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TECHNICAL PROPOSAL

For consulting services for the assignment of

Horishni Plavni – District Heating Project Feasibility Study

By **Sweco International AB, Sweden**

in partnership with

GARDE, Zhytomyr, Ukraine

Stockholm, December 21, 2016

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FORM TECH-1
TECHNICAL PROPOSAL SUBMISSION FORM

Stockholm, 21 December 2016

To: NEFCO
Fabianinkatu 34
FI-00100 - Helsinki,
Finland

Dear Sirs,

We, the undersigned, offer to provide the consulting services for **Horishni Plavni District Heating Feasibility Study** in accordance with your Request for Proposals dated 15 November 2016 and our Proposal. We are hereby submitting our Proposal, which includes this Technical Proposal, and a Financial Proposal sealed under a separate envelope.

We hereby declare that all the information and statements made in this Proposal are true and accept that any misinterpretation or misrepresentation contained in it may lead to our disqualification.

If negotiations are held during the period of validity of the Proposal as defined in the Letter of Invitation, we undertake to negotiate on the basis of the proposed staff. Our Proposal is binding upon us during this period, and subject to the modifications resulting from Contract negotiations.

We undertake, if our Proposal is accepted, to initiate the consulting services related to the assignment not later than the date indicated in Clause 4.2 of the Instructions to Consultants.

We understand that you are not bound to accept any proposal you receive.

We hereby accept the Agreement and the General Conditions of Contract for Consultant's Services attached as Annex 1 to your RFP.

Yours sincerely,

_____
Authorized Signature [*In full and the original copy initialized*]:

Kaj Möller
Head of Export
Sweco International AB
Gjörwellsgatan 22
SE-100 26 Stockholm, Sweden

FORM TECH-2
CONSULTANT'S ORGANIZATION AND EXPERIENCE

A. Consultant's Organization

Lead Consultant – Sweco International AB

Sweco plans and designs the communities and cities of the future. The results of our work are sustainable buildings, efficient infrastructure and access to clean water. With 14,500 employees, Sweco is Europe's leading architecture and engineering consultancy, with sales of approximately SEK 16.5 billion (EUR 1.7 billion). Since undertaking its first international assignment in 1903, Sweco has executed projects in more than 100 countries. Each year, Sweco carries out tens of thousands of projects in approximately 70 countries globally. Many of these projects are financed by the **World Bank**, European Bank for Reconstruction and Development (**EBRD**), Nordic Environment Finance Corporation (**NEFCO**) and the Swedish International Development Cooperation Agency (**Sida**). Sweco has more than 25 years' experience delivering assignments in CIS countries in fields of energy efficiency and district heating. Sweco's business system is certified according to Quality Standard ISO 9001, Environmental Standard ISO 14001 and Occupational Health & Safety Management Standard OHSAS 18001.

Sweco International is a marketing, contractual and coordinating agent for international projects within the Sweco Group. Further information can be found at www.sweco.se and www.swecogroup.com.

Local Sub-Consultant – GARDE

The consulting company Garde was founded in 1994 and is a member of the Association of Engineers of Sustainable Energy Technologies in Ukraine (AESETU) – a national organization uniting 24 companies with 1,230 experts from 16 regions of Ukraine. In 2015, AESETU decided that Garde will build its profile as consulting company for international assignments in Ukraine, and it will involve for such assignments members of the Association as independent consultants on contractual basis. This would allow utilization of the large knowledge resources of AESETU and provide competitive advantage for international financiers and consultants.

The Garde consultants have experience in implementation of energy efficiency and district heating projects in Ukraine. Garde's Kherson office is experienced in provision of the related district heating services, among them:

- Design and optimization of district heating systems
- Energy consulting
- Energy inspection and audits of budget organizations and utility companies
- Consulting, design recommendations, business plan development, technical and economic calculations
- Related environmental services

B. Consultant's Experience

Sweco's and its subconsultant Garde's recent experience of assignments of a similar nature is benchmarked in the table below and described in greater detail below the table.

Reference	Company	FS	IFI	DH	IHS	EE	CIS	UA
1 Lutsk, 2016-ongoing	Sweco and Garde	☑	☑ (NEFCO)		☑	☑	☑	☑
2 Ukraine, 2012-ongoing	Sweco		☑ (NEFCO)	☑		☑	☑	☑
3 Zhytomyr, 2014-ongoing	Sweco		☑ (NEFCO)		☑	☑	☑	☑
4 Cherkasy, 2015-16	Sweco and Garde	☑	☑ (NEFCO)		☑	☑	☑	☑
5 Ukraine, 2014-16	Sweco	☑	☑ (NEFCO)		☑	☑	☑	☑
6 Prijedor, 2013-14	Sweco	☑	☑ (EBRD)	☑		☑	☑	
7 Chisinau, 2012-14	Sweco	☑	☑ (WB)	☑		☑	☑	
8 Odesa, 2009-11	Sweco		☑ (EBRD)	☑		☑	☑	☑
9 Murmansk, 2003-10	Sweco	☑	☑	☑		☑	☑	
10 Zhytomyr, 2008-09	Sweco	☑	☑ (EBRD)	☑		☑	☑	☑
11 Kaliningrad, 2009	Sweco	☑	☑ (EBRD)	☑		☑	☑	
12 Sweden, 2016-ongoing	Sweco			☑				
13. Green School, 2016	Garde		☑ (NEFCO)	☑	☑	☑	☑	☑
14. Kherson DH system, 2011	Garde	☑		☑	☑		☑	☑
15. DH schemes for 3 cities in Ukraine, 2008-2010	Garde	☑		☑	☑		☑	☑

Key to the table: **FS** – feasibility study; **IFI** - international financial institutions; **DH** – district heating, **IHS** – individual heat substation or ITP; **EE** – energy efficiency; **CIS** - Commonwealth of Independent States; **UA** – Ukraine.

1. Energy Efficiency in Public Buildings, FS, Lutsk, Ukraine, NEFCO, 2016-ongoing

The feasibility study financed by NEFCO is considering credit and grant financing to the City of Lutsk in order to increase energy efficiency of a number of its public buildings, with the primary objective of lowering energy costs, improving indoor environment, reducing natural gas consumption and carbon dioxide emissions. The Consultant shall carry out a Feasibility Study for the City in order to develop a Priority Investment Programme (PIP) for the energy efficiency improvements in public buildings. The Assignment aims to result in deliveries of such quality that the City, NEFCO and E5P would be able to take qualified decision on financing the proposed Investment Programme.

Experts provided by SWECO: Gunnar BARK – Team Leader, heating system expert; Julia KOSULKO – Assistant team leader, energy engineer; Staffan ÖST – Expert, Energy Efficiency in buildings; Mikael JÖNSSON– Expert, Energy Efficiency in buildings; Anna MINAKOVA – Expert, Financial, economic and investment; Anders ELLEGÅRD – Expert, Environment and Socio economical

Contract Value: 150,000 EUR. *Local subcontractor*: Garde

2. **DemoUkrainaDH, Ukraine, NEFCO, 2012-ongoing**

Coordination (CC) and Communication (ComC) Support Services to NEFCO in connection with the Facility for funding of demonstration projects in the District Heating Sector of Ukraine, DemoUkrainaDH. In total 20 demonstration projects in different Ukrainian cities are expected to be implemented in the frame of the programme. The funding facility is established by NEFCO and Sida in cooperation with the Ministry of Construction, Housing and Municipal Economy of Ukraine (the Ministry). The E5P Fund is financing Technical Assistance. The objective of the DemoUkrainaDH programme is to support the development and funding of environmentally sustainable and energy efficient demonstration projects in Ukraine's district heating (DH) sector and to demonstrate new district heating technology and district heating system solutions in combination with the introduction of international practices for project preparation, design, procurement, implementation and follow up for more sustainable and efficient district heating services. *Contract Value*: 1,150,000 EUR.

Experts provided by SWECO: Mikael JÖNSSON – Team Leader after December 2015; Ronny NILSSON – Team Leader before December 2016

3. **Energy Efficiency in Public Buildings, Zhytomyr, PIU Support, NEFCO, 2014-ongoing**

The feasibility study financed by Sida and performed by the consulting company ENSI identified 19 public buildings in Zhytomyr that require energy efficiency investments and for each of them provided related cost breakdown. It is expected that these investments shall significantly improve sanitary conditions in the buildings and their energy performance which shall subsequently reduce energy costs within the city budget. The City, the borrower of the NEFCO loan and the beneficiary of the grant funding, has established a Project Implementation Unit (PIU) which has been given the mandate to implement all the tasks and duties required under the Financing Agreements related to the Project.

Experts provided by SWECO: Staffan ÖST - Team Leader; Anna MINAKOVA – Expert, Financial, economic and investment; Michael MORRIS – Procurement and contracting

Contract Value: 200,000 EUR. *Local subcontractor*: Sergiy Shamko

4. Energy Efficiency in Public Buildings, FS, Cherkasy, Ukraine, NEFCO, 2015-16

The feasibility study financed by NEFCO considered credit and grant financing to the City of Cherkasy in order to increase energy efficiency of a number of its public buildings (schools), with the primary objective of lowering energy costs, improving indoor environment, reducing natural gas consumption and carbon dioxide emissions. Consultant shall carry out a Feasibility Study for the City in order to develop a Priority Investment Programme (PIP) for the energy efficiency improvements in public buildings. The Assignment aims to result in deliveries of such quality that the City, NEFCO and E5P would be able to take qualified decision on financing the proposed Investment Programme.

Experts provided by SWECO: Gunnar BARK – Team Leader, heating system expert; Julia KOSULKO – Assistant team leader, energy engineer; Staffan ÖST – Expert, Energy Efficiency in buildings; Anna MINAKOVA – Expert, Financial, economic and investment; Anna WISÉN – Expert, Environment and Socio economical

Contract Value: 150,000 EUR. *Local subcontractor*: Garde

5. TA for Energy Saving and Cleaner Production Credits, Ukraine, NEFCO, 2014-16

By the end of 2014, Grontmij (today SWECO) signed a two-year frame agreement for continued technical assis-tance for the NEFCO Energy Saving and Cleaner Production Credits in Ukraine. By today, eleven call-off assignments for energy efficiency measures on public buildings and street lighting systems in various parts of Ukraine have been carried out. Since February 2014, Grontmij (today SWECO) has as sub-consultant to Pöyry SwedPower, supplied technical assistance for another four business plans, including energy audits, for the NEFCO ESC facility. The same staff did previously carry out 12 other business plans for CPF and ESC during the years 2011-13. *Contract Value*: 150,000 EUR

Experts provided by SWECO: Team Leader: Mikael JÖNSSON

6. District Heating Feasibility Study, Prijedor, Bosnia-Herzegovina, EBRD, 2013-14

The main objective of this assignment was to present a bankable investment project in the district heating sector of the City of Prijedor by defining a long term strategy for the district heating sector in the City and develop a long-term strategic investment programme (15-20 years) based on least cost analysis and ranking methodology according to best applicable technology, availability of other heating sources, other fuels (biomass) and with strong environmental and social benefits *Contract Value*: 250,000 EUR.

Experts provided by SWECO (Grontmij): Team Leader: Ronny NILSSON; Financial Expert: Fredrik PITZNER-JÖRGENSEN; Social Expert: Helle THERKELSEN STOLTZ; Environmental Expert: Dennis BRUHN

7. District Heating Study, Chisnau, Moldova, EBRD, 2009-11

The main objective of the provided technical assistance was to define a short term priority investment program for about 20 million USD over a period of about three years. This objective was divided into two parts, namely: (i) justification of the priority investments and (ii) preparation of required technical specification for selected and approved investments (i.e. second stage: technical specifications and tender documents). *Contract Value*: 380,000 EUR.

Experts provided by SWECO: Staffan ÖST - Team Leader; Stig LINDKVIST – Expert, Automation and control; Anna MINAKOVA – Expert, Financial, economic and investment; Michael MORRIS – Deputy Team Leader, Time scheduling, Procurement and contracting; Christian PLAHN - Expert, District heating, piping and substations

8. District Heating Rehabilitation Project, PIU Support, Odesa, Ukraine, EBRD, 2009-11

Support to the local PIU. Implementation of measures including installation of new district heating pipes, new boilers, new substations. *Contract Value*: 480,000 EUR.

Experts provided by SWECO: Staffan ÖST - Team Leader; Hans BERGMAN - Expert, District Heat Production; Anna MINAKOVA - Deputy Team Leader, Local Financial Expert; Christian PLAHN - Expert, District Heat Distribution

9. DH Rehabilitation Programme, FS and PIU Support, Murmansk, Russia, 2003-10

Phase 1 comprised a feasibility study for evaluating options for improving the heat supply service in the City of Murmansk and rehabilitating the city's district heating system. In addition, two Demo East projects, an extended hydraulic analysis and preparation of bid documents were carried out. Phase 2 comprised support to the PIU in Implementation of the PIP. *Contract Value*: 1,670,000 USD.

Experts provided by SWECO: Bernt ANDERSSON - Team Leader; Hans BERGMAN - Production Plants, Distribution Network; Christian PLAHN - Deputy Project Manager Substations, Distribution Network; Jan ERIKSSON – Procurement

10. District Heating Rehabilitation Project, FS, Zhytomyr, Ukraine, EBRD, 2008-09

The project comprised a feasibility study for evaluating options for improving the heat supply service in the City of Zhytomyr and rehabilitating the city's district heating system. The Feasibility Study included: analysis of heat supply options and heat demand assessment; technical and financial assessment; environmental assessment incl. baseline study; preparation of a priority investment programme; cost estimates; preparation of procurement and implementation plans; preparation of a financial analysis of the company; preparation and proposal of a new tariff system; preparation of an affordability analysis; preparation of a service agreement. *Contract Value*: 182,000 EUR.

Experts provided by SWECO: Staffan ÖST - Team Leader; Hans BERGMAN - Production Plants, Distribution Network; Mirjam LARSSON - Financial Expert; Anna MINAKOVA - Economic/Financial Expert; Gunnar NORDBERG - Environmental; Christian PLAHN - Substations, Distribution Network.

11. District Heating FS Update, Kaliningrad, Russia, 2009

The District Heating Component of Kaliningrad Water and Environmental Services Rehabilitation Programme was elaborated in a Feasibility Study performed by Grontmij (today Sweco) in 2003 (Nov 2002 – July 2003, 40 staff-months). The Feasibility Study covered institutional, organisational, financial and technical assessment and evaluation options for improvement of the district heating service and rehabilitation of the district heating system in Kaliningrad and development of an investment programme for the district heating enterprise MUE Kaliningradteploset. However, implementation of the investment programme as recommended by the Feasibility Study was significantly delayed pending signing of the loan documentation by the Government of the Russian Federation and was not signed until December 2008. There was a need to update the FS. The study comprised a review and re-evaluation of the situation in the City in respect of: new priority investments to maximize benefits in rehabilitation of the district heating system; changes in price policy with impact on viability and priority of the DH Component; new and amended legislation with impact on supply of district heating services. *Contract Val*ue: 75,000 EUR.

Experts provided by SWECO (Grontmij): Team Leader: Ronny NILSSON: Financial Expert: Johan BENJAMINSSON; Environmental Expert: Jessica ENGLUND.

12. Due Diligence of District Heating Companies, Sweden, 2016-ongoing

Sweco is working on two due diligence assignments related to Swedish district heating companies: one including technical and environmental due diligence related to refinancing and one including technical, environmental and commercial due diligence related to acquisition. The due diligences include production plants, distribution systems and other installation for several district heating systems.

Experts (with relevance to this tender) provided by SWECO: Christian PLAHN – Production Plants, Substations, Distribution Networks; Julia KOSULKO – Commercial; Mikael JÖNSSON– Production Plants, Substations, Distribution Networks

13. Pilot Project "Green School", Ukraine, NEFCO, 2016

The Pilot Project "Green School" (Grant financing from Government of Finland), in Antonovka, Kherson. Development of design estimate, installation and commissioning works related to pipelines and networks (heating, water supply, ventilation, electricity) and special works (fire alarm system, video surveillance, etc.). Subcontractor supervision during construction. Consideration of technical issues related to project implementation. *Contract Value:* 300,000 EUR

14. Development of Kherson DH system optimisation plan, Ukraine, 2011

Analysis of the current situation, verification of current loads, calculation of future annual demand, examination of generation sources and networks present condition and potential. Identification of perspective development directions based on the best international heat power engineering experience; development of specific measures for DH system optimisation for the period 2011-2015 and for perspective period 2016-2020. *Contract Value*: 78,500 EUR

15. Design of DH schemes for three cities in Ukraine, 2008-2010

Analysis of the current situation, verification of current loads, calculation of future annual demand, examination of generation sources and networks present condition and potential. Identification of perspective development directions based on the best international heat power engineering experience. Development of specific measures for DH system optimisation. *Contract Value*: 63,000 EUR.

FORM TECH-3
COMMENTS AND SUGGESTIONS ON THE TERMS OF REFFERENCE

- It is vital that all available data and reports are made available to the Consultant by the Client upon start of the assignment and that the Client supports the Consultant in all aspects of the elaboration of the feasibility study, including data gathering.
- All local facilities for the trainings and workshops will be provided by the City or the Company.
- The ToR calls for a Financial Analyst to be a member of the core team. We agree on this and have included an experienced Ukrainian speaking expert to handle the economic and financial analyses and modelling required for a successful feasibility study.
  However, the ToR also calls for expertise in energy economics for load forecasting, load duration curve modelling and scenario analysis. We mean that this requires competencies and experience not generally and necessarily related to a Financial Analyst. This has lead us to the decision to split the duties of the Financial Analyst and also include an Energy Economics expert with Ph. D. degree to the team. This means that the Financial Analyst will concentrate on the economic and financial analysis and modelling related to the City and the Company while the Energy Economist will handle the scenario analysis related to the measures identified in the Long-Term Investment Programme.
- We have interpreted the requirement on a short term expert on legal issues as mainly related to regulatory issues where we have relevant competencies among the key experts. If additional legal competence should be required, we will add such as backstopping expertise (local or international) for the legal issues that might arise.

FORM TECH-4
DESCRIPTION OF APPROACH, METHODOLOGY AND WORK PLAN

A. Technical Approach and Methodology

Understanding of the Objectives

We understand that the objective of the assignment is to prepare a feasibility study for energy efficiency improvement in the four district heating systems with total sales of about 150,000 Gcal per year and total network length of 54 kilometres operated by Teploenergo. The assessment of the existing facilities and situation is understood to cover assessment and brief description of the present status of the heating systems operated by Teploenergo. The assessment should form a basis for enhanced understanding of the present status in technical, financial, socio-economic, regulatory, legal

and environmental terms. Based on the assessment of Teploenergo's operations, a benchmark study should be performed with the intention to compare Teploenergo's operations from technical, institutional, financial and environmental point of view with the international best practices in the sector, not unusually represented by DH in the Nordic countries. Together with the data from the assessment, this benchmark should be inspiration for the planning of future energy efficiency activities for the overall strategy pointing 15-20 years ahead. The availability of sustainable biomass and its potential to supply more boilers, besides the 1.5 MW biomass boiler installed in 2014, is important for this part of the work and should be covered at this stage. The strategy should result in a long-term investment programme – again covering 15-20 years.

The efforts for development of a bankable project, including development of a Priority Investment Programme for the next three years, should be concentrated on the measures from the long-term investment programme having the best economic and financial outcome. The Priority Investment Programme should fully meet NEFCO's requirements for environmental performance and emission reductions.

The study shall be presented to and discussed with NEFCO, Teploenergo, the city of Horishni Plavni and other key stakeholders to enable them to appraise a bankable project.

Approach to the Services

Energy Efficiency projects in Eastern Europe, especially those aimed at rehabilitation of municipal assets, often involve many parties (the Bank, the Company, the City, Stakeholders, consultants etc) and are often complex and subject to a high level of risk. Experience shows that one of the biggest risks is overall delay. This among other may be caused by non-technical factors, such as multi-national co-operation and communication, adoption of new working routines and technologies etc.

Sweco has a vast experience from delivering assignments in post-Soviet environment, and has derived its own approach on how to handle the challenges involved. It implies establishment of an open and well-informed discussion and information exchange between all project parties. Further, we are aware of differences in project development processes between the CIS countries and Europe. This deep understanding allows us building up communication with the Client and processes of developing the Technical Assistance in a way that is acceptable and understandable by all project parties. Finally, we involve experts that are known professionals in cross-cultural communication that are able to establish fruitful collaborative environment with the Client and the Bank.

Good communication and measures described above determine Sweco's approach to the Assignment and its working relationships with all project parties.

The general approach to the development of the feasibility study will be based on successful Nordic experience applied for the characteristics of Horishni Plavni. The assessment of the entire Teploenergo systems will form the basis for a proposed optimal solution for the DH system.

A main component of our approach for this specific project is to propose a core team of experts where each member has a wide knowledge and experience from most aspects of the district heating sector. This means that the technical experts have overlapping competencies in the fields of generation, distribution and demand side installations, but also that the technical experts have a general knowledge of financial, economic, environmental and social aspects of district heating. In the same way our financial, economic, environmental and social experts do have a good knowledge and experience of the technical aspects of district heating. This will benefit to more efficient resource utilisation during work in the field as all experts in the core team will be able to discuss the various aspects of the project.

Methodology for Carrying Out the Activities and Obtaining the Expected Output

Our proposed methodology for the assignment is structured in accordance with the TOR. The studies will cover all issues mentioned therein. In the following are listed and commented on specific essential issues.

Baseline Study

The initial assessment will provide basic data of Horishni Plavni and Teploenergo and will cover technical, as well as environmental, financial, socio-economic and institutional segments. The assessment of Teploenergo and its assets and operations will expectantly result in a general understanding of the competitiveness of district heating in relation to optional heating solutions in Horishni Plavni and the legal and regulatory framework Teploenergo is set to act under. It will also give an indication of where the "low hanging fruits" for efficiency improvements and the most essential measures for improved operational performance can be found. The initial assessment should also give an understanding of Teploenergo's current financial situation and provide input information for the financial model and projections. In particular, the baseline study will cover:

- Socio-economic context;
- City and municipal segment;
- District heating sector set-up;
- The Company:
    - General description;
    - Technical assessment, including service area, heat generation, distribution and demand side.
    - Financial assessment.

As a result of the Baseline Study, a sound analysis of the environment for the investment will be presented to the Client. Most important issues will be highlighted on a red-flag basis.

Overall Strategy and Demand Projections

The overall strategy and the corresponding long-term investment programme should cover the next 15-20 years of the activities of Telopenergo. The baseline study and also the Horishni Plavni Action Plan for Sustainable Energy Development should form important background for the overall strategy.

At this stage, a criteria guiding planning efforts shall be designed. It shall consider the current state of affairs and projected needs on the company in short and long run. It is important that the overall strategy becomes a sound plan to avoid exhaustion of the assets, enhance reduction of losses and improve efficiency of generation and distribution.

For development of the Demand Projections it is important to consider energy efficiency, climate change effects, as well as user patterns. It is important to analyse overall social patterns in Horishni Plavni in order to determine probability of city expansion and associated district heating network expansion. Even though some cities in Ukraine are still only at the beginning of the energy efficiency improvement path, the effects of the energy efficiency can be significant in the future. It is important to determine their effect.

Availability of Biomass

The availability of biomass will be analysed in order to estimate the possibility of biomass-based heat production in Horishni Plavni. While providing an overview of the biomass sector on the national level in Ukraine, special efforts will be set towards analysis of the local opportunities since the biomass market often is geographically segmented. The analysis will be done for various available biomass alternatives, waste wood from forestry industry, as well as an option of own production of the energy crops. Finally, the analysis will be presented both short and long term, with consideration of both financial and sustainability issues.

Long-Term Investment Programme

Energy sourcing, in particular availability of biomass, is essential for the planning of the future heat generation. Options with and without cogeneration based on gas and biomass should be considered for baseload plants. Availability of sufficient peak and backup capacity should also be secured. The required reconstruction of the distribution network should be derived and new proposed pipelines should be laid in the ground and based on prefabricated bonded pipelines fulfilling the

requirements in the European standards. Proposed pipeline dimensions should be based on pressure drop calculations. For demand side management, the use of modern individual heating substations should under normal conditions be the preferred option and single stage substations should be used, preferably with brazed heat exchangers. For the five central heat supply stations, conversion to individual substations should be considered as long as the central stations are not proven to be the significant least cost heating solution. A demand driven variable flow district heating system should be the goal. All proposed measures in the long-term investment programme should be ranked based on economic and financial indicators.

Economic and financial analysis of the options

All options shall be economically and financially analysed in order to determine their ranking that will be further used for development of the PIP.

Priority Investment Programme

The definition of the PIP will be based on the outcome of the initial assessment and on the highest ranked measures from the long-term investment programme. Furthermore, the developments of the DH operation and the projections for demand and revenues from the overall strategy should be analysed.

Least Cost Analysis

Analysis of the least-cost heating alternatives will be performed in comparison to the district heating option in order to determine attractiveness of the district heating option. The analysis will be include a sensitivity analysis to capital, fuel prices, operational costs etc.

Socio-Economic Context

On the background of the current billing and collection methodologies and practice and current tariff levels compared with the sum of all recurrent costs, and on the background of the legal and regulatory framework, the Consultant will describe plans to achieve full cost recovery. In this context, the affordability for different income groups will be analysed, to enable an assessment of the feasibility of applying the required tariffs.

Financial Model and Projections

The Consultant will analyse the expected effect from the project on the financial performance of the Company. A financial model will be developed with projections for a horizon of 15 years. The purpose of the model is to provide financial and economic performance indicators and to enable the Consultant to assess whether the Company will have the financial capacity to fully support its operations and finance the Project. The financial projections shall include annual income statement, balance sheet and cash flow statement, and shall reflect the financing plan for the project, which is to be proposed by the Consultant. The Consultant envisages close collaboration with Teploenergo, but also with NEFCO with respect to setting the assumptions for the financial model and discussion of modelling issues during the assignment. Sweco has a well proven financial model, which has been used with good results in several previous IFI financed projects. This model will be adapted to the specific conditions of Horishni Plavni.

Environmental and social analysis

Environmental and social analysis will be performed of the Investment Programme. It will cover:

- Overview of the related legislative framework;
- Environmental and Social Scoping;
- Environmental Impact Assessment, considering among other:
    - Direct effects of the PIP measures;
    - Effects during construction;
    - Possible accumulative effects;
    - Waste handling

  - Possible hazardous materials;
- Social Impact Assessment
- Health and Safety issues
- Mitigation measures

Project Implementation Unit

In order to have a well-functioning PIU, it is important to ensure that:

- The unit is well-integrated to the company structure;
- People forming the unit possess the spectrum of the required expertise (technical, project management, financial, language etc.);
- Experts proposed to form the PIU have time reserved for the PIU responsibilities;
- The PIU receives the necessary capacity building and training.

During the initial phase of the assignment the consultant will assess the situation inside the company in order to evaluate the situation according to the components presented above. Already in the Inception Report the proposed set-up will be outlined. During the rest of the project the consultant will provide the necessary support and advice to the company in order to make sure the unit is formed.

Additionally, during the planned workshops some sessions will be dedicated to the capacity building of the PIU. Content of these sessions will be determined as a result of the initial analysis of the situation.

Quality Control

Quality control is most essential. The Team Leader will have the main responsibility for the quality control. He will however be assisted by the key experts in their responsibility within the technical, financial, environmental and social areas.

Communication

Within our team, several members speak Ukrainian fluently, this helps with communication and enables mitigation of language and cultural barriers. Also, all the participants of the proposed team have very long experience in working with similar projects in Ukraine and other Eastern European countries.

Deliverables

We shall deliver the requested reports for the assignment according the ToR and to the time schedule agreed during the contract negotiations. The deliverables are listed in the Form Tech 8.

B. Work Plan

The assignment is expected to be completed within 18 weeks after commencement of the contract. The work plan is based on our approach and methodology outlined above, and is presented as the Work Schedule of Form TECH-8. The main idea with the proposed work plan is to carry out the baseline study as soon as possible after the assignment initiation phase and then to have basically all work finalised before the information workshop in week 13.

C. Organization and Staffing

The proposed team is composed of experienced persons with verified knowledge in the areas of relevance for this particular Assignment and experienced in working in similar environments. The team also possesses good communication skills in English and Ukrainian (see FORM TECH-5 below). Beside the key-experts we have a support team from Sweco International. Following the intentions of the work plan, the staffing schedule (Form Tech 7) shows the highest level of activity during the early stage of the assignment. Still, we have tried to ensure availability of key experts at site during most weeks up to the information workshop in week 13.

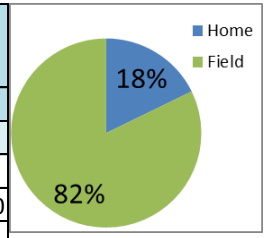
FORM TECH-5
TEAM COMPOSITION AND TASK ASSIGNMENTS

Name of Staff	Firm	Areas of Expertise	Position Assigned	Tasks Assigned
Sweco key experts				
Gunnar Bark	Sweco International	Energy efficiency and DH in Eastern Europe	Team Leader, Technical specialist, DH engineer	Overall responsibility and input in all tasks Main responsibility for overall strategy and PIP
Mikael Jönsson	Sweco International	District heating, CHP, energy efficiency and renewable energy	Technical specialist, DH engineer	Main: Generation, demand side, Support: Distribution, overall strategy, PIP, procurement
Anders Ellegård	Sweco International	Environment and socio-economy	Environmental and social expert	Socio-economic data, affordability, environmental & social analysis, climate change
Christian Plahn	Sweco International	Renewable energy, district heating	Technical specialist, DH engineer	Main: Distribution, Support: Generation, demand side, overall strategy, PIP
Anna Minakova	Sweco associate	Financial analysis, investment planning	Financial analyst	Financial assessment, city & company data, economic and financial analysis, tariffs, institutional & regulatory issues, procurement
Sub consultant experts				
Volodymyr Skorokhod	GARDE	District Heating and heat substations	Local consultant team leader Local technical specialist, DH engineer	Generation, distribution, demand side, overall strategy, PIP, procurement
Tatyana Plokhaia	GARDE	District Heating and heat substations	Local technical specialist, DH engineer	Generation, distribution, demand side
Olexandr Savenko	GARDE	Environment and economy	Local environmental expert	Environmental & social analysis, biomass study
Irina Tsymbaliuk	GARDE	Coordinator, interpreter	Local coordinator, interpreter	Overall input in all tasks
Sweco non-key experts				
Julia Kosulko	Sweco International	Energy efficiency, socio-economy, environment, project management	Assistant team leader	Biomass study, workshops, demand projections, stakeholder consultations, reporting, overall coordination of all tasks
Lennart Larsson	Sweco associate	Energy economy	Energy Economist	Main: Heat & consumption pattern and forecasts Support: Tariffs

FORM TECH-7. STAFFING SCHEDULE

We assume one man-week to be of five man-days, and an average man-month to be of 23 man-days.

#	Name of Staff		Staff Input (in the form of bar chart), weeks																		Total staff-days input			Total staff-weeks input		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	Home	Field	Total	Home	Field	Total
Foreign																										
1	Gunnar Bark	(Home)																			10			2,0		
		(Field)																				20	30		4,0	6,0
2	Christian Plahn	(Home)																			5			1,0		
		(Field)																				10	15		2,0	3,0
3	Julia Kosulko	(Home)																			10			2,0		
		(Field)																				15	25		3,0	5,0
4	Mikael Jönsson	(Home)																			8			1,6		
		(Field)																				17	25		3,4	5,0
5	Anders Ellegård	(Home)																			4			0,8		
		(Field)																				5	9		1,0	1,8
6	Lennart Larsson	(Home)																			4			0,8		
		(Field)																				0	4		0,0	0,8
																				Subtotal	41	67	108	8,2	13,4	21,6
Local																										
1	Anna Minakova	(Home)																			0			0,0		
		(Field)																				30	30		6,0	6,0
3	Volodymyr Skorokhod	(Home)																			0			0,0		
		(Field)																				30	30		6,0	6,0
4	Olexandr Savenko	(Home)																			0			0,0		
		(Field)																				10	10		2,0	2,0
5	Tatiana Plohaya	(Home)																			0			0,0		
		(Field)																				30	30		6,0	6,0
6	Iryna Tsymbalyuk	(Home)																			0			0,0		
		(Field)																				20	20		4,0	4,0
																				Subtotal	0	120	120	0,0	24,0	24,0
																				Total	**41**	**187**	**228**	**8,2**	**37,4**	**45,6**



Note! Dashed cells represent activities of consultant on an on-call basis/request.

FAORM TECH-8. WORK SCHEDULE

#	Activity	Weeks 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	**Initiation**	•	•	•	•	•	•												
	- Preparation, mobilization, data request	■	■	■															
	- Kick-off meeting with city and company			◆															
	- Key Stakeholders interviews and site visits		■	■	■	■													
2	**Complex Baseline Study (tech, soc, env, fin, org)**			•	•	•	•	•	•	•	•	•							
	- Complex Data Collection			■	■	■	■	■											
	- Survey			■	■	■	■	*	▨	▨	▨								
	- Data verification and analalysis				■	■	■	■	■	■	■								
3	**Project Definition**						•	•	•	•	•	•	•	•	•				
	- Overall strategy / Long-term programme						■	■	■	■	■	■	■	*	▨				
	- Biomass availability assessment						■	■	■	■									
4	**PIP**								•	•	•	•	•	•	•	•	•	•	•
	- Mid-term workshop								◆										
	- Selection of components for the PIP								■	■	■	■	*	▨	▨	▨	▨	■	■
	- Affordability analysis								■	■	■	■	■	■	■				
	- Tariffs setting										■	■	■	■	■				
	- Financial model and projections										■	■	■	■	▨				
	- Environmental and socal analysis								■	■	■	■	■	■	▨				
5	**PIU**		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Assessment of the PIU needs		■	■															
	PIU Establishment and training			■	■	*	▨	▨	▨	▨	▨	▨	▨	▨	■				
	ToR for PIU Support								■	■	■	■	■		■				
6	**Reporting**			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Report Preparation			■	■	■	■						■	■	■			▨	▨
	Client's and Nefco's review of the deliverables															■	■	■	
	Deliverables																		
1	Information Workshop													◆					
2	Inception report				◆														
3	Draft Final Report														◆				
4	Final report																		◆
5	ESP Application Draft														◆				
6	ToR for PIU Support														◆				

Color Key:
- • Main activity
- ■ Process activities
- * ▨ Activities upon necessity
- ◆ Events and deliverables
- Client's and Nefco's review of the deliverables

FORM TECH-6
CURRICULUM VITAE (CV) FOR PROPOSED PROFESSIONAL STAFF

Gunnar Bark - Team Leader, Technical specialist, DH engineer

1. Family name: **Bark**

2. First names: **Gunnar**

3. Date of birth: April 21, 1954

4. Nationality: Swedish

5. Civil status: Married

6. Education:

Institution	B.Sc. Collage of Engineering, Soltorgsskolan Borlänge
Date: from (month / year): to (month / year):	08/1970 – 06/1974
Degree(s) or Diploma(s) obtained:	B.Sc. Collage of Engineering

7. Language skills: (Mark 1 to 5 for competence, 5 being the highest)

Language	*Reading*	*Speaking*	*Writing*
Swedish	5	5	5
English	5	5	5
German	3	2	2
French	1	1	1
Chinese	-	1	-

8. Membership of professional bodies:

9. Other skills (e.g. computer literacy, etc.):

10. Present position: Senior Consultant International Energy Projects

11. Years within the firm: 2

12. Key qualifications (relevant to the programme):

Mr. Bark is currently the project manager for the ongoing assignment, a feasibility study in the City of Lutsk, regarding Energy Efficiency measures in Public Buildings financed by NEFCO.

Mr. Bark is currently the project manager for the ongoing assignment, a feasibility study in the City of Cherkasy, regarding Energy Efficiency measures in Public Buildings financed by NEFCO.

Mr. Bark is also currently the project manager for the ongoing assignment in Indonesia, regarding the Government-to-Government cooperation INSISTS (Indonesian – Swedish Initiative for Sustainable Energy Solutions) financed by the Swedish Energy Agency.

Mr Bark has recently been the team leader for the assignment to provide technical assistance to the Government of Moldova, to support public institutions in the energy sector, including the recently

established Energy Efficiency Agency (EEA), with the objective to improve energy efficiency and renewable energy management and to align the legal and institutional framework within these areas to EU standards.

Mr Bark has been working with Energy Efficiency, District Heating and CHP projects for more than 35 years. Mr Bark duties has been performing appraisals, feasibility studies, design, preparing tender documents and contracts, managing procurements, follow ups, supervision, commissioning and site manager works related both to rehabilitation projects as well as green field projects. 3 years stationed and living in Beijing China, responsible for sales and development of district heating- and CHP-projects. He has also been working as project manager for Waste to Energy projects one in Ukraine and one in China. More than 25 years of experience as project manager and about 20 years' experience of working with International financing organizations such as Sida, NEFCO, Finnida, EBRD, Asian Development Bank and the World Bank with international energy projects in China, Ukraine, Indonesia, Iraq, India, Tanzania, Moldova, Thailand, Lithuania, Kosovo, Poland, Russia, Latvia, Senegal, Norway and Saudi Arabia.

13. Specific Eastern European and CIS experience:

Country	*Date: from (month / year) to (month / year)*
Ukraine	8/2015 - ongoing
Moldova	1/2012 – 10/2015
Russia	12/2012- 08/2014
Ukraine	11/2009- 04/2013
Latvia	02/2008-11/2008
Russia	01/2008-04/2008
Kosovo	08/1999-08/2000
Lithuania	06/1998-08/1999
Ukraine	05/1996- 06/1998
Poland	05/1995-06/1995

14. Professional Experience Record:

Employment Record

2015 -	Sweco Energuide AB, Stockholm Senior Consultant International Energy Projects
2009 – 2015	ÅF-Industry AB, Stockholm Senior Consultant Heat & Power
2008 – 2009	Vattenfall Power Consultant AB, Stockholm Senior Project Manager, International
2007 – 2008	ÅF-Process AB, Stockholm Senior Advisor, Manager International Operations China
2004 – 2006	ÅF-Process AB, Stockholm Head of department Heat and Power, Manager International Operations China.
2003-2004	Fortum Teknik & Miljö, Stockholm Manager International Projects, Senior consultant
2000-2003	Fortum Engineering, Beijing, China Development & Sales manager, Senior consultant

1999 – 2000	Fortum Teknik & Miljö, Stockholm Manager International Projects, Senior consultant
1996 – 1999	ÅF-Energikonsult Stockholm AB, Stockholm Manager International Projects, Senior consultant
1987 – 1996	ÅF-Energikonsult Stockholm AB, Stockholm Head of Department Distribution Systems
1982 – 1987	VBB AB, Stockholm Project Manager
1979-1982	VBB AB, Umeå Project Manager
1978-1979	VBB AB, Riyadh Saudi Arabia Supervisor
1977 – 1978	AIB Falun Design and Supervision engineer
1975 – 1977	Falu Anläggnings AB, Falun Engineer.

Some selected assignments

Date: from (month / year) to (month / year)	06/2016 mobilization phase
Location:	Lutsk, Ukraine
Company:	Client: NEFCO
Position:	Team Leader
Description:	*Feasibility study* Energy efficiency in public buildings in the city of Lutsk, Ukraine. Assessment of current situation and to develop a priority investment plan.

Date: from (month / year) to (month / year)	01/2016 to on going
Location:	Indonesia
Company:	Client: Swedish Energy Agency
Position:	Project Manager
Description:	*Technical and Management assistance* Regarding the Government-to-Government cooperation INSISTS (Indonesian – Swedish Initiative for Sustainable Energy Solutions).

Date: from (month / year) to (month / year)	08/2015 to on going
Location:	Cherkasy, Ukraine
Company:	Client: NEFCO
Position:	Team Leader

Description:	*Feasibility study* Energy efficiency in public buildings in the city of Cherkasy, Ukraine. Assessment of current situation and to develop a priority investment plan.

Date: from (month / year) to (month / year)	06/2014 to 06/2014
Location:	Erbil, Kurdistan Iraq
Company:	Client: Chamber of Commerce Erbil
Position:	Team Leader
Description:	*Technical assistance* Workshops, responsible for renewable energy, energy efficiency, waste to energy and waste management

Date: from (month / year) to (month / year)	11/2013 to 05/2014
Location:	Qingdao, China
Company:	Client: Qingdao Environmental Protection Bureau
Position:	Team Leader
Description:	*Sustainable Urban planning* Developing environmental indicators for a sustainable urban planning project in Qingdao, China. A new district with about 700,000 inhabitants will be constructed. Responsible for energy supply, DH and waste management solutions.

Date: from (month / year) to (month / year)	05/2013 to 08/2014
Location:	Karelia, Russia
Company:	Client: NEFCO
Position:	Project Manager
Description:	*Feasibility Study* Existing District Heating systems in four cities in Karelia Republic, Russia. The cities are Soujärvi, Sortovala, Kostomuksha and Nadvoitsy. Assessment of current situation and to develop a priority investment plan and also a long term strategic investment plan. Technical, environmental and financial assessment of the District Heating companies and the different District Heating systems.

Date: from (month / year) to (month / year)	12/2012 to 12/2013
Location:	Komi, Russia
Company:	Client: NEFCO
Position:	Project Manager
Description:	*Feasibility Study* 250 existing District Heating systems in rural areas of Komi Republic, Russia. Assessment of current situation and to develop a priority investment plan and also a long term strategic investment

	plan. Technical, environmental and financial assessment of the District Heating company and the different DH systems.

Date: from (month / year) to (month / year)	04/2013 to 04/2013
Location:	Sulemaynia, Kurdistan Iraq
Company:	Client: Chamber of Commerce Sulemaynia
Position:	Team Leader
Description:	*Technical assistance* Workshops, responsible for renewable energy, energy efficiency, waste to energy and waste management

Date: from (month / year) to (month / year)	1/2012 to 10/2015
Location:	Chisinau, Moldova
Company:	Client: Ministry of Economics
Position:	Team leader
Description:	*Technical assistance* Provide technical assistance to the Government of Moldova, to support public institutions in the energy sector, including the recently established Energy Efficiency Agency (EEA), with the objective to improve energy efficiency and renewable energy management and to align the legal and institutional framework within these areas to EU standards.

Date: from (month / year) to (month / year)	2/2012 to 2/2012
Location:	Bangkok, Thailand
Company:	Client: Swedish Embassy, Ministry of Energy
Position:	Senior Consultant
Description:	*Technical assistance* For Ministry of Energy and Swedish Embassy, invited to give a speech in a seminar related to alternative energy sources and waste to energy.

Date: from (month / year) to (month / year)	1/2011 to 3/2012
Location:	Dar Es Saalam, Tanzania
Company:	Client: Rural Energy Agency
Position:	Project Manager
Description:	*Technical assistance* For a new Governmental Agency for Rural Energy projects and development. Two workshops for the REA staff, one in January and one in February. The first workshop was about external and internal communication, the other was about Project Financing etc.

Date: from (month / year) to (month / year)	11/2009 to 04/2013

Location:	Donetsk, Ukraine
Company:	Client: EcoEnergy Scandinavia AB
Position:	Project Manager
Description:	*Project Manager* Waste to Energy facility in Donetsk, incineration capacity 470000 ton municipal solid waste /year. Boiler 2*50MW, turbine 30MW and a semi dry flue gas cleaning. Overall responsibility for the EPC contract.

Date: from (month / year) to (month / year)	1/2010 to 12/2010
Location:	Lviv, Ukraine
Company:	Client: EBRD
Position:	DH expert
Description:	*Feasibility Study* Heat Production and DH network Expert. Lviv District Heating- feasibility study. Preparation of a feasibility study to be presented to financiers to enable them to appraise an investment loan.

Date: from (month / year) to (month / year)	11/2009 to 07/2010
Location:	Shanghai, China
Company:	Client: Government Offices of Sweden
Position:	Project Manager
Description:	*System- and cost/benefit analysis* Regarding EcoCity development in China. Study of three scenarios (Now-tech, Hi-tech and New-tech) regarding waste management and wastewater treatment and energy use in buildings for heating and cooling, Presentation of the results at WorldExpo 2010 in Shanghai.

Date: from (month / year) to (month / year)	01/2010 to 05/2013
Location:	Changzhou, China
Company:	Client: EcoEnergy Scandinavia AB
Position:	Project Manager
Description:	*Feasibility study* A Waste to Energy facility in the Changzhou Xinbei district. Technical and economic feasibility study also included a general EIA in the feasibility study. Including budgetary inquiries for boiler, turbine and flue gas treatment.

Date: from (month / year) to (month / year)	11/2009 to 12/2011
Location:	Gongqing and Danyang, China
Company:	Client: DigiEcoCity
Position:	Project Manager/Technical Expert
Description:	*Sustainable Urban planning*

	A project for planning of new city districts with 100.000 inhabitants in two existing cities Gongqing and Danyang. Responsible for waste management and waste to energy plant and also energy supply, district heating and district cooling.

Date: from (month / year) to (month / year)	09/2009 to 11/2009
Location:	Borås, Sweden
Company:	Client: Borås Energi & Miljö AB
Position:	Project Manager
Description:	*Due Diligence* Of the biofuel power plant, Ryaverket Borås. Consisting of the bio fuelled boilers, fuel handling system and flue gas system.

Date: from (month / year) to (month / year)	11/2009 to 11/2009
Location:	Dehli, Hyderabad, Mumbai, India
Company:	Client: Confederation of Indian Industry
Position:	Project Manager/Technical Expert
Description:	*Workshops* Performed workshops in Delhi and Hyderabad regarding waste management, waste to energy and energy efficiency. Also a speech in the Green Business Summit 2009 conference in Mumbai, regarding waste management and waste to energy.

Date: from (month / year) to (month / year)	06/2009 to 06/2010
Location:	Shanghai, China
Company:	Client: TetraPak AB
Position:	Project Manager/Technical Expert
Description:	*Energy Effiency* Energy efficiency project for all utilities needed for a big dairy outside Shanghai. The project consisted of an energy audit, reporting etc for improvements and savings of steam, hot water, electricity, ice water, clean water and compressed air. A prefeasibility study regarding utilize whey and waste water for biogas production.

Date: from (month / year) to (month / year)	03/2009 to 05/2009
Location:	Finland
Company:	Client: Oy Katternö AB
Position:	Project Manager
Description:	*Due diligence* Economical, technical and environmental due diligence of an existing biofuel pelleting production plant before purchase

Date: from (month / year) to (month / year)	01/2008 to 04/2008
Location:	Sweden
Company:	Client: Malka Oil, Tomsk, Russia
Position:	Project Manager
Description:	*Pre- feasibility study* Power supply study with gas-turbines or light fuel engine for a new oil/gasfield in Tomsk area, Siberia.

Date: from (month / year) to (month / year)	02/2008 to11/2008
Location:	Riga, Latvia
Company:	Client: Latvenergo
Position:	Project Manager
Description:	*Owners engineer* Support to Latvenergo during reconstruction of Riga TEC2 power plant for NOx emission reduction.

Date: from (month / year) to (month / year)	02/2008 to 01/2009
Location:	Dakar, Senegal
Company:	Client: Companie d'Electricité du Senegal S.A.
Position:	Project Manager
Description:	*Owners engineer* Project Manager for a new coal fired power plant 125MWe. Responsibilities as Owners Engineer regarding an EPC delivery during construction time and as part of the Operational management team for a period of 5 years. The project was cancelled in the end of 2008 due to the financial crisis.

Date: from (month / year) to (month / year)	08/2007 to12/2007
Location:	Sweden
Company:	Client: Trondheim Energi AS
Position:	Project Manager/Technical Expert
Description:	*Due diligence* Economical, technical and environmental due diligence of 5 existing district heating plants around in Sweden before purchase

Date: from (month / year) to (month / year)	03/2007 to 07/2007
Location:	Sweden
Company:	Client: Värmeland AB
Position:	Project Manager/Technical Expert
Description:	*Due diligence*

	Economical, technical and environmental due diligence of 22 existing district heating plants around in Sweden before purchase

Date: from (month / year) to (month / year)	01/2007 to 06/2007
Location:	Norrköping, Sweden
Company:	Client: Sweden Bioenergy AB
Position:	Project manager
Description:	*Feasibility Study Bio-diesel plant* Technical and economic study of supply and usage of electricity, steam, process cooling, heating and water for a new production plant for bio-diesel.

Date: from (month / year) to (month / year)	11/2005 to 09/2006
Location:	Inner Mongolia, P.R. China
Company:	Client: Ministry of Foreign Affairs
Position:	Project manager for the energy part
Description:	*Sustainable city, Inner Mongolia* Project manager for a pre-feasibility study regarding district heating and district cooling production and supply for the cities of Hohhot and Wuhai based on a sustainable solution. The study was a joint project together with other Swedish companies and financed by Ministry of Foreign Affairs Sweden in co-operation with Ministry of Construction China..

Date: from (month / year) to (month / year)	05/2005 to 07/2006
Location:	Qingdao, P.R. China
Company:	Client: Qingdao Environmental Protection Bureau
Position:	Project manager
Description:	*Pre-feasibility and Feasibility study* Project manager for a study regarding replacing an existing coal fired district heating plant with a seawater source heat-pump plant for dual operation. The project included district heating and district cooling for a district in Qingdao city as a part of environmental improvement before the Olympics 2008. Technical, environmental and economic analysis.

Date: from (month / year) to (month / year)	09/2003 to 10/2007
Location:	Stockholm, Sweden
Company:	Client: Fortum Värme
Position:	Project manager

Description:	*A World unique research project* Project manager for a world unique research project regarding alternative energy production, including solar panels, electrolyser and a fuel cell driven by hydrogen or biogas.

Date: from (month / year) to (month / year)	02/2004 to 09/2006
Location:	Tianshui, P.R. China
Company:	Client: Sida
Position:	Project manager
Description:	*Technical advisor* Support to Tianshui District Heating Company, the procurement organization and to assist Sida in the no-objection procedure for a district heating project. Including advice during the bidding procedure, bidding documents, bid opening and evaluation, contract negotiations and award.

Date: from (month / year) to (month / year)	09/2003 to 03/2004
Location:	Stockholm, Sweden
Company:	Client: Fortum Generation
Position:	Project manager
Description:	*Management study* Regarding the organisation for future control of the water dams for all of Fortum Generations hydropower stations in Sweden.

Date: from (month / year) to (month / year)	10/2001 to 08/2003
Location:	Panjin, China
Company:	Client: Panjin Liaohe Fortum Thermal Power Co
Position:	Project Engineer
Description:	*Owners Engineer* For Fortum Liaohe Phase II project, 20 MWe coal fuelled power plant. Supervision of the detail design. During construction time, responsible for cost control, reporting and time schedule for the 100 MUSD joint-venture project.

Date: from (month / year) to (month / year)	09/2001 to 11/2001
Location:	Huangdao, Baotou, Qingdao, China
Company:	Client: Finnida
Position:	Project manager
Description:	*Negotiations* Responsible for negotiations regarding three different district heating projects, financed by Finnish Governmental soft loans.

Date: from (month / year) to (month / year)	09/2001 to 12/2001
Location:	Changchun, China
Company:	Client: Finnida
Position:	Project manager
Description:	*Negotiations* Responsible for negotiations for a district heating project utilising waste energy from Volkswagen factory.
Date: from (month / year) to (month / year)	09/2001 to 11/2001
Location:	Qinghuangdao, China
Company:	Client: Qinghuangdao District Heating Company
Position:	Commissioning manager
Description:	*Implementation* Commissioning Manager of a 10 MUSD District Heating Project in Qinhuangdao. Finnida project.

Date: from (month / year) to (month / year)	09/2000 to 11/2001
Location:	Qinghuangdao, China
Company:	Client: Qinghuangdao District Heating Company
Position:	Site manager
Description:	*Implementation* Site Manager of a 10 MUSD District Heating Project in Qinhuangdao. Finnida project.

Date: from (month / year) to (month / year)	05/2000 to 09/2000
Location:	Qinghuangdao, China
Company:	Client: Qinghuangdao District Heating Company
Position:	Senior Advisor
Description:	*Senior Technical Advisor* A new district heating distribution project in Qinhuangdao. Financed by Finnida.

Date: from (month / year) to (month / year)	10/1999 to 06/2000
Location:	Porsgrunn, Norway, Kosovo
Company:	Client: Fortum Värme
Position:	Project manager
Description:	*Feasibility study* Feasibility study regarding establishment of district heating in the city of Porsgrunn, utilising waste energy from a chemical industry.

Date: from (month / year) to (month / year)	05/2000 to 08/2000
Location:	Pristina, Gjakova Kosovo
Company:	Client: Sida
Position:	Project manager
Description:	*Tender documents, evaluation, contract* Preparing tender documents, evaluation of bids and preparing contracts for two District Heating rehabilitation projects in Pristina and Gjakova.

Date: from (month / year) to (month / year)	10/1999 to 04/2000
Location:	Pristina, Kosovo
Company:	Client: Sida
Position:	Project manager
Description:	*Implementation of a rehabilitation project* Implementation, rehabilitation and modernisation of the District Heating system in Pristina.

Date: from (month / year) to (month / year)	08/1999 to 10/1999
Location:	Pristina, Kosovo
Company:	Client: Sida
Position:	Project manager
Description:	*Project appraisal* Project appraisal for a rehabilitation and modernisation district heating project in Pristina

Date: from (month / year) to (month / year)	05/1998 to 08/1999
Location:	Vilnius, Lithuania
Company:	Client: The World Bank and Sida
Position:	Project manager
Description:	*Feasibility study* Responsible for the technical team regarding transmission, distribution system and substations in a feasibility study for rehabilitation and modernisation of production and distribution of district heating for the city of Vilnius. Least cost option DH rehabilitation compared with decentralisation. CHP study. Technical, environmental, economic, financial and institutional analyses.

Date: from (month / year) to (month / year)	1998 to 1998
Location:	Stockholm, Sweden
Company:	Client: Sifu
Position:	Project manager
Description:	*Seminar*

	Project manager for a three days seminar regarding small-scale energy production, natural gas and bio fuel.

Date: from (month / year) to (month / year)	1998 to 1998
Location:	Shanxi Province, P.R. China
Company:	Client: Sida
Position:	Project manager
Description:	*Project appraisal* Project appraisal and evaluation regarding a Coal Seam Gas Power Generating Plant. For a big Coal mine in Shanxi province.

Date: from (month / year) to (month / year)	1998 to 1998
Location:	Haikou Province, P.R. China
Company:	Client: Sida
Position:	Project manager
Description:	*Negotiations* Responsible for negotiations regarding a landfill project in Haikou

Date: from (month / year) to (month / year)	1997 to 1998
Location:	Sevastopol, Ukraine
Company:	Client: The World Bank and Sida
Position:	Project manager
Description:	*Feasibility study* Phase II a review of a new energy company Sevteploservice. Technical, environmental, economic, financial and institutional analyses.

Date: from (month / year) to (month / year)	1996 to 1997
Location:	Sevastopol, Ukraine
Company:	Client: The World Bank and Sida
Position:	Project manager
Description:	*Feasibility study* Project manager for a feasibility study Phase I for rehabilitation and modernisation of production and distribution of district heating for the city of Sevastopol. Least cost option DH rehabilitation compared with decentralisation. CHP study. Technical, environmental, economic, financial and institutional analyses.

Date: from (month / year) to (month / year)	04/1995 to 06/1995
Location:	Gdansk, Poland

Company:	Client: Sida
Position:	Project manager
Description:	*Waste Master plan* Negotiations for a waste master plan project concerning the cities Gdansk and Gdynia

Date: from (month / year) to (month / year)	01/1995 to 12/1998
Location:	Shijiazhuang, China
Company:	Client: Sida
Position:	Project manager
Description:	*Turn key project* A new district heating plant (35+75 t/h coalfired steamboilers). The project consisted of delivery of equipment and material to a district heating plant. It also included education, training and engineering. Financed by Sida

Date: from (month / year) to (month / year)	09/1994 to 12/1994
Location:	Jiamusi, Fushun, Shijiazhuang, China
Company:	Client: Sida
Position:	Project manager
Description:	*Negotiations* Negotiations for three different district heating project, consisting of delivery of equipment and material, also including education, training and engineering financed by Swedish Governmental soft loans

15. Others:

16. Publications:

Mikael Jönsson - Technical specialist, DH engineer

1. **Family name:** **JÖNSSON**
2. **First name(s):** **Mikael**
3. **Date of birth:** 24 July 1962
4. **Nationality:** Swedish
5. **Education:**

Institution (name, place, country):	Lunds tekniska högskola (Lund Institute of Technology) Lund, Sweden
Date: from - to (month/year):	09/82 - 06/86
Degree(s) or Diploma(s) obtained:	Master of Science in Engineering Physics
Institution (name, place, country):	Folkuniversitet, Stockholm, Sweden
Date: from - to (month/year):	01/98 – 06/99
Degree(s) or Diploma(s) obtained:	University level courses in Law and Economy (25 p)
Institution (name, place, country):	Malmö University, Malmö, Sweden
Date: from - to (month/year):	09/14 – 01/15; 09/15-01/16
Degree(s) or Diploma(s) obtained:	Russian I-II, 30 hp (equivalent to one semester)

Recent courses:

May 2013, Contract Law, Malmö, Sweden

April 2012, Public Procurement, Malmö, Sweden

May 2008, Practical Use of FIDIC Contract Conditions, ECV/FIDIC, Doha, Qatar

6. **Language skills:** (Mark 1 to 5 for competence, 5 being the highest)

Language	Reading	Speaking	Writing
Swedish (mother tongue)	5	5	5
English	5	4	4
German	3	3	3
Danish and Norwegian	5	3	3
Russian	2	1	1
Ukrainian	1	1	1

7. **Other skills (e.g. computer literacy, etc.):**

Very good general computer skills and knowledge of standard software, e.g. MS Office (Word, Excel, PowerPoint, Outlook, Access, Project, Visio, VBA). Basic knowledge of AutoCAD.

8. **Present position:**

Senior Consultant

9. **Years within the firm:**

Third year at Sweco

10. **Key qualifications (relevant to the Assignment):**

- 30 years' experience from the energy and environment sector
- Feasibility studies including technical and financial analyses
- Procurement and contracts
- District energy – production, distribution and customer installations
- Energy efficiency
- Heat and power production, CHP, renewable fuels

- Experience from Ukraine, Moldova, UK, Russia, Poland, Azerbaijan, Middle East, Tanzania, Germany, the Netherlands and Scandinavia
- Highly flexible and mobile

11. Specific experience in Eastern Europe and CIS countries:

Country	*Date: from (month / year) to (month / year)*
Ukraine	September 2009 to present (about 70 visits)
Azerbaijan	March 2010 to September 2010 (full time)
Moldova	November 2015
Russia	April 1997 to April 1999
Poland	February 1995 to November 1995

12. Selected Professional Experience Record:

Assignment:	Energy Efficiency in Public Building in Lutsk, Feasibility Study
Country:	Ukraine
Company:	Sweco
Beneficiary:	NEFCO
Position:	Technical Expert
Period:	June 2016 – ongoing
Description, role:	Technical Expert The main result of the feasibility study, which includes 40 public buildings in the city of Lutsk, will be a priority investment programme for energy efficiency measures.

Assignment:	District Heating in Stoke-on-Trent, Feasibility Study
Country:	UK
Company:	Sweco
Beneficiary:	Springnet-Heatnet UK Ltd
Position:	Project Manager
Period:	March 2016 – ongoing
Description, role:	Feasibility study on the development of a district heating system in the city of Stoke-on-Trent.

Assignment:	DemoUkrainaDH - Coordination and Communication Support Services
Country:	Ukraine
Company:	Grontmij AB /Sweco
Beneficiary:	NEFCO
Position:	Project Manager
Period:	December 2015 – ongoing
Description, role:	Team Leader and Coordination Consultant (CC) from December 2015. Grontmij AB has carried out Coordination and Communication Support Services since January 2012 to NEFCO in connection with the DemoUkrainaDH funding facility for demonstration projects in the District Heating sector of Ukraine. The funding facility is established by NEFCO and Sida in cooperation with the Ministry of Construction, Housing and Municipal Economy of Ukraine. The Eastern Europe Energy Efficiency and Environment Partnership (E5P) Fund

	finances Technical Assistance for the funding facility. The objective of the DemoUkrainaDH facility is to support the development and funding of 20 sustainable and energy efficient demonstration projects in Ukraine's district heating (DH) sector.

Assignment:	CHP Conversion
Country:	Sweden
Company:	Grontmij AB / Sweco
Beneficiary:	Ronneby Miljö & Teknik AB
Position:	Project Manager
Period:	April 2015 – ongoing
Description, role:	Project Manager for conversion from heat only to CHP, including conversion of a biomass-fired hot water boiler (9 MW) into a steam boiler and procurement of a wet steam turbine including auxiliary equipment.

Assignments:	Due Diligence of Swedish District Heating Companies (two assignments)
Country:	Sweden
Company:	Sweco Energuide AB
Beneficiary:	(i) International Investor and (ii) Bank
Position:	Technical Expert
Period:	November 2016 – ongoing
Description, role:	Analysis, site visits, collection of information, reporting, etc during two due diligence processes in relation to potential acquisition and refinancing.

Assignment:	Review of Business Plan for NEFCO ESC Project
Country:	Ukraine
Company:	Grontmij AB / Sweco
Beneficiary:	GIZ
Position:	Project Manager
Period:	December 2015 – April 2016
Description, role:	Review and preparation of business plan for a NEFCO loan for energy efficiency measures in public buildings in Odessa in cooperation with the GIZ local consultant.

Assignment:	Cleaner Production and Energy Saving Credits
Country:	Ukraine
Company:	Grontmij AB / Sweco
Beneficiary:	Sida and NEFCO
Position:	Project Manager and Technical Expert
Period:	December 2014 – December 2016
Description, role:	Technical assistance for energy efficiency projects in Ukraine; preparation of Environment, Energy and Financial Surveys and preparation of Business Plans. Projects include industrial energy efficiency, municipal buildings (insulation, windows, district heating substations, internal heating systems, etc) and street lighting. This far 11 municipal projects have been carried through or started.

Assignment:	RAVA – Tools for Planning of Maintenance and Renewal of DH Networks
Country:	Sweden

Company:	Grontmij AB / Sweco
Beneficiary:	Swedish District Heating Association and Swedish Energy Agency
Position:	Project Manager
Period:	January 2015 – March 2016
Description, role:	The objective of the study is to propose ways in which risk assessment and vulnerability analysis (RAVA) can be used as a tool for planning maintenance and renewal of district heating networks. Questions that are intended to be answered in this study are: How do the RAVA work and how are they structured? What parameters are important and which systems do district heating companies use today? How do related industries work with RAVA?

Assignment:	Tariff Review for ANRE (The National Energy Regulatory Agency)
Country:	Moldova
Company:	Grontmij AB
Beneficiary:	Sida
Position:	Energy Expert
Period:	October 2015 – December 2015
Description, role:	External assistance to provide a transparent, uniform and objective tariff audit with regard to the justifications for the tariff increases presented by the national distribution, transport and supply companies for electricity and gas.

Assignment:	Analysis on Energy and Construction
Country:	Nordic Countries
Company:	Grontmij AB
Beneficiary:	Nordic Council of Ministers
Position:	Energy Expert
Period:	March 2015 – October 2015
Description, role:	Analysis of the Nordic market players' needs, constraints, preferences and benefits of an increased Nordic authority cooperation on energy issues in construction and buildings.

Assignment:	District Heating Feasibility Studies
Country:	Sweden
Company:	Grontmij AB
Beneficiary:	Municipality of Ekerö
Position:	District Heating Expert
Period:	July 2014 – September 2015
Description, role:	Feasibility studies on the establishment of district heating in central Ekerö and in Stenhamra.

Assignment:	Due Diligence of Swedish Energy Company
Country:	Sweden
Company:	Grontmij AB
Beneficiary:	International Investor
Position:	Technical Expert
Period:	December 2014 – March 2015

Description, role:	Analysis, site visits, collection of information, reporting, etc during an extensive technical and commercial due diligence process in relation to potential acquisition.

Assignment:	Second Opinion on CHP Project
Country:	Sweden
Company:	Grontmij AB
Beneficiary:	City of Borås
Position:	CHP Expert
Period:	August 2014 – January 2015
Description, role:	Second opinion on a planned 3,000 million SEK investment in a new biomass-based CHP plant and a new waste water treatment plant.

Assignment:	Consultancy Services for Procurement of a Project Consultant for the Hale Rehabilitation Project
Country:	Tanzania
Company:	Grontmij AB
Beneficiary:	Sida and Tanzania Electric Supply Company (TANESCO)
Position:	Procurement Expert
Period:	January 2014 – January 2015
Description, role:	Consulting services for assistance to TANESCO in the procurement of the Project Consultant for the Hale Hydropower Rehabilitation Project from Expression of Interest to final contract.

Assignment:	Programme Document regarding Swedish Financial Support to the Rural Energy Fund
Country:	Tanzania
Company:	Pöyry SwedPower AB
Beneficiary:	Sida and Rural Energy Agency, Tanzania
Position:	Energy Expert
Period:	December 2013 – November 2014
Description, role:	Consulting services for assistance in the formulation of a programme document regarding Swedish Financial Support to the Rural Energy Fund in Tanzania including (i) review of background documents, (ii) interviews with key stakeholders in Tanzania and (iii) assistance to support the Rural Energy Agency to formulate the programme document.

Assignment:	Cleaner Production and Energy Saving Credits
Country:	Ukraine
Company:	Pöyry SwedPower AB
Beneficiary:	Sida and NEFCO
Position:	Project Manager and Technical Expert
Period:	November 2011 – October 2014
Description, role:	Technical assistance for energy efficiency projects in Ukraine; preparation of Environment, Energy and Financial Surveys and preparation of Business Plans. 16 projects were carried through of which 14 were municipal projects. Projects include industrial energy efficiency, municipal buildings (insulation, windows, district heating substations, internal heating systems, etc) and street lighting.

Assignment:	Kosovo District Heating

Country:	Kosovo
Company:	Pöyry SwedPower AB
Beneficiary:	Sida
Position:	District Heating Expert and Team Leader
Period:	November-December 2012 and September 2013 – January 2014
Description, role:	Two assignments: 1. Review of the existing documentation concerning a district heating rehabilitation project in Pristina, Kosovo Heating Project. The aim was to give a second opinion on the project before Sida's involvement in the project. 2. Monitoring consultant for Sida activities in the district heating rehabilitation project in Pristina.

Assignment:	Carpe Futurum
Country:	Sweden
Company:	Pöyry SwedPower AB
Beneficiary:	Vattenfall AB
Position:	Project Engineer
Period:	September 2012 – January 2014
Description, role:	Planning phase of new biomass CHP in Uppsala, Sweden. Functionality analysis and initial technical specifications. Study on the connection of the new CHP to the existing district heating system.

Assignment:	Örtofta CHP
Country:	Sweden
Company:	Pöyry SwedPower AB
Beneficiary:	Lunds Energi AB / Kraftringen Produktion AB
Position:	Procurement Expert
Period:	October 2011 – January 2014
Description, role:	Work with Balance of Plant for new biomass CHP in Örtofta, Sweden. Several procurements based on ABA 99, AB 04, ABM 07. Follow-up work (claims etc) during installation.

Assignment:	Joint Energy Sector Review 2012/13
Country:	Tanzania
Company:	Pöyry SwedPower AB
Beneficiary:	Sida and Ministry of Energy and Minerals, Tanzania
Position:	Energy Expert
Period:	July 2013 – December 2013
Description, role:	The objective of the study was to review the overall performance of the energy sector, the implementation of the energy policies and strategies, sector governance and financing structure. The study covers the whole energy sector, including Consumption & Supply; Policy & Strategy; Electricity; Petroleum & Gas; Renewable Energy; and Sector Financing.

Assignment:	LNG for Rockwool
Country:	Norway
Company:	Pöyry SwedPower AB
Beneficiary:	Rockwool Scandinaiva AS
Position:	Project Manager and Procurement Expert

Period:	February 2013 – June 2013
Description, role:	Procurement of an LNG reception station for Rockwool in Moss, Norway.

Assignment:	UKEEP
Country:	Ukraine
Company:	Vattenfall Power Consultant AB
Beneficiary:	EBRD, Ukrainian Commercial Banks
Position:	Technical Expert
Period:	September 2009 – May 2013
Description, role:	Technical expert in UKEEP - Ukraine Energy Efficiency Programme. Project identification, promotion work, project screening, energy surveys. Vattenfall Power Consultant's project manager for the project. Speaker at several UKEEP seminars in Ukraine. Participated in several site visits and also performed energy surveys in different industries.

Assignment:	Heat Buffers
Country:	Netherlands and Germany
Company:	Pöyry SwedPower AB
Beneficiary:	Vattenfall AB
Position:	Technical Expert
Period:	January 2012 – April 2012
Description, role:	Due diligence of modelling and design of heat buffers at CHP plants in Amsterdam and Berlin.

Assignment:	Quality Assurance of Gas Metering Systems
Country:	Sweden
Company:	Pöyry SwedPower AB
Beneficiary:	E.ON Gas AB
Position:	Project Engineer
Period:	February 2011 – August 2011
Description, role:	Quality assurance of the natural gas metering systems.

Assignment:	Employer's Representative
Country:	Azerbaijan
Company:	Vattenfall Power Consultant AB
Beneficiary:	EIAB and Azerbaijan Ministry of Economic Development
Position:	Team Leader
Period:	March 2010 – September 2010
Description, role:	Team Leader for the Employer's Representative (EIAB) during the construction of a waste incineration plant for 500,000 tons of waste per year and with a net electric power generation of 33 MW. FIDIC Design Build Operate Contract. 7 months full time at the site.

Assignment:	Feasibility Study
Country:	Sweden
Company:	Vattenfall Power Consultant AB
Beneficiary:	Ystad Energi AB
Position:	Senior Consultant

Period:	November-December 2009
Description, role:	Study concerning the use of a flue gas condenser and a hot water accumulator in the bio-fuel based district heating plant in Ystad.

Assignment:	District Cooling in Bahrain
Country:	Bahrain
Company:	Tabreed Bahrain (Bahrain District Cooling Company)
Beneficiary:	-
Position:	Manager, Projects & Engineering
Period:	March 2007 - September 2009
Description, role:	As Manager of the Projects & Engineering Department involved in all aspects of the first district cooling system in Bahrain – planning, financial analyses, marketing, permit processes, design and realisation of district cooling plants, district cooling networks and energy transfer stations in customer buildings. Procurement of equipment, consultants and contractors (FIDIC White, Red, Yellow and Silver).

Assignment:	Energy Efficiency Study
Country:	Norway
Company:	Vattenfall Power Consultant AB
Beneficiary:	Hydro AS
Position:	Technical Expert
Period:	2007
Description, role:	Energy efficiency study in Herøya Industrial Park. Team member.

Assignment:	Boiler Reconstruction Study
Country:	Sweden
Company:	Vattenfall Power Consultant AB
Beneficiary:	Dalkia Industry Partner AB
Position:	Technical Expert
Period:	2007
Description, role:	Study on reconstruction of boiler plant at industrial site. Team member.

Assignment:	Energy Efficiency Study
Country:	Sweden
Company:	Vattenfall Power Consultant AB
Beneficiary:	Höganäs AB
Position:	Technical Expert
Period:	2007
Description, role:	Energy efficiency study at metal powder mill. Team member.

Assignment:	District Heating Feasibility Study
Country:	Norway
Company:	Vattenfall Power Consultant AB
Beneficiary:	Vattenfall AB
Position:	Technical Expert
Period:	2006-2007

Description, role:	District Heating Feasibility study in Kirkenes. Responsible for distribution and customer parts.

Assignment:	Procurements, Windpower
Country:	Sweden
Company:	Vattenfall Power Consultant AB
Beneficiary:	Vattenfall AB, Windpower
Position:	Procurement Expert
Period:	2005-2007
Description, role:	Several procurements for offshore and land based wind power plants, e.g. Lillgrund and Krieger's Flak (FIDIC, AB, ABT, ABA, etc).

Assignment:	District Heating
Country:	Sweden
Company:	Vattenfall Power Consultant AB
Beneficiary:	Vattenfall AB, Nordic Heat
Position:	Project Manager
Period:	2004-2007
Description, role:	Project Manager for district heating projects: • Procurement of exhaust gas condenser for Höganas Bjuv AB ceramic industry • Pre-feasibility study and procurement of new bio-fuel based production for Fisksätra District Heating Plant • Procurement of a new bio-fuel based production plant for Gustavsberg District Heating System • Studies, procurement and realisation of district heating expansion in Bjuv

Assignment:	Risk Analysis
Country:	Sweden
Company:	Vattenfall Power Consultant AB
Beneficiary:	Österlens Kraft AB
Position:	Project Manager
Period:	2006
Description, role:	Risk Analysis for district heating system in Simrishamn. Project Manager

Assignment:	Functionality Analysis
Country:	Sweden
Company:	Vattenfall Power Consultant AB
Beneficiary:	Lunds Energi AB
Position:	Senior Consultant
Period:	2005
Description, role:	Analysis of the impact on the total district heating system functionality of a new transmission pipeline and a new CHP plant.

Assignment:	District Heating in Trelleborg
Country:	Sweden
Company:	Vattenfall Power Consultant AB
Beneficiary:	Trelleborgs Fjärrvärme AB
Position:	Procurement Expert

Period:	2005
Description, role:	Procurement of a new bio-fuel based district heating plant in Trelleborg.

Assignment:	AMR and Measurement Database
Country:	Sweden
Company:	Vattenfall Power Consultant AB
Beneficiary:	C4 Energi AB
Position:	Procurement Expert
Period:	2005
Description, role:	Procurement and implementation of Automatic Meter Reading and Measurement Database systems for all electricity and district heating customers in Kristianstad.

Assignment:	District Heating in Markaryd
Country:	Sweden
Company:	Vattenfall Power Consultant AB
Beneficiary:	Markaryds fjärrvärmeverk AB (Sydkraft AB /E.ON AB)
Position:	Senior Consultant
Period:	2004-2005
Description, role:	Project for the establishment of district heating in Markaryd. Managed in cooperation with the CEO the project including technical design, procurement, sales and marketing and project coordination.

Assignment:	CIS System
Country:	Sweden
Company:	Unicon Konsult AB
Beneficiary:	Lunds Energi AB
Position:	Procurement Expert
Period:	2003-2004
Description, role:	Projects for the procurements of a new customer information system and a new telephone system for a utility company (district energy, gas, electricity).

Assignment:	Närvärme
Country:	Sweden
Company:	Närvärme Sverige AB
Beneficiary:	-
Position:	Manager of Technical Department and Business Developer
Period:	1999-2003
Description, role:	Projects for establishing small-scale bio-fuel based district heating in several Swedish towns, e.g. Trosa, Vingåker, Söderköping, Vaxholm, Vallentuna and Vagnhärad. Involved in most aspects of the activities, e.g. due diligences in connection with acquisitions of existing businesses, marketing, planning, analyses, permit issues, choice of equipment and design of production plants, distribution networks and customer installations, procurement and project realisation.

Assignment:	Status Review
Country:	Russia
Company:	ÅF Energikonsult Stockholm AB

Beneficiary:	IVO Power Engineering, Finland
Position:	Senior Consultant
Period:	1997, 1998
Description, role:	Status of completion review of CHP plant in St Petersburg, Russia.

Assignment:	District Heating Study
Country:	Russia
Company:	ÅF Energikonsult Stockholm AB
Beneficiary:	Sida (The Swedish Agency for International Development Cooperation)
Position:	Technical Team Manager
Period:	1998
Description, role:	District heating rehabilitation study in Gatchina, Russia.

Assignment:	District Heating Study
Country:	Russia
Company:	ÅF Energikonsult Stockholm AB
Beneficiary:	Sida (The Swedish Agency for International Development Cooperation)
Position:	Technical Expert
Period:	1997
Description, role:	District heating rehabilitation study in Novgorod, Russia

Assignment:	CHP Study
Country:	Poland
Company:	ÅF Energikonsult Stockholm AB
Beneficiary:	EC Białystok
Position:	Project Manager
Period:	1995
Description, role:	Study concerning a CHP plant in Białystok – market potential for heat and power and rehabilitation measures for the production plant.

Assignment:	CHP Study
Country:	Poland
Company:	ÅF Energikonsult Stockholm AB
Beneficiary:	Inter-EC
Position:	Technical Expert
Period:	1995
Description, role:	Study of the market potential for heat and power of three CHP plants in the Katowice region – Bedzin, Bytom and Chorzow

13. Employment Record:

Date: from - to (month/year):	02/14 -
Location:	Malmö, Sweden
Company:	Grontmij AB / Sweco
Position:	Senior Consultant
Description:	Projects related to energy and environment

Date: from - to (month/year):	09/09 – 01/14
Location:	Malmö, Sweden

Company:	Vattenfall Power Consultant AB / Pöyry SwedPower AB
Position:	Senior Consultant
Description:	Projects related to energy and environment

Date: from - to (month/year):	03/07 - 09/09
Location:	Manama, Bahrain
Company:	Tabreed Bahrain (Bahrain District Cooling Company)
Position:	Manager, Projects & Engineering
Description:	Involved in all aspects of the first district cooling system in Bahrain

Date: from - to (month/year):	09/04 – 03/07
Location:	Helsingborg, Sweden
Company:	SwedPower AB / Vattenfall Power Consultant AB
Position:	Senior Consultant
Description:	Projects related to energy and environment

Date: from - to (month/year):	04/03 – 09/04
Location:	Helsingborg, Sweden
Company:	Unicon Konsult AB
Position:	Consultant
Description:	Procurement projects in the energy sector.

Date: from - to (month/year):	11/99 – 04/03
Location:	Täby and Helsingborg, Sweden
Company:	Närvärme Sverige AB
Position:	Manager of Technical Department and Business Developer
Description:	Projects for establishing small-scale bio-fuel based district heating in several Swedish towns, e.g. Trosa, Vingåker, Söderköping, Vaxholm, Vallentuna and Vagnhärad.

Date: from - to (month/year):	01/87 - 11/99
Location:	Stockholm, Sweden
Company:	ÅF-Energikonsult Stockholm AB
Position:	Consultant
Description:	Projects related to energy and environment

14. Publications:

- **2016:** Behov av nordiskt samarbete inom byggande och energi, Nordiska ministerrådet, ISBN 9789289344180, Henrik Gåverud, Mikael Jönsson, Johan Lindenfors
  "Demand for increased Nordic cooperation in construction and energy, Nordic Council"
- **2015**: Riskhantering för underhåll av fjärrvärmenät – bakgrund, erfarenheter och förslag, Fjärrsyn 2015:185, ISBN 9789176731857; Kerstin Sernhed, Mikael Jönsson, My Olsson
  "Risk management for district heating network maintenance – background, experiences and suggestions"

Anders Ellegård - Environmental and social expert

Name of Staff: **ANDERS ELLEGÅRD**

1. **Date of Birth:** 26 May 1952
2. **Nationality:** Swedish
3. **Civil Status:** Married
4. **Education:**

Institution/Date	Degree(s) or Diploma(s) obtained
Göteborg University, Göteborg, Sweden, 09/1993– 06/1997	PhD. Human Ecology
Göteborg University, Göteborg, Sweden, 09/1974– 06/1980	BSc. in Chemistry, Biology and Human Ecology
Swedish Army, Sweden, 09/1973– 05/1974	Compulsory Military Service Training

5. **Language Skills:** Indicate competence on a scale of 1 to 5 (5 being the highest competence)

Language	Reading	Speaking	Writing
English	5	5	5
Swedish (Mother tongue)	5	5	5
French	4	4	3
Russian	1	1	1

6. **Membership of Professional Bodies:** International Association of Impact Assessment (IAIA)
7. **Other skills:** GPS and Georeferencing, SPSS (Statistics), ARCGIS
8. **Present position:** Senior Environmental and Social Analyst
9. **Years within the firm:** 3 years (since May 2013)
10. **Key Qualifications:**

- Ellegård holds a Ph.D. in Human Ecology. He has been responsible for full environmental and social impact assessments for several energy- and other infrastructure projects, most recently 220 kV transmission Makambako-Songea (Tanzania 2012), 330 kV transmission Mombasa-Nairobi (Kenya 2007). He has recently completed the ESIA for a 220 kV substation and rural distribution in Kilombero and Ulanga districts (Tanzania 2014), and he is the project manager and team leader for the ESIA in Zambia of the 400 kV ZIZABONA transmission line from Livingstone to Sesheke. Among other projects he was the project leader for the ADB feasibility study of O Mon Thermal Power Complex in Vietnam 2007-2008, where he was the leader of a team of 12 international and national experts. Most international EISA projects carried out by Dr. Ellegård have included development of the resettlement and compensation action plan (RAP).
- Dr. Ellegård has a long-standing experience in field data gathering, including environmental data and social surveys. Dr. Ellegård has excellent skills in communicating and reporting in English, and thorough working experience in statistical data analysis using the IBM-SPSS package. He is good at French, has a basic knowledge of Portuguese and Spanish, and some acquaintance with Russian and Kiswahili.

13. Specific EBRD Country Experience:

Country	Date from - Date to	Country	Date from - Date to
Belarus	04/2009- 0472009	Serbia	07/2003-08/2003, 07/2010-03/2011
Poland	07/2004	Turkey	09/2009- 06/2010
Romania	06/2009- 10/2011	Ukraine	04/ 2015-08/2015, 08/2011-0/2014

12 Professional Experience Record:

Date: (from-to)	12/2015
Location:	Gulf Region
Company:	Sweco Energuide AB, Sweden
Position:	Environmental and Social Impact Analyst
Description:	Environmental due diligence for seawater desalination in the Arabian Gulf using reverse osmosis. **Contracting Entity/Client Reference**: Name: Costin Lupu, Monsson Group, Tel: +974 55926809 , costin.lupu@monssongroup.com

Date: (from-to)	July 2015 – February 2016
Location:	Tajikistan
Company:	Sweco Energuide AB, Sweden
Position:	Senior Environmental and Social Advisor
Description:	**ESIA Development for Sebzor Hydropower Plant *(Aga Khan Development Network)*** *Activities Performed*: Environmental and social impact assessment, Environmental Monitoring Plan, Stakeholder Engagement Plan, Resettlement and Compensation Action Plan. **Contracting Entity/Client Reference**: Name: Daler Jumaev, Pamir Energy, daler.jumaev@pamirenergy.com

Date: (from-to)	May 2015 – Present

Location:	Mozambique
Company:	Sweco Energuide AB
Position:	Senior Environmental and Social Advisor
Description:	**Environmental Due Diligence and Assistance to EMP Development for Corumana Hydropower Plant *(Sida)*** *Activities Performed*: • Occupational health and safety assessment. **Contracting Entity/Client Reference**: Name: Ildo Rufino Electricidade de Moçambique, Tel:+258 21 499 978 , Fax: +258 21 493 002, e-mail: ildo.rufino@edm.co.mz

Date: (from-to)	April 2015 – November 2015
Location:	Ukraine
Company:	Sweco Energuide AB
Position:	Senior Environmental and Social Advisor
Description:	**Environmental due diligence and assistance to EMP development for Lviv Teploenergo *(EBRD*)** *Activities Performed*: • Occupational health and safety assessment. **Contracting Entity/**Client Reference: Name: Olivier Oudin, Company: Egis International, Olivier.oudin@egis.fr

Date: (from-to)	April 2014 – April 2015
Location:	Tanzania
Company:	Sweco Energuide AB
Position:	Senior Environmental and Social Advisor
Description:	**Feasibility Study for 220/33 kV Substation and 100 km Rural Distribution in Kilombero and Ulanga districts of Morogoro Region**. ***(European Union)*** *Activities Performed*: • Environmental and social impact assessment including socio-economic survey, public and stakeholder consultations. **Contracting Entity/**Client Reference: Name: Bengiel H. Msofe, Rural Energy Agency, Tel: +255 784 969 313 , e-mail: bmsofe@rea.go.tz

Date: (from-to)	September 2014-October 2014
Location:	Uganda
Company:	Sweco Energuide AB
Position:	Senior Environmental and Social Advisor
Description:	*Activities Performed*: • Policy advice to East African Community regarding the role of EAC with respect to energy development in member states. **Contracting Entity/**Client Reference: Name: Jean-Claude Nsengiyumva, EAC-HQ, Tel: +255 27 2162100 , Fax: +255 27 2162102, e-mail: eac@eachhq.org

Date: (from-to)	April 2014-July-2014
Location:	Kazakhstan
Company:	Sweco Energuide AB
Position:	Environmental Advisor
Description:	**Shardarinskaya Hydropower Project Rehabilitation *(EBRD)*** *Activities Performed*: • Occupational Health And Safety Assessment. **Contracting Entity/**Client Reference: Brendan Quigley, Stucky Ltd. Brendan.quigley@stucky.com

Date: (from-to)	July 2013-August 2013
Location:	Tanzania
Company:	Sweco Energuide AB
Position:	Senior Environmental and Social Advisor
Description:	**Participation in Bid Evaluation for Distribution part of Makambako-Songea 220 kV and Rural Electrification Project *(Sida)*** **Contracting Entity/Client Reference**: Name: William G. Mhando, TANESCO, Tel: +255 22 245 1130 , Fax: +255 22 245 2026

Date: (from-to)	August 2011–April 2014
Location:	Ukraine
Company:	Vattenfall Power Consultant, Pöyry SwedPower AB
Position:	Ukraine
Description:	**ESIA and Feasibility Study for 330 kV Transmission Line Novoodesskaya-Artsyz *(EBRD)*** *Activities Performed*: • Drafting and studying line route alternatives, environmental impact assessment, and stakeholder engagement program. **Contracting Entity/Client Reference**: EBRD, London, UK. Tel.: +44 20 7338 6000. E-mail: consultants@ebrd.com

Date: (from-to)	September 2010 – April 2011
Location:	Saudi Arabia/Egypt
Company:	Vattenfall Power Consultant/Pöyry SwedPower AB
Position:	Senior Environmental Advisor
Description:	**Submarine HVDC transmission, feasibility study for connection** **Contracting Entity/Client Reference**: Name: Ola Oskarsson, Company: Marin Mätteknik AB Tel: +46 31 762 03 00 , e-mail: ola.oskarsson@mmtab

Date: (from-to)	May 2010- August 2011
Location:	Sweden
Company:	Vattenfall Power Consultant
Position:	Environment Advisor
Description:	Development of Environmental Competence Network in Vattenfall Business Unit Engineering. **Contracting Entity/Client Reference**: Name: Magnus Hemmingson, Vattenfall BUE e-mail: Info@vattenfall.com

Date: (from-to)	July 2009- March 2011
Location:	Serbia

Company:	Vattenfall Power Consultant
Position:	Environment Advisor
Description:	**Serbia Wind Integration Study (EBRD)** Impact assessment of alternative extensions of the transmission system in Serbia for wind power integration. Leader of environmental assessment component. **Contracting Entity/Client Reference**: EBRD, London, UK. Tel.: +44 20 7338 6000. E-mail: consultants@ebrd.com

Date: (from-to)	June 2009- October 2011
Location:	Romania/Turkey
Company:	Vattenfall Power Consultant
Position:	**Senior Environmental Advisor**
Description:	**Submarine HVDC Transmission, Feasibility Study Project** **Contracting Entity/Client Reference**: Name: Neli Paun, Transelectrica e-mail: Neli.paun@transelectrica.ro

Date: (from-to)	April 2009-June 2009
Location:	Liberia
Company:	Vattenfall Power Consultant
Position:	Senior Environmental Advisor
Description:	**Social and Environmental Aspects, Biomass Fuel Project** Environmental Due Diligence for biomass supply project **Contracting Entity/Client Reference**: Name: Sara Nordström, Vattenfall e-mail: sara.nordstrom@vattenfall.com

Date: (from-to)	2009
Location:	Chile
Company:	Vattenfall Power Consultant
Position:	Senior Environmental Advisor

Description:	**Submarine HVDC Transmission Project** Environmental study **Contracting Entity/Client Reference**: Name: Transelec S/A

Date: (from-to)	2009
Location:	Vietnam
Company:	Vattenfall Power Consultant
Position:	Senior Environmental and Social Advisor
Description:	**Due Diligence of Nam Khoa 3 Hydropower Project** *Activities Performed*: • Occupational Health and Safety assessment. **Contracting Entity/Client Reference**: Vattenfall Europe, Berlin

Date: (from-to)	2009
Location:	Laos
Company:	Vattenfall Power Consultant
Position:	Senior Environmental and Social Advisor
Description:	**Due Diligence of Xeset 2 Hydropower Project** Environmental and social due diligence **Contracting Entity/Client Reference**: Vattenfall Europe, Berlin

Date: (from-to)	February 2009 – February 2014
Location:	Ghana
Company:	VPC AB, Pöyry SwedPower, Sweco
Position:	Environmental Health and Safety Expert
Description:	**West African Power Pool 330 kV Transmission.** *Activities Performed*: • Environmental and occupational health and safety aspects. **Contracting Entity/Client Reference**: Name: Francis Kyere, Volta River Authority

Date: (from-to)	February 2009- February 2009
Location:	India
Company:	Vattenfall Power Consultant
Position:	Senior Environmental and Social Advisor
Description:	**Due Diligence of Bhilangana Hydropower Project** *Activities Performed*: Environmental and social due diligence **Contracting Entity/Client Reference**: Vattenfall Europe, Berlin

Date: (from-to)	2008
Location:	China
Company:	Vattenfall Power Consultant
Position:	Senior Environmental Advisor
Description:	**Due Diligence for Cdm Component of Hpp in Shaanxi Province** *Activities Performed*: • Occupational Health and Safety assessment. **Contracting Entity/Client Reference**: Vattenfall Europe, Berlin

Date: (from-to)	March 2007 –May 2009
Location:	Vietnam
Company:	Vattenfall Power Consultant
Position:	Team leader
Description:	**O Mon Thermal Power Complex** Social, environmental, technical, financial and economic assessment. *Activities Performed*: • Social impact assessment, resettlement and compensation. **Contracting Entity/Client Reference**: Name: Anthony J. Jude, Asian Development Bank Tel: (632) 632-6198, e-mail: ajude@adb.org

Date: (from-to)	May 2006- April 2007
Location:	Kenya
Company:	Vattenfall Power Consultant
Position:	Environmental and Social Advisor
Description:	**Environmental and Social Impact Assessment for 330 kV Overhead Transmission line Mombasa-Nairobi** **Contracting Entity/Client Reference**: Agence Francaise de Developpement

Date: (from-to)	October 2006- November 2006
Location:	Mozambique
Company:	SwedPower AB
Position:	Environmental and Social Advisor
Description:	**Environmental and Social Impact Assessment for Transmission line Chibata-Dondo** **Contracting Entity/Client Reference**: Electricidade de Mozambique

Date: (from-to)	2005-2006
Location:	Sweden
Company:	Vattenfall AB
Position:	Environmental and Social Advisor
Description:	**Environmental and Social Impact Assessment of Hydropower Development**

Date: (from-to)	2005
Location:	Mozambique
Company:	Vattenfall AB
Position:	Environmental and Social Advisor
Description:	**Environmental and Social Impact Assessment for the Rehabilitation of Mavuzi and Chicamba Hydropower Stations.** **Client:** Elctricidade de Mozambique

Date: (from-to)	2005
Location:	Ecuador
Company:	Vattenfall AB
Position:	Team Leader
Description:	**Institutional Framework for Market Development of Solar PV and Micro-hydro in Ecuador.** Project aimed at providing remote communities with renewable power under semi-commercial conditions. Client: Conam Ecuador

Date: (from-to)	2004-2005
Location:	Mozambique
Company:	Vattenfall AB
Position:	Environment and Energy Specialist
Description:	**Environmental and Social Impact Assessment of Rural Electrification Project in Sofala, Manica and Tete provinces, Mozambique.** Client: Sida

Christian Plahn - Technical specialist, DH engineer

Name of Firm:	SWECO International AB
Name:	Christian Plahn
Company	SWECO, Principal Engineer, District Heating technical, economical
Year of Birth	1960
Nationality	Swedish
Marital Status	Married
Years with Firm	30
Years of Experience	30

Key Qualifications

Planning, design, analysis and procurement of district heating systems. Planning of systems includes planning of all parts from heat production via distribution to substations. The design and analysis work comprises strength calculation, hydraulic analysis and heat loss calculations. Procurement includes the whole process from preparation of bidding documents to signing of contract.

Feasibility studies. Technical and economical valuation of district heating systems. Preparation and audits of Quality Assurance systems.

Employment Record

1999	SWECO Energuide AB / SWECO International AB, Stockholm, Sweden
1986-1999	VBB Anläggning AB / SWECO International AB, Stockholm, Sweden
1984	Fläkt AB, Stockholm, Sweden

Experience Record

2016-ongoing	Springnet AB – Heatnet & Nordic Heat. Responsible for analyses and planning a new district heating distribution system for the city Stoke-on-Trent, United Kingdom. The analyses included pressure drop calculations, routing and preparation of cost estimates for the pipe system.
2015-ongoing	Täby District Heating Company, Täby, Sweden Technical advisor to the district heating company. The city of Täby is building a new DH system comprising ca 430 substations and 66 km DH pipes ranging from DN 700 and smaller. The assignment comprises project management, preparation of tender documentation for procurement of various products and services, contract issues and audit of drawings, documents and protocols.

2014	Mora District Heating Company – E.ON, Mora, Sweden. Responsible for analyses of the district heating system in the city of Mora. The analyses included pressure drop calculations and preparation of recommended measures when rebuilding the system due to connection of new customers, change of heat production strategy and extension of the network.
2012-2014	Moldova Energy Projects Implementation Unit (MEPIU), Chisinau, Moldova Identification of Near-term Priority Investments and Preparation of their Technical Specifications and Tender Documents. Main project features: Consulting services for "Technical Assistance for Identification of Near-term Priority Investments and Preparation of their Technical Specifications and Tender Documents. Positions held: District heating engineer expert (pipes and substations).
2012	CHP Unit at Solid Waste Treatment Plant, City of Oujda, Morocco Analysis of existing CHP-plant, (gas motor fuelled with landfill gas) at the Solid Waste Treatment Plant, in Oujda, Morocco. Modification of gas motor cooling system.
2011-ongoing	Kiruna District Heating Company, Kiruna, Sweden. Responsible for analysis of consequences for the district heating system when a greater part of the city is moved due to land deformation caused by mining activities. The analysis included pressure drop calculations and preparation of recommended measures when rebuilding the system.
2011-ongoing	Kiruna District Heating Company, Kiruna, Sweden. Responsible for analyses and design of the extension of the district heating system in Kiruna. The analyses included pressure drop calculations and preparation of design documents for the recommended measures (pipes, pumping stations, substations) when rebuilding the system.
2010-2015	NKS – Nya Karolinska Solna, Hospital, Solna, Sweden Responsible for strength calculation of the district heating and cooling pipe system for the new hospital. Responsible for the hydraulic analyses of the district heating and cooling pipe system for the new hospital.
2010- ongoing	Ivano-Frankivsk District Heating Company, Ivano-Frankivsk, Ukraine. Support to the Project Implementation Unit (PIU) at Ivano-Frankivsk District Heating Company (Ivano-FrankivskTeploKommunEnergo, IFTKE). The PIU will implement the Priority Investment Project (PIP) based on a Feasibility Study. The main components in the PIP are: Installation of Individual Heating Substations (heat exchangers) in all buildings, Pipeline replacement, Installation of new burners, Replacement and installation of pumps, Installation of a SCADA system. Responsible for technical specifications for the pipeline replacement, preparation of tender documents and procurement as well as support to the PIU in the overall implementation of the PIP.

2009- 2011	Odessa District Heating Company, Odessa, Ukraine. Support to the Project Implementation Unit (PIU) at Odessa District Heating Company (Teplopostachannya Mista Odesi, TMO). The PIU will implement the Priority Investment Project (PIP) based on a Feasibility Study. The main components in the PIP are: Installation of Individual Heating Substations (heat exchangers) in all buildings, Pipeline replacement, Installation of new burners, Replacement and installation of pumps, Installation of a SCADA system. Responsible for technical specifications for the pipeline replacement, preparation of tender documents and procurement as well as support to the PIU in the overall implementation of the PIP.
2008-2009	Zhytomyr District Heating Company, Zhytomyr Ukraine, (financed by EBRD) Preparation of a ”Feasibility Study” for the Zhytomyr district heating system. The project comprises defining a bankable project, development of strategic and priority investment programme, preparation of financial analysis, development of new tariff system, affordability analysis, outline Service Agreement, determine implementation strategy and preparation of environmental analysis. Responsible for technical analyses regarding substations and distribution systems.
2008-2009	Tabreed District Cooling Company, Abu Dabu/Bahrain. Investigation and design of equipment for different district cooling plants. Cooling capacity 11 000-55 000 tons
2007-2008	Luftfartsverket (Swedish Civil Aviation Authority), Arlanda, Sweden Dimensioning of the district cooling distribution system at Arlanda airport. Responsible for the pressure drop calculations of the distribution system.
2008-2009	IKEA, Moscow, Russia.Analysis of heat and electricity supply options for IKEA's Mega Family Shopping Centers in Russia. Analysis of the energy market in Russia.
2006-2007	Ministry of Industry and Energy of the Russian Federation, Russia. Responsible for elaborating a set of policy guidelines for Arkhangelsk in order to reduce barriers to the implementation of energy efficiency projects. The project comprised: - Provide an analysis of Regional Energy Balances and assumptions for future development. - Conduct in-depth analysis of energy efficiency and energy saving in Arkhangelsk, preparation of a boiler rehabilitation program.- Develop an updated Regional Energy Efficiency Action Plan for year 2006-2010.

2006	Design and test a series of viable model energy efficiency projects and energy savings in the Arkhangelsk region. Deliver pre-feasibility studies for bankable energy efficiency investment projects. The project also includes preparation and hosting of conferences and workshops. The project covers the energy supply sector, the public sector and houeholds energy consumers, and the industrial sector and the industrial energy consumers.
	TEKOS Murmansk, Russia. Support to the Project Implementation Unit (PIU) at TEKOS Murmansk. The PIU will implement the Priority Investment Project (PIP) based on the Feasibility Study prepared earlier by SWECO. The main components in the PIP are: Installation of heat exchangers in all buildings, Interconnection of two heating networks and replacement of part of the network pipe, Installation of new burners on two steam boilers, Replacement and installation of pumps, Installation of a SCADA system. Responsible for the detailed design, preparation of tender documents and procurement as well as supporting the PIU in the overall implementation of the PIP.
2006-2009	LKAB, Kiruna, Sweden. Pipe design and strength analysis.Responsible for the hydraulic analysis and strength analysis of the district heating pipe system at the LKAB mining industry.
2004-2005	TEKOS Murmansk, Russia. Assistance in detailed design for upgrading of the district heating network in Murmansk. Responsible for preparation of bidding documents (for International Competitive Bidding) for procurement of 3 000 m (diameter 50-500 mm) district heating pipe line, fittings and valves. The bidding documents are based on World Bank standard Bidding documents.
2004-2005	TEKOS Murmansk, Russia Responsible for the detailed design, preparation of tender documents and procurement of 30 pcs district heating substations and 900 m (diameter 500 mm) district heating pipe line. Also responsible for the detailed hydraulic analysis of two district heating systems in Murmansk.
2003-2004	TEKOS Murmansk, Russia Preparation of a ”Feasibility Study” for the Murmansk district heating system. The project comprised development and assessment of a technical and financial rehabilitation program for the Murmansk district heating system. Responsible for the assessment of heat demand, substations and distribution network.
2004	Luftfartsverket (Swedish Civil Aviation Authority), Arlanda, Sweden Review of the energy supply to Arlanda airport. Responsible for the valuation and technical assessment of existing heat production and heat distribution system.

2003	Fortum Generation AB. Project manager for the update and further development of an emergency plan for the power production and power distribution company Fortum Generation in Stockholm.
1990-2010	Söderenergi AB / Telge Energi AB / Södertörns Fjärrvärme AB Project manager for annual analysis of the operation of the two connected district heating systems in suburbs to Stockholm. Analyses include calculation and analyses of distribution heat losses, flows, primary temperature levels, pump operations and sold and purchased energy. Total network length 145 + 230 = 375 km, sold energy 610 + 850 = 1 460 GWh.
2001	Ekerö Bostäder, Stockholm, Sweden. (Principal Engineer) Responsible for the technical and economical analysis and planning of a new district heating system based on solid fuel. The project resulted in installation of district heating network and purchase of a 600 kW bio fuelled boiler plant.
2001-2002	Lysekils Energi AB, Sweden (Principal Engineer) Responsible for the design of a new district heating system based on waste heat from an oil refinery. Hydraulic calculations including water hammer analyses.
2000-2001	Lysekils Energi AB, Sweden (Principal Engineer) Responsible for the technical and economical analysis and planning of a new district heating system based on waste heat from an oil refinery.
1999	Birka Värme AB, Stockholm (Principal Engineer) Development of an emergency plan for a district heating production and distribution company in Stockholm.
1999	Graninge Energi AB, Stockholm (Project Manager) Design of district heating distribution pipes and substations for multi-family houses.
1999	Birka Värme AB, Stockholm (Project Manager) Dimensioning, planning and costing of town gas service pipes.
1999	Birka Värme AB, Stockholm (Project Manager) Pre-feasibility study regarding crossing a high way with a gas pipe using drilling technique.
1998-1999	Graninge Energi AB, Stockholm (Project Manager) Planning and costing of a district heating production and distribution system for a group of industries and other commercial customers.
1998	Telge Energi AB, Södertälje (Project Manager) Responsible for the economic and technical valuation of Södertälje district heating system, Sweden. The system included both the production units and the distribution system.

1997-1998	Söderenergi AB, Södertälje (Project Manager) Responsible for a study regarding optimisation of temperature levels and flows in district heating systems in Södertälje and Stockholm, Sweden.
1997	Principal Engineer. Surge analysis of a Swedish hydro power plant.
1997	Different sewage treatment companies (Principal Engineer) Water hammer analysis of different sewage networks.
1996-1997	Nässjö Energi AB (Principal Engineer) Water hammer analysis of a Swedish district-heating network.
1996-1997	Sundlink Contractors Deputy Quality Assurance (QA) manager for the Design of the Öresund Bridge between Sweden and Denmark (Öresund Link - Contract No. 3 - Bridges)
1996-1997	SWECO Internal Quality Assurance auditor, engaged in the process of implementation of a Quality Assurance system for getting SWECO approved according to ISO 9001.
1996-1997	Vattenfall AB (Principal Engineer) Development of a maintenance programme for a Swedish nuclear power plant. The basis for the programme was the database program Microsoft Access.
1995-1996	Astra AB, Södertälje (Project Manager) Hydraulic (pressure drop, water hammer) and mechanical (strength) analysis of a sewage pipe line (length 6 000 m) placed in an existing tunnel.
1992-1994, 1997	MPEC Krakow / World Bank (Principal Engineer) Analysis of the Krakow (Poland) district heating system including pressure drop calculations, investigations and economical analyses of the distribution net, substations and distribution pumps. The analyses were the base for a Master plan for the city of Krakow, Poland. Implementation of hydraulic calculation programme.

Education

1986	M.Sc. in Mechanical Engineering, Royal Institute of Technology, Stockholm, Sweden
1980	Bachelor of Science, Electrical Engineering, Vasa Gymnasium, Stockholm, Sweden
Courses	-Analysis of District Heating Systems, Ola Rossing AB/Chalmers -Quality Assurance ISO 9001. Audit of Quality Assurance Systems -MS Office -Licheat; flow analysis of district heating systems -Licflow; steady-state/transient state analysis of flow in pipe networks -Licgas; gas-network analysis -CAEPIPE; strength calculation of pipe systems

-Visual Basic; programming
-MathCad; analysis, programming

Languages On a scale of 1 –5 (1 - excellent; 5 - basic)

	Speaking	Reading	Writing
English	1	1	1
French	3	3	3
Russian	5	5	-
Swedish	1 (Mother tongue)	1 (Mother tongue)	1 (Mother tongue)

Lennart Larsson - Energy Economist

1. **Family name** : Larsson
2. **First names** : Lennart
3. **Date of birth** : 1951-11-10
4. **Nationality** : Swedish
5. **Civil status** : Married

6. **Education** :

Institution:	**University of Lund**
Date (from – to):	1970-1976
Degree(s) or Diploma(s):	M.Sc Mechanical Engineering
Institution:	**University of Lund**
Date (from – to):	1976-1983
Degree(s) or Diploma(s):	Ph.D Energy Economics and Planning
Institution:	**University of Lund**
Date (from – to):	1979-1980
Degree(s) or Diploma(s):	Economy 20p

7. **Language skills:** Language skills mark 1 (worst) to 5 (best) for competence:

Language	Reading	Speaking	Writing
English	5	5	5
German	3	2	2
Spanish	1	1	1
Swedish	Native		

8. **Membership of professional bodies:** :

1976-present Member, Swedish Association of Masters of Business Administration (SACO)

2001-2006 Member of the Board, Swedish Institute of Applied Mathematics

2000-2006 Chairman 2005-2006, EDEVE, a group of international experts on Load Research

1995-1996 Member of the Board, Sydkraft Elförsäljning AB

9. **Other skills** :
10. **Present position :** **Senior Advisor**
11. **Years within the firm** **:1**
12. **Key qualifications (Relevant to the project)**:

Dr Lennart Larsson is an internationally well-known expert on Energy system planning and on Deregulation of Energy Markets. His focus has always been on Long term Energy system development with sub areas as Price, Demand and Market forecasts, System expansion and System operation, Security of Supply and on Energy Business Development. He is one of Sweden's leading experts on Deregulation of Energy Markets and he is also a known speaker on conferences on the subjects mentioned above. He has experiences from several countries in Europe and from Mexico, Nicaragua, Colombia, Uruguay, Zambia, Zimbabwe, Mozambique,

Egypt, Tanzania, Saudi Arabia, Dubai, Armenia, Thailand, Philippines, Vietnam, Laos, Cambodia, Malaysia, Indonesia and Mongolia.

13. Specific Country experience:

Country	Date: from - to
Mexico	1994-1995
Nicaragua	1993
Colombia	1997-1998
Uruguay	1994
Zambia	1998-1999
Zimbabwe	1998-1999
Egypt	2004
Saudi Arabia	1996-1997
Dubai	2008-2009
Armenia	2003-2004
Thailand	1996, 2002-2004
Philippines	2002-2004
Vietnam	1991, 1996, 2000-2010
Mongolia	2011
Moldova	2013

14. Professional experience record (Selected assignments):

CHP Feasibility Study, Sweden
Position Energy System Expert (Sweco Energuide AB)
Project period 08/2015-05/2016
Client E.ON AB
Future strategies for EON District heating in Täby - The objectives of the services were to prepare a simulation study for a number of scenarios containing either new production capacity or new interconnections to other district heating systems.

CHP Feasibility Study, Sweden
Position Energy Planning Expert (Sweco Energuide AB)
Project period 06/2014-06/2016
Client Mälarenergi AB
The objectives of the services were to: Analyse if it would be feasible to add a new CHP plant to the already existing production capacity in Västerås and to propose a suitable size and technology.

Preparation of strategies for the future development of the district heating in Trelleborg, Sweden
Position Business development and Energy Planning Expert
Project period 04/2014-08/2014
Client Trelleborg Fjärrvärme AB

Support to District Heating in Pristina

Position	Energy Market Expert
Project period	09/2013-ongoing
Client	Termokos
Financing agency	Sida

The objectives of the services are: 1) Monitoring the project on behalf of Sida. 2) Address specific focus issues, such as Termokos-customer relations, the profitability and commercialization of the company etc. 3) Arranging a study tour to Sweden for approximately ten participants.

Evaluation of the technical assistance programme for capacity building to the Ministry of Economy (MoE) and the Energy Efficiency Agency (EEA) in Moldova, Moldova

Position	Capacity Building Expert (Pöyry SwedPower AB)
Project period	03/2013-02/2014
Client	Ministry of Economy
Financing agency	Sida

The aim of this assignment is to assist the MoE, EEF and the Swedish Embassy in Chisinau to assess and analyse progress made under the agreed capacity building programme, and to provide recommendations on how to further increase the efficiency and effectiveness in the continued implementation process. The expected output is: 1) A report on progress and plans based on the documentation presented at the Annual Review Meeting, 2) A report on progress to date based on first-hand information gathered during the fact-finding mission, including recommendations on how to increase the efficiency of the program, 3) Oral feedback and slides to complement the written reports.

Assistance in preparing Programme Documents for Capacity Building within the National Energy Regulator and the National Energy Effiency Fund, Moldova

Position	Deregulation and Capacity Building Expert (Pöyry SwedPower AB)
Project period	01/2013-02/2014
Client	National Energy Regulator of Moldova
Financing agency	Sida

The objective of this assignment is to assist the Moldovan partner in the preparation of Capacity Building Programmes to the ANRE (National Energy Regulator) and EEF (National Fund for Energy Efficiency) respectively with financial support from Sweden. The expected output is: 1) Programme Documents for each of the respective organizations. 2) Procurement Documents 3) Second opinion to the Swedish Embassy in the technical assessment of proposals under the procurement process.

Carpe Futurum, Sweden

Position	Energy System Expert (Pöyry SwedPower AB)
Project period	03/2012-05/2014
Client	Uppsala Energi AB

The aim of this project is to prepare a Feasibility study for a new CHP plant in Uppsala. Lennart Larsson is responsible for the Energy System Analysis

Technical Assistance to Strengthen EDM's Capacity for Investment and Network Development Planning, Mozambique

Position	Planning expert (Pöyry SwedPower AB)
Project period	06/2012-10/2012
Client	EDM
Financing agency	Sida

The aim of this project is to Update the Master Plan for EDM. Lennart Larsson was responsible for the Generation System Expansion plan.

Converting of a Heat only Boiler to a combined Heat and Power plant, Sweden

Position	Energy System Expert (Pöyry SwedPower AB)
Project period	05/2012-06/2012
Client	Nässjö Energi

The aim of this project was to prepare a Prefeasibility study of additional electricity generation in Nässjö. Lennart Larsson was responsible for the Energy System analysis and for the Financial Evaluation.

Financial performance for a new CHP in Värnamo, Sweden

Position	Energy System Expert (Pöyry SwedPower AB)
Project period	03/2012-04/2012
Client	Värnamo Energi AB

Värnamo Energi had decided to build a new CHP Plant. After receiving the final tenders for erection of the plant they needed a Final financial analysis of the project. Lennart Larsson was Team Leader and responsible for estimation of the utilisation of the heat plants and for the financial assessment.

Procurement of a bio fuelled boiler to Malmö Airport, Sweden

Position	Team Leader (COWI AB)
Project period	10/2011-02/2012
Client	Swedavia AB

Malmö Airport needed to improve their heating system with a 0,5 MW bio fuelled boiler. The aim of this project was to Prepare the Procurement documents. Lennart Larsson was Team Leader for COWI's team.

Second Opinion on Värnamo District Heating Expansion Plan, Sweden

Position	Energy System Expert (COWI AB)
Project period	06/2011-02/2012
Client	Värnamo Energi AB

Lennart Larsson was Team Leader and also responsible for preparation of the Energy System Analysis and for the financial assessment.

System Integration of Termis Software, Sweden

Position	Project Manager (COWI AB)
Project period	02/2011-02/2012
Client	Hässleholm Miljö AB

The aim of this Project was to integrate the Termis Software into Hässleholms district heating network planning. Lennart Larsson was Project Manager.

Strategic Plan for Development of District Heating, Sweden

Position Project Manager (COWI AB)
Project period 12/2010-03/2011
Client Hässleholm Miljö AB

The aim of this project was to Develop a strategic plan for district heating development within Hässleholm and Tyringe. Lennart Larsson was project manager and also responsible for production system expansion plan and for the financial analysis.

District Heating in Aberdeen, United Kingdom

Position Project Manager (Vattenfall Power Consultant AB)
Project period 10/2009-12/2009
Client Tenants First Housing Company

Pre-Feasibility Study for establishment of Small scale district heating in Aberdeen. Lennart Larsson was Project Manager and also responsible for the financial assessment.

A new bio-fuelled heat plant in Haparanda, Sweden

Position Energy Planning Expert (Vattenfall Power Consultant AB)
Project period 01/2007-12/2009
Client Haparanda Fjärrvärme AB

The aim of this project was to prepare a Feasibility study for a new bio-fuelled heat plant in Haparanda. Lennart Larsson was responsible for financial assessment and also for the maximum demand forecast.

Waste Heat transmission pipeline, Sweden

Position Financial Expert (Vattenfall Power Consultant AB)
Project period 06/2007-10/2009
Client Kalix Fjärrvärme AB

Feasibility study for a new waste heat transmission line from a Pulp factory to the district heating system of Kalix. Lennart Larsson was responsible for the financial assessment of the proposed line.

A new bio-fuelled heat plant in Trelleborg, Sweden

Position Energy Business Expert (Vattenfall Power Consultant AB)
Project period 06/2007-06/2009
Client Trelleborg Fjärrvärme AB

The aim of this project was to prepare a Feasibility study for a new bio-fuelled heat plant in Trelleborg. Lennart Larsson was responsible for financial assessment and further development of pricing models for huge customers and for evaluation of possibilities to connect new huge customers.

O Mon Thermal Power Plant IV, Vietnam

Position Power System Expert (Vattenfall Power Consultant AB)

Project period 03/2007-06/2009
Client Asian Development Bank
The aim of this project was to prepare a Feasibility study for a new 750 MW natural gas fired combined cycle unit in southern Vietnam. Lennart Larsson was responsible for the Power system study and for the Economic assessment and for the Gas supply analysis.

Due Diligence, Sweden
Position Energy Business Expert (Vattenfall Power Consultant AB)
Project period 10/2008-03/2009
Client Tidaholm Energi AB
Tidaholms Energi AB has built a CHP plant. They own the buildings and leases the process parts during 20 years, where after the company shall purchase the process parts for a fixed fee. The aim of this project was to give a qualified estimate of the value of the process parts after twenty years of operation. Lennart Larsson was Project manager and financial expert.

Introduction of waste fired district heating in Kirkenäs, Norway
Position Energy Business Expert (Vattenfall Power Consultant AB)
Project period 10/2006-12/2008
Client Östfold Avfallssellskap AS, Norway
Prefeasibility study for introduction of waste fired district heating in Kirkenäs. Lennart Larsson was responsible for financial assessment of the project and for development of a special agreement for a huge customer.

Institutional capacity building and corporate development support for electricity distribution companies in South Serbia, Serbia
Position Energy Business Expert (Vattenfall Power Consultant AB)
Project period 11/2005-12/2008
Client Jugoistok
Financing agency International Management Group (IMG)
The aim of this project was to assist Jugoistok in their efforts to become a competitive actor in the future Serbian energy market. Lennart Larsson was responsible for the Area “Billing, collection and customer service”. Participating in the Area “Financial management systems” with main responsibility to train the financial staff in Investment calculations and the financial director in Corporate financial projections.

Management of Wind Power Development – International Training Programme, Multinational
Position Financial Expert (Carl Bro International AB)
Project period 09/2003-11/2007
Client
Financing agency Sida
International Training Programme for managers from African, Latin American and South East Asian power companies. Lennart Larsson was responsible for training in financial assessment of Wind Power Projects, pricing of the electricity produced and evaluation of the capacity value.

Impact on Nordic maximum demand and CO2 emissions of electric heating, Sweden

Position	Sub Project Manager (Carl Bro International AB)
Project period	02/2006-04/2007
Client	Elforsk AB

Lennart Larsson was Sub Project Manager responsible for estimation of the impact on demand curve and on utilisation of the generation system.

Cogen 3, Multinational

Position	Technical and Financial Advisor (Carl Bro International AB)
Project period	01/2002-12/2004
Client	Asean Federation (Malaysia, Indonesia, Burma, Thailand, Brunei, Cambodia, Vietnam and Philippines)
Financing agency	European Union

The aim of this project was to Promote introduction of European Cogeneration Technology in the Asean Countries. Lennart Larsson acted as Senior Technical Advisor, focusing on Pre- Feasibility and Feasibility studies for Industrial Cogeneration Plants.

Institution Building in Elektroprivreda Srbije (EPS), Serbia

Position	Financial Expert (Carl Bro International AB)
Project period	08/2003-10/2004
Client	Elektroprivreda Srbije (EPS), Belgrade, Serbia
Financing agency	European Union

The specific objectives of the project were to provide technical assistance to EPS in order to: 1) improve the standard of planning in the company, 2) introduce new management techniques to the company. The training consisted of two main parts Cross-functional training for top managers and Functional training for functional managers. Lennart Larsson was responsible for: 1) One of the major activities in the cross functional program the “Business Game”, 2) Training in pricing of electricity and network services in the functional part

Kaliningrad District Heating Rehabilitation Programme., Russian Federation

Position	Load forecast and Financial expert (Carl Bro International AB)
Project period	11/2002-12/2003
Client	Kaliningradteploset, Kaliningrad, Russia
Financing agency	Sida

Feasibility Study regarding rehabilitation of the district heating system in Kaliningrad. Lennart Larsson was responsible for preparation of Energy Forecasts and for development of tariff proposals.

CHP in Slupsk, Poland

Position	Project manager (Carl Bro International AB)
Project period	08/2002-12/2003
Client	Sydkraft Generation

Feasibility study for a cogeneration plant in Slupsk. Lennart Larsson was Project manager and also responsible for the financial analysis and for creation of an electricity price forecast.

Due Diligence, Norway

Position	Energy Business Expert (Sycon Energikonsult AB)
Project period	01/2000-12/2000
Client	Confidential

A major Swedish Power company wanted to expand their energy business in Norway by purchase of District heating companies in the southern part of Norway. Lennart Larsson was responsible for evaluation of the potential for expansion of district heating in the Oslo region.

Due Diligence, Poland

Position	Energy Business Expert (Sycon Energikonsult AB)
Project period	01/2000-12/2000
Client	Confidential

Objects – Several District Heating Companies in Poland. Lennart Larsson was responsible for establishment of: general conditions (i.e. actual demand, price, supply system and competitors), forecasts (demand, supply, fuel prices), necessary actions (maintenance, investments, environment), legal aspects (sales contract, regulations, fuel purchase contracts, environmental rules), financial projections, risk analysis and finally the value of the company.

Master Plan update for EWR, Jeddah, Saudi Arabia

Position	Load Forecast Expert (Sycon Energikonsult AB)
Project period	11/1996-12/1997
Client	Electricity in Western Region (EWR)

The aim of this project was to update the Master Plan for the High Voltage transmission system and the generation system. Lennart Larsson was responsible for Load and Demand Forecast and development of customised software. This software contains an End Use model, a Load Curve model and a Maximum demand model, all of them valid on both National and Transmission Area level.

Da Nang Distribution Project, Vietnam

Position	Load Forecast Expert (Sydkraft Elförsäljning AB)
Project period	02/1996-10/1996
Client	Power Company 3, Vietnam
Financing agency	Sida

The aim of the Da Nang Distribution Project was to prepare and realise a rehabilitation of the city's distribution network. Lennart Larsson was responsible for the forecasting of annual energy and maximum demand in Da Nang and training of the client's staff in load forecasting.

Implementation of New Distribution Topology for U.T.E, Uruguay

Position	Load Forecast Expert (Sydkraft AB)
Project period	04/1994-12/1994
Client	U.T.E., Montevideo, Uruguay
Financing agency	Bits

The aim of this project was to implement a New Distribution Topology for U.T.E in Uruguay. Lennart Larsson was responsible for the development of Energy and Maximum demand forecasts and forecasting models valid on National, Regional and local levels.

ToppKap, Sweden

Position	Sub Project Manager (Sydkraft AB)
Project period	03/1989-12/1990
Client	Sydkraft AB

Sydkraft's (Now EON Scandinavia) DSM project with the aim to point out actions necessary to reduce the demand peak with 100 MW and to realize actions to reduce the peak with 15 MW. Lennart Larsson was Sub project manager, responsible for the financial assessment of all proposed actions and for the estimation of the influence on the load curve and on the maximum demand.

Consultancy Services for Delhi Electric Supply undertaking, New Delhi, India. Responsible for the forecasting of the annual energy and the maximum demand in New Delhi, for the years 1990 - 2005, divided into now existing areas and areas which are going to be exploited in the future., India

Position	Load Forecasting Expert (Sydkraft AB)
Project period	03/1988-06/1989
Client	Delhi Electric Supply undertaking
Financing agency	SIDA

The aim of this project was to introduce a new network planning Software. This included development of a load forecast model and Lennart Larsson was responsible for development of this and for the preparation of a forecasting of the annual energy and the maximum demand in New Delhi, for the years 1990 -2005, divided into now existing areas and areas which are going to be exploited in the future.

Electricity, Natural gas and District Heating demand curves from houses with electric heating, oil fired heating, district heating and natural gas fired heating., Sweden

Position	Project Manager (University of Lund)
Project period	10/1983-12/1984
Client	
Financing agency	Byggforskningsrådet

The aim of this project was to develop proposal to dimensioning figures for the demand on different levels in the electric network, district heating network and natural gas network.

Model for simulation of hourly generation planning, Sweden

Position	Model developer (University of Lund)
Project period	09/1976-12/1976
Client	
Financing agency	Nämnden för Energiproduktionsforskning

The aim of this project was to develop a heuristic simulation model for hourly power generation planning. This model should then be used as a tool for research on the influence of introduction of new generation technologies.

15. Employment Record:

Dates	07/2014-present
Company	Pilekon AB (Sweco associate)
Position	Senior Advisor
Description	Senior Advisor within Energy planning, Feasibility studies, Financial assessment, Pricing, Deregulation and Business development within the energy sector all over the world.
Dates	03/2012-06/2014
Company	Pöyry SwedPower AB
Position	Senior Advisor, Key Account Manager
Description	Senior Advisor within Energy planning, Feasibility studies, Financial assessment, Pricing, Deregulation and Business development within the energy sector all over the world. Acting Manager for Department of Heat & Power and Department of Sustainable Energy from March - September 2012. Key Account Manager for International customers.
Dates	08/2010-02/2012
Company	COWI AB
Position	Department Manager
Description	Manager for the Department of Energy Systems, Establishment and Management of a department with a number of very qualified consultants. Consultancy work within Energy planning, financial assessment of energy companies and business development
Dates	09/2006-07/2010
Company	Vattenfall Power Consultant AB
Position	Department Manager
Description	Manager for the Department of Energy Technology in Malmö: Management of a department with a number of very qualified consultants. Consultancy work within Energy planning, financial assessment of energy companies, electricity, network, natural gas and district heat pricing, deregulation (electricity and natural gas), financial risk analysis and business development.
Dates	02/2002-08/2006
Company	Carl Bro International AB
Position	Senior Project Manager
Description	Consulting within Energy planning, electricity, network, natural gas and district heat pricing, deregulation (electricity and natural gas), financial risk analysis, financial assessment of energy companies and business development.
Dates	11/1996-01/2002

Company	Sycon Energikonsult AB
Position	Senior Project Manager
Description	Consulting within Energy planning, electricity, network, natural gas and district heat pricing, deregulation (electricity and natural gas), financial risk analysis, financial assessment of energy companies and business development.
Dates	01/1994-10/1996
Company	Sydkraft Elförsöljning AB
Position	Business Controller
Description	Electricity pricing, price coordination between customer segments, long term price forecasting and financial risk analysis. Responsible for development of the risk analysis model and for preparing the first complete analysis for Sydkraft.
Dates	02/1993-12/1994
Company	Sydkraft AB, Market Division
Position	Industrial Pricing Manager
Description	Development of strategies for the emerging deregulation, pricing, distribution of traditional electricity tariffs on energy and network.
Dates	07/1986-01/1993
Company	Sydkraft AB, Corporate Planning
Position	Market Analyst
Description	Strategic planning, strategic analysis, deregulation planning, financial risk analysis and DSM program development.
Dates	08/1984-06/1986
Company	Sydkraft AB, Planning Department
Position	Load Forecast Manager
Description	Market analysis and long term energy forecasting. Long term planning of power systems.
Dates	09/1976-12/1983
Company	University of Lund
Position	Research Assistant
Description	Research concerning Load curves, windpower integration and power system optimisation. Teaching in Heat and Power technology and in Energy Economics and Planning.

16. Publications:

2003 Asia's biomass thumbprint, Regen, August/September 2003, Sidcup, Kent, UK

1999 The KEES Project – Energy Efficiency in a Deregulated Market

1991 Report of the Group of Experts on Knowledge and Management of Load Curves (TARLOD)

1991 Impact of Taxation Systems and Emission Fees on the Energy Sector and its Emissions - A Model Study with special focus on Power Production.

1990 Energy Conservation and Efficient Utilisation

1990 Load Forecasting with Typical Load Curves

1987 MARKAL - An Energy System Model

1984 A Method for Forecasting Electric, Natural Gas and Heating Load from Groups of Single Family Houses

1983 Load Consequences of Time of Day Tariffs

1983 Electric Load in Single Family Houses - Load Analysis and Simulation Studies for Low Voltage Networks (Doctoral Thesis)

1978 Large Scale Introduction of Wind Power Stations into the Swedish Grid - A simulation study

Julia Kosulko - Assistant Team Leader

Name	**Julia KOSULKO**
Date of Birth	January 18, 1988
Nationality	Ukrainian
Present Position	Consultant at Sweco

Education

Name of institution	Degree(s) or Diploma(s) obtained:	Date obtained
Chalmers University of Technology, Gothenburg, Sweden; Royal University of Technology (KTH), Stockholm, Sweden	M.Sc. Innovative Sustainable Energy Engineering	
Kyiv National University of Construction and Architecture, Ukraine	M.Sc. in Construction Engineering with major in specialty of Heating, Ventilation and Air Conditioning systems (HVAC). Completed with honours.	2010
Kyiv National University of Construction and Architecture, Ukraine	Bachelor in Construction Engineering. Specialized in heating, ventilation and air conditioning. Completed with honours.	2009

Complementary education

2012	Training conference on facilitation technique “Open Space Technology”. Organized by Young Professionals Caucasus and Youth in Action, EU
2011	Leadership training camp, Norway. 10 days workshop, organized by Board of European Students of Technology
2011	International Environmental Agreements, University of Gothenburg, Sweden
2010-2012	Soft Skills workshops organized by Board of European Students of Technology: • Public Speaking and Presentation Skills, • Personality Types (MBTI), • Facilitation, • Team Dynamics, • Persuasion Technique, • Change Management, • Situational Leadership, • Strategic Planning.

Key qualifications

Julia Kosulko is an energy generalist with attention to energy policies. Her expertise in energy efficiency has detailed technical roots of indoors climate engineer brought further up to municipal and national levels. Ms. Kosulko performed a thesis research on barriers to energy efficiency in Ukraine, where she has analysed complexity of technical, financial and institutional barriers within heating and electricity sectors. She has also gained experience supporting environmental and social assessments with related analysis and data collection.

Ms. Kosulko has participated in a number of analytical assignments, including due diligence assignments in the district heating sector in Sweden and Finland. In later she performed tasks as a member of the commercial team with a goal to project volumes of district heating sales, competition, etc.

Within focused trainings and challenging assignments Julia has developed strong communication and facilitation skills, including bi-lingual. This, in combination with in-depth knowledge of Eastern European business environment and particularities of its energy sector, allows Ms. Kosulko provide effective support to project management of assignments run in the region.

Languages

Language	**Reading**	**Speaking**	**Writing**
Ukrainian	Native		
Russian	Native		
English	Excellent	Excellent	Excellent
Swedish	Fair	Fair	Fair

Computer literacy

Excellent Ms Office, AutoCAD.

Employment Record

2013- present	**Sweco Energuide AB, Sweden** Consultant within Energy Strategies and Energy Markets team, KDC for EBRD Support and facilitation of energy projects in post-Soviet countries. Support to international business development. Key Donor Coordinator for EBRD.
2011-2013	**Pöyry SwedPower AB, Sweden** Project Manager assistant for “Power Line 330kV Novoodesskaya–Artzys. Feasibility Study and ESIA” in Ukraine. Delivery work, stakeholders management, local sub-consultants management, multi-language facilitation of official meetings.
2010	**LLC “AERUM service”, Kyiv, Ukraine** Project Manager. Management, design and procurement for air conditioning projects.

2009	**LLC "REHAU", Kyiv, Ukraine** Heating, water supply and solar systems design for private houses.
2009	**"Systemair", Kyiv, Ukraine** Client support

Membership in professional associations

2012 – present	**World Wide Studies alumni** Alumni network of awardees of the Victor Pinchuk Foundation Grant for education at best western universities.
2010 – 2013	**Board of European Students of Technology** Alumni, former President of the local group in Gothenburg in 2012/2013.
2012 – present	**Chalmers alumni** Alumni network of graduates from Chalmers University of Technology

Overseas Experience

2016	Ukraine, Denmark, Finland, UK, Ghana, Sweden
2015	Ukraine
2014	Ukraine, Kazakhstan, Myanmar
2009-2013	Ukraine

Professional Experience

2016 - ongoing	**Optimization of energy metering in region of Teatrarna, Sweden** Analyst. Implemented centralized naming of the meters in question. Client and Financing: Swedish Property Board - SFV Teatrarna
2016	**Commercial Due Diligence of a district heating company in Sweden** Commercial analyst. Analysis of the commercial side of district heating business of the Targeted Company, district heating volumes projections. Client and Financing: Confidential.
2016	**ECG Ashanti Pilot Project – optimization of the utility, Ghana** Consultant. Quality assurance of final deliverables and on-job training. Client: Electricity Company of Ghana, Ashanti Region

2016 - ongoing	**Energy Efficiency of Public Buildings of Lutsk, Feasibility Study, Ukraine** Assistant Team Leader, engineer. Energy efficiency feasibility calculations, team organization and control, PIP formulation, reporting Client and financing: Nefco
2016	**Future Drivers and Trends with power sector of Sweden** Analyst. Analysed and summarized current trends among Swedish electricity consumers (private, residential, commercial, and industrial) with particular focus on their interest in demand response and behind-the-meter generation Client: Mowat, Ontario
2016 – ongoing	**Indonesian-Swedish Initiative for Smart Energy Solutions (INSISTS)** Consultant. Supported organization of the delegation visit to Sweden (5 days of various sessions with overall focus on sustainable cities). Co-delivered workshop on Symbio City concept with application to Indonesian cities. Client: Swedish Energy Agency
2016	**Analysis of Demand Prognosis of the Nord Pool (aFRR project)** Analyst. Developed excel-based model to analyse Nord Pool power market demand prognosis in each of its bidding zones each hour of whole year (8762x12 data points)
2016	**Commercial Due Diligence of a district heating company in Finland** Commercial specialist. Analysis of the commercial side of district heating business of the Targeted Company. Client and Financing: Confidential.
2015	**Energy Audits in the UK, Denmark and Finland** Team Leader. Energy audits in United Kingdom, Denmark and Finland to fulfil the EU Energy Efficiency Directive. Client and financing: Ernst & Young (Netherlands)
2015	**Energy Efficiency of Public Buildings of Cherkasy, Feasibility Study, Ukraine** Assistant Team Leader, engineer. Feasibility study to determine priority investment plan for energy efficiency measures for the public buildings. Client and financing: Nefco
2015	**PIU support for Lviv District Heating, Ukraine** Environmental support in line with EBRD PRs, workshop facilitator. Subcontractor to Egis. Financing: EBRD
2014	**PIU support for Energy Efficiency of public buildings of Zhytomyr, Ukraine** Workshop facilitator. Support to Project Implementation Unit with realization of energy efficiency measures to 19 public buildings of Zhytomyr, Ukraine. Client and financing: NEFCO

2014	**Energy Strategy for Myanmar** Analysis of coal and natural gas sectors of Myanmar.
2014	**Shardara HPP Rehabilitation Project, Kazakhstan** Consultant for environmental, health and safety issues. Lender's engineer assignment. Subcontractor to Stucky Ltd. of Switzerland. Financing: EBRD
2011 – 2014	**Power Line 330kV Novoodesskaya–Artsys. Feasibility Study and ESIA, Ukraine** Assistant Team Leader. Developed Feasibility Study report with multicriteria analysis of the project alternatives. Performed Gap Analysis between legislative frameworks on construction project management, stakeholders' management and ESIA in Ukraine vs EBRD. Performed proactive information gathering; delegation to and supervision of local consultants, communication with the Client and local institutions and authorities; bilingual facilitation of official meetings, including stakeholder meetings. Client: NEC "Ukrenergo". Financing: EBRD
2010	**Heating and air conditioning of a control office SC "Antonov"** Project manager, engineer. The project covered stages from design outline to a system start.
2010	**Ventilation of a private house, 470m2** Project manager, engineer. The project covered stages from design scratch to a system start. Performed supervision of contractors and equipment purchase.
2009	**Heating systems of private houses** Engineer for a number of assignments to design heating systems for private customer-made houses. Performed calculation of heat losses, development of concepts for systems, detailed design of the systems, specification of the required equipment etc..

Anna Minakova - Financial analyst

1. Name of staff: Minakova Anna
2. Employer: free-lancer (Sweco Associate)
3. Date of Birth: 09.03.1959 Nationality: Ukrainian
4. Education:

Name of institution	*Degree(s) or Diploma(s) obtained:*	*Date obtained*
Grant MacEwan College, Edmonton, Canada	Diploma with Distinction (Management study programme, majors: Financial and Managerial Accounting)	01/1999 - 06/ 2000
Inter-Regional Academy of Personnel Management (MAUP), Kiev, Ukraine	Diploma in Management in Production Sphere	10/1996 - 12/1997
Institute for Problem of Material Science of Ukraine	PhD in Physics and Mathematics	1990
Kiev Polytechnic Institute, Kiev, Ukraine,	Diploma in Metallurgical Engineering, Specialty: Metal Physics (eq. to M.Sc. in Engineering)	09/1976 - 03/1982

5.Languages: *For each language indicate proficiency: good, fair or poor in speaking, reading and writing*

Language	*Reading*	*Speaking*	*Writing*
Ukrainian	good	good	good
Russian	good	good	good
English	good	good	good
German	poor	poor	poor

6. Key Qualifications

- Investment planning. Due Diligence and Feasibility Studies.
- Tariffs for heat and gas. Affordability studies
- Development and implementation of cost and cash flow control, disbursement control and follow-up, project progress follow-up
- Financial modelling, financial analysis.
- IFI procurement procedures (EBRD, WB, EC), tender dossier drafting (technical and general parts, FIDIC Yellow and Red Books and others), procurement follow-up
- Project Implementation Plan preparation
- Energy efficiency in industries, utilities, power generation, heat production, transportation and distribution
- Harmonisation of regulations, technical norms, standards and practices applied to the gas sector
- Project management and administration

7. Employment Record:

2000-ongoing	Freelancer, private entrepreneur, within the last 16 years has worked in the framework of service contracts with Sweco Industry Oy (Finland), Sweco

	International AB (Sweden), Tebodin (the Netherlands), Ramboll (Denmark), BSI (GB), Fichtner (Germany). Positions: Financial and Economy expert, Gas Expert, Technical Expert, Team Leader Assistant, Deputy Team Leader, Team Leader
1982-2004	Institute of Material Science, National Academy of Science Ukraine, Positions: Senior researcher; Researcher; Junior Researcher; Engineer

Professional societies:
N/A

8. Experience Record

PROJECTS

Year	*Project name. Client. Role in the assignment*
2016-ongoing	Project name: Energy efficiency in public buildings in the city of Lutsk – feasibility study Client: Sweco International AB, Sweden Services provided: Analysis of financial standing of the City of Lutsk, identification of the Priority Investment Plan (IRR, NPV etc.)
2015-2016	Project name: Energy efficiency in public buildings in the city of Cherkassy – feasibility study Client: Sweco International AB, Sweden Services provided: Analysis of financial standing of the City of Cherkassy, identification of the Priority Investment Plan (ROI, NPV etc.)
2015-ongoing	Project name: Energy efficiency in public buildings in the city of Zhytomir – PIU support (NEFCO loan, E5P Grant, SIDA Grant) Client: Sweco International AB, Sweden Services provided: PIU support (objectives, functions, roles, PMBOK), heat tariff analysis, update of priority investment programme (heat insulation of building envelopes and installation of individual heat substations), preparation of Tender Dossiers (NEFCO standard procurement rules), procurement procedure, investment implementation
2014-2016	Project name: Feasibility study of Ungeny-Chisinau gas pipeline (EBRD and EIB loans, EU Grant): Client: Fichtner (Germany). Services provided: Gas demand analysis and forecasting, gas transportation tariff analysis and calculation, investment costs calculation, financial modelling, gas legislation review, review of taxation system, Project Implementation plan
2014-2015	Project name: District Heating of Ivano-Frankivsk, Implementation Support (EBRD loan and SIDA grant) Client: Sweco International AB, Sweden Services provided: Preparation of tender documents in compliance with the EBRD procurement procedure and rules (pre-qualification paperwork and procedure, technical specifications for pipes and individual heat substations, one and two stage tender procedures under the EBRD rules).

2013-2014	Project name: Reconstruction of a power plant in Ukraine Client: Confidential Services provided: preparation of a tender dossier for procurement of Owner's Engineer services (including Terms of Reference, qualification requirements, evaluation methodology, tender Dossier in accordance with the Law of Ukraine on public procurement), review of evaluation methodology for main equipment bids, review of CAPEX and construction period for similar projects implemented worldwide.
2013	Project name: Review of energy legislation and tariff system of Mongolia Client: Sweco industry Oy, Finland Services provided: review of valid legislation of Mongolia in the energy sector covering heat and electricity generation, transportation and distribution from the view point of the Second and the Third Energy package. Review of tariff setting and structure for heat and electricity
2012-2013	Project name: Identification of Near-term Priority Investments and Preparation of their Technical Specifications and Tender Documents (World Bank loan) for the district heating system of Chisinau, Moldova Client: Sweco International AB, Sweden Services provided: Identification of leakages from heat carrier pipes, energy saving potential, financial and economic analysis (initial data collection, accounting system, budgeting and financial management practices), identification of a Priority Investment Programme, reporting. Preparation of Tender Dossiers (including technical and general parts) for a new pump station and connecting heat supply pipe in accordance with the WB procurement rules
2012	Project name: Feasibility study for the enhancement of the district heating systems of the cities of Khimki and Elektrogorsk, Russia Client: Sweco industry Oy, Finland Services provided: Participation in financial and commercial analysis of the companies, in identification of energy saving potential of district heating heat network, heat substations and boilers. Analysis of customer's loads (building of residential and public customers), establishment of a database. Review of current heat tariff setting legislation. Development of a priority investment plan (ROI, NPV, DCF etc.) for 7 years, procurement plan, effect of the identified program on tariffs for 2013-2026 years, affordability study
2010-2013	Project name: Ivano-Frankivsk, Implementation Support (EBRD loan and SIDA grant) Client: Sweco International AB, Sweden Services provided: Draft job description for the PIU, verification and updating of the investment program prepared at the feasibility study stage covering energy saving measures in DH facilities, updating of the procurement plan (including biofuel boiler, pipes, individual heat substations), project implementation plan, drafting of a costs and cash flow control system, participation in preparation of tender documents in compliance with the EBRD procurement procedure and rules (pre-qualification paperwork and procedure, technical specifications for pipes and individual heat substations, two-stage tender procedure under the EBRD rules, FIDIC Yellow Book).

2010-2011	Project name: Odessa District Heating - Implementation Support (EBRD loan and SIDA Grant) Client: Sweco International AB, Sweden Services provided: Verification and updating of the investment program prepared at the feasibility study stage covering energy efficiency measures, participation in preparation of the project implementation plan, preparation of cost control and cash flow models, procurement monitoring models
2008-2009	Project name: District Heating Rehabilitation Project in Zhytomyr, Feasibility Study (for EBRD) Client: Sweco International AB, Sweden Services provided: Financial analysis of the company, investment plan, including biofuel boiler, financial modelling, and financial projections, DH tariff study and affordability analysis. Participation in development of a strategic and priority investment program
2000-2006	Project name: Completion of the 200MWe CHP (TEZ-5) plant in StPetersburg Engineering Due Diligence Study of the plant for the EBRD (2002) Consulting services for Project Implementation Plan, General Contract, Monitoring of the construction of 200 CHP plant. (2003 – 2006) for Lenenergo Client: Sweco PIC Oy, Finland Services provided: development and implementation of a cost control system, procurement follow-up system, team leader's assistant.
1999-2003	Project name: EC project ENUK9901 "Development of Cost-Effective Small-Scale Heat and Power (CHP) installations in Food and Related Industries in Ukraine" Client: PIC Engineering Oyj, Finland Services provided: financial analysis of the companies, investment planning
1997	Preparation of pipeline of projects in DH sector of Ukraine, EBRD Client: March Consulting Group, GB Services provided; Financial analysis, restatement of Ukrainian Accounts to IAS and IFRS formats, preparation of financial reports in conformity with IAS and IFRS, sales and revenue collection analysis

Publications

N/A	

Volodymyr Skorokhod - Local consultant team leader, Local technical specialist, DH engineer

2. Name of Firm: GARDE
3. Name of Staff: **Volodymyr Skorokhod**
4. Date of Birth: 1950
5. Nationality: Ukrainian
6. Education: M.Sc. in Mechanical Engineering, Odesa University of Technology, 1979
7. Membership of Professional Associations:

2001-present	Member of the Association of Engineers of Energy Efficient Technologies
2003-present	Member of the Association of Thermal Energy Enterprises
2007-present	Member of the corporation "European Energy Company"
2010-present	Chairman of the Supervisory Board of "Teplotehnika"
2008-present	Member of the Academy of Construction of Ukraine
2005-present	Member of the Editorial Board of the scientific journal "Nova Tema"

8. Other Training:

01/2012	Presenter at the National Conference in Zaporizzhya, Ukraine. Subject: Strategy for development district heating in Ukraine
11/2011	Participant in the meeting with Ministry of Ukraine with the report on the Regional program of modernization the district heating system in Kherson region for 2011-2015
09/2012	Presenter at the Russian-Ukrainian Conference on district heating in Yalta, Autonomous Republic of Crimea. Subject: The prospect on district heating systems of settlements.

9. Countries of Work Experience: Ukraine
10. Languages: Ukraine (native); Russian (good); German (poor)
11. Employment Record Relevant to the Assignment:

2010 – ongoing	GARDE	Consultant
2010 – ongoing	Southern Branch of UkrNDIinzhproekt	Director
1996 – 2010	JSC «Teplotehnika»	Director
1986 – 1996	Association «Dnipro», plant «Energy»	Deputy Director, Chief Energy Engineer
1980 – 1986	Skadovsky plant of semiconductor devices	Head of power department

12. Adequacy for the Assignment:
Key Qualifications:
Master Degree in Electromechanics. Vladimir Skorokhod has 35 years of experience of work in the senior leadership positions. He is a highly qualified professional and a demanding leader in the sphere of thermal engineering. He has also developed amendments to building regulations of Ukraine, which will allow to reconstruct basement-located boiler-houses which are being operated with violations of valid regulatory documents (there are more than 5.000 of such boiler-houses in Ukraine nowadays). Mr. Skorokhod has participated in the development of the national construction standards 2.5.77:2014 «Boilers». He has performed tasks within the technical aid projects including those of USAID *Reforming Municipal Heat Supply System in Ukraine* and *Municipal Heating Reform in Ukraine*. He participated in the implementation of United

Nations Development Programme (conducting of an audit and developing of design documents for thermal modernization of kindergarten and rural health post in village Grigorievka, Chaplynskiy district, Kherson region). He is a consultant on energy efficiency of the Eastern European Foundation Programme. Mr. Vladimir Skorokhod is a participant of professional conferences and an author of articles devoted to thermal engineering and central heating supply development in Ukraine. He is an Honoured Energy Worker and was presented with Governor's Citations and Citations of the Head of Energy Saving State Committee as well as Honorary Certificates of Ukrainian State Committee of Housing and Utilities Infrastructure. He took part in developing number of investment projects related to energy efficiency increase of residential and public buildings in Kherson, as well as integration of solar heating to heating systems of stand-alone houses.

Reference to Prior Work/Assignments that Best Illustrates Capability to Handle the Assigned Tasks:

2010-2011	USAID, Reforming Municipal Heat Supply System in Ukraine and Municipal Heating Reform in Ukraine Project support , performance of technical tasks, consulting services for Kherson City Municipality in the development of Sustainable Energy Action Plan (SEAP)
2011	Eastern European Foundation, Eastern European Foundation Programme Consultant on energy efficiency. Development of guidelines and capacity building of managers of condominiums on the energy efficiency of buildings
2013-2014	United Nations, United Nations Development Programme Conducting of an audit and developing of design documents for thermal modernization of kindergarten and rural health post in village Grigorievka, Chaplynskiy district, Kherson region
2015-ongoing	NEFCO, "Thermo-modernisation of the Kherson City Clinical Hospital named after A. and O. Tropin" Preparation of the feasibility assessment, support to project implementation, support to procurement and preparation of follow-on activities
2016	NEFCO, Energy Efficiency in Public Buildings in the City of Cherkasy-Feasibility study ITP expert, data verification, design of energy efficiency measures
2016-ongoing	NEFCO, Energy Efficiency in Public Buildings in the City of Cherkasy-Feasibility study DH and ITP expert, design of energy efficiency measures

Publications and Reports

Years	*Publications*
2006	Magazine "Nova Tema" issue number 1. "The practice of designing and reconstruction of the basement boiler in urban environment."
2007	Magazine " Nova Tema" Issue № 3. "Integrated energy technology of the future: the European experience."
2011	Magazine "Nova Tema " Issue № 3. "On issues of the heat supply system in the Southern regions of Ukraine».
2006	Magazine "Nova Tema" issue number 1. "The practice of designing and reconstruction of the basement boiler in urban environment."

Expert's contact information: e-mail vvs@tt.ks.ua, mobile phone +3800 67 555 1632

Olexandr Savenko - Local environmental expert

Name of Expert:	Oleksandr Savenko
Name of Firm	GARDE
Date of Birth:	11th December 1959
Country of Citizenship/Residence	Ukraine

Education:

1972 - 1977 Kherson Agricultural Institute, Kherson, Ukraine
Field: Hydro-Amelioration, Degree: Hydraulic Engineer

Professional Societies: Member of the Ukrainian public organization "Guild of construction engineers"

Languages

1 – poor, 5 - fluent

Language	*Reading*	*Speaking*	*Writing*
English	1	1	1
Russian	5	5	5
Ukrainian	native		

Key Qualifications

Experienced Designer of:

- Environmental impact assessments of industrial, agricultural, public and residential facilities (existing and those projected) – 19 years of experience; knowledge of related national regulations and legislation in the field of ecology; qualification certificate number AR 003211.
- Budget Estimates (investment budgets, contractual prices, acts of performed works) of construction, reconstruction and technical re-equipment, capital and current repairs of various industries, public and residential buildings – 29 years of experience; knowledge of related national regulations in developing budget estimates.

Employment record relevant to the assignment:

Period	**Employing organization and your title/position. Contact infor. for references**	**Country**	**Summary of activities performed relevant to the Assignment**
2015 – to date	Garde / LLC "Company Group "Teplotekhnika", Kherson, Ukraine Position: Leading Engineer. For references: Tel. +380675551632/e-mail: vvs@tt.ks.ua; Mr. Volodymyr Skorokhod, Deputy Director	Ukraine	Development of: - estimate documentation of the sites of construction, reconstruction and technical re-equipment, overhauls and current repairs; - environment impact assessment.
2006 – 2015	SE “State Scientific and Production Enterprise	Ukraine	Development of:

	"Vynkonservproekt" Kherson, Ukraine. Position: Leading Engineer.		- estimate documentation of the sites of construction, reconstruction and technical re-equipment, overhauls and current repairs; - environment impact assessment.
2004 – 2006	LLC "TPK Zernovyk", Kherson, Ukraine. Position: Leading Engineer.	Ukraine	Development of: - estimate documentation of the sites of construction, reconstruction and technical re-equipment, overhauls and current repairs; - environment impact assessment.
1999 – 2004	Municipal Institution "Khliboