the new Swedish National Energy Administration was established – from 1 January 2002 the name in English has been changed to the Swedish Energy Agency - has taken over the responsibility for the Programme for an Environmentally Adapted Energy System in the Baltic region and Eastern Europe (EAES Programme) from NUTEK (Swedish National Board for Industrial and Technical Development.

G. Contribution to capacity building, transfer of environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention. In this process, the developed country Parties shall support the development and enhancement of endogenous capacities and technologies of developing country Parties

G.1 **Identification of environmentally sound technology and know-how**

- Name of manufacturer: HOTAB AB (main contractor of the combustion equipment)

- Place of manufacture *(country)*: Sweden

- Model names and numbers of equipment *(where appropriate)*:

The main parts of the delivery have been:

- Fuel storage above the ground complete with hydraulic discharge scrapers;
- Fuel conveyor from storage to furnace;
- Prefurnace with gas channel and air system;

- Flue gas cleaning of multyicyclone type;
- Flue gas fan, air fans;
- Ash and slag removable system;
- Control and supervision system;
- Stairs walkways and railings for operation and maintenance.

- Any other relevant key specific technology characteristics:

An existing oil-fired DKVR 10-13 boiler has been converted to bio fuels firing through installation of an integrated movable inclined grate in the boiler. Furthermore, automatic fuel storage and flue gas cleaning are included in the project.

Boiler type:	DKVR 10-13 (steam)
Boiler output:	6 MW
Pre-furnace:	Integrated in the boiler (moving inclined grates)
Flue gas cleaning:	Multicyclone <300 mg/Nm3
Fuel type:	Wood chips, sawdust, bark, 35-55% RH
Previous fuel:	Mazout (high-sulphur content heavy fuel oil)

- Where applicable, name and location of provider and nature of training:

In-site training of local staff on operation and maintenance of the installed equipment provided by main supplier according to the Contract

G.2 **Characteristics of environmentally sound technology**
The technology is *(underline the option)*:

- At a research and development stage
- Being tested or demonstrated in similar conditions outside the host country
- At the initial stage of introduction into the world market
- At the initial stage of introduction into the host market
- Commercially available and deployed in the world market
- Commercially available and deployed in the host market
- Not characterized by the above options. *Please describe:*

G.3 **Impact of the AIJ project on capacity-building and transfer of environmentally sound technology and know-how** *(up to two pages):*

Systematically, the capacity building and transfer of know-how have involved the following activities over time and have taken place through:

i) Technology transfer through STEM technical specialist and co-operation between foreign supplier and local partner during the implementation of the project:

- Technical support of STEM specialist to the local project leader and municipality;
- Knowledge in negotiations to foreign companies;
- Knowledge in managing and planning of industrial projects;
- Transferring of environmental issues to the local parties;
- Transferring of knowledge in operation and maintenance issue;
- Operation and maintenance software was introduced to the plant-owners.

ii) Conferences, seminars, documentation and training:

- Personal from boiler plant has been invited to different seminars and workshops and several presentations about company experience have made, documentation for training has been handed over;
- There were arranged seminars through close cooperation between STEM and Estonian partners:
  - ✓ Environmentally Friendly Energy Systems in the Baltic Region and Eastern Europe - seminar in Tallinn, 14-15 Aprill, 1994;
  - ✓ Environmentally Friendly Energy Systems in the Baltic Region and Eastern Europe - seminar and workshops in Tartu, 25 November, 1994 (prepared information by topics in Estonian over than 150 pages);
  - ✓ EAES Programme District Heating Day in Vändra, 27 July, 1995;
  - ✓ Environmentally Adapted Local Energy Systems - seminar and presentation of translated into Estonian booklet "Environmentally Adapted Local Energy Planning" in Rakvere, 11 November, 1998 and in Tartu, 12 November, 1998.
  - ✓ Exploitation of boiler houses on bio fuels. Practical experiences – international seminar in Narva-Jõesuu, 3 –5 April, 2001 (in Russian language);
  - ✓ Arrangement of operation of boiler houses on bio fuels – seminar in Essu, 19 – 21 September, 2001 in Russian language).

iii) Stimulate "net-working" for the exchange of experience between plant owners with similar problems, e g "bio-clubs":

- Activities have been supported by STEM to establish Estonian Bio Fuels Association: meetings representatives of plant owners and consultants were arranged in Haabneeme, Valga, Võru, Tartu, Pärnu and Viljandi;
- The boiler plant has been visited by specialist from another boiler plants (incl. Russia, Baltic Countries). The local staff has an exchange of experience with the staff from another boiler plants and has been active in "bio-club";
- Estonian Bio Fuels Association is established in 1998 (mainly by "bio-club" and local experts) and the company is a member.

H. Additional comments

Complete as appropriate:

1) Any practical experience gained:

- Good training and experience of the staff is necessary to operate bio fuel boiler at full capacity.
- A department for electrical installations was established in the company, which has been supplier to he STEM projects.
- A department for DH network installations is established and has been rather successful.
- Is very important to control temperature in the prefurnace and the temperature gauge must be installed in the suitable place to avoid lining damages.
- The sonic boiler tubes cleaning equipment was installed to increase bio fuel boiler efficiency.
- Converted steam boiler was rebuilt into hot water boiler in summer 2002 and it was possible to increase heat production on wood fuel some 15 % at the end of year. In 2003 the heat production on wood fuel has increased up to 7000 MWh.

2) Technical difficulties:

- To get the managers understanding about maintenance of existing equipment in co-operation to the new and operation of new equipment during guaranty time (reliability of grates,

combustion process adjustment). These problems are solved and the converted boiler heat production is above projected level.

- The existing gas fired boiler (used as peak load boiler) has been too big to start for small loads when converted boiler is operating with full capacity. This problem was solved in year 2000 by installation new gas fired hot water boiler with capacity 4 MW.
- The wood fuel boiler lining repairing works has been done.
- The connections of scrapers hydraulic cylinders in the automatic fuel storage have been repaired in 2001.
- Repairing works are needed to continue operation of the existing bio fuel boiler (scrapers, hydraulic cylinders, etc.). Inspection on the wood fuel boiler is planned on 2006 to find out the amount of repairing works or the need to install new wood fuel boiler.
- Partly the crushed wood fuel has been supplied on 2005. There have been problems in the fuel feeding system to feed crushed wood fuel.

3) Effects encountered:

- Several local companies have participated in the project (design, ground and constructions works).
- Execution of the follow up and monitoring activities for evaluation of the results of the different measures and get feedback to the programme
- Consulting support from both Swedish and Estonian side, also after commissioning.
- ESRO Ltd intends to start CHP production on the base of bio fuels. Feasibility study has been done with Danish support. CHP project is still actual (2006).

4) Impacts encountered:

- The experiences from EAES Programme projects have formed the basis for a new policy as respect to increasing renewable energy sources in the total energy balance of Estonia.
- Reduced dependence on imported fuels.

5) Other obstacles encountered:

- Lack of a strong national focal point to support and promote biomass energy use
- Lack of wood fuel in the local market due to increased wood fuel (sawmills wastes, white chips, bark) export from 2001. The sawdust is mainly used now as raw material in pellet factories. The sawmills wastes have been the main wood fuel during latest years and the share of use of forest residues has not been high. Wood fuel quality has been become lower (2003) the share of forest residue has been increased in the total amount of used wood fuel.
- There have been difficulties in wood fuel supply at the end of year 2001 (November, December).

6) Other:

- No subsidies to renewables, taxation policy is not in support of bio fuel use. Energy and fuel taxation is planned (on 2004) to establish with zero taxes for bio fuel to stimulate the wider use of bio fuels in the municipal heat production.
- About 60 % of the project costs are spent local.
- Calculations of the volume of emissions of sulphur dioxide and nitrogen oxide in the section D are calculated according to the Regulation No. 99 of 02 August 2004 of the Ministry of the Environment “The procedure and methods of determination of the volume of pollutants from combustion plants to the air”.
- On 2000 a research project was started with Det Norske Veritas with the aim to develop methods for simplifying the verification of JI-projects based on the experiences from the

Swedish boiler conversion projects in the Baltic countries. The project has been finished in 2001.

- On 2002 by the Ministry of Environment there was prepared draft National Programme for Reduction of Greenhouse Gases 2003-2012, which has been adopted by the Government on 2004.
- The National Allocation Plan (NAP) to the European greenhouse gas emissions trading scheme has been developed on 2004 according to the Directive 2003/87/EC, establishing a scheme for greenhouse gas emission allowance trading in the Community. ESRO Ltd has been included in the NAP.
- New environmental taxes law has been enforced from January 2006. According to this law CO_2 tax has been implemented also for use fossil fuels in medium size burning equipment.

PARTICIPANTS' CONTACT INFORMATION

Please provide contact information for each organization. Add rows as required (by copying and pasting)

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(* From 1 January, 1998, the new Swedish National Energy Administration – from 1 January 2002 the name in English has been changed to the Swedish Energy Agency - has taken over the responsibility for the Programme for an Environmentally Adapted Energy System in the Baltic region and Eastern Europe (EAES Programme) from NUTEK (Swedish National Board for Industrial and Technical Development).

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[a] *Address should include: department; street; postal code; city; country and the Internet address of the organization (if available).*

[b] *Organization includes: institutions, ministries, government agency closely following the activity, companies, non-governmental organizations, etc. involved in the activity.*

[c] *Function within activity: please use the following categories:*

Function	*Description of function*
Project development	*Designing/developing the AIJ project and/or submitting the AIJ project proposal*
Project operator	*Implementing and administering the AIJ project activities*

Government regulation/oversight	*Ensuring compliance of the project with laws and regulations*
Technical assistance	*Providing scientific or other technical guidance or support for the purposes of project development and/or project administration, implementation, training and education activities*
Financing	*Serving as a source of funding for the AIJ project*
Initial independent assessment of project activity	*Assessing whether the project activity meets a given set of criteria*
Monitoring	*Monitoring the environmental and/or socio-economic results of the project in accordance with a monitoring protocol*
Independent assessment of project performance	*Assessing the performance (environmental and/or socio-economic) achieved by a project against pre-set criteria*
Providing independent written statement on performance	*Providing written assurance that a performance is achieved and/or a set of criteria is met by an activity*
Designated national authority	*Entity authorized to officially accept, approve or endorse the AIJ project*
Other (please specify)	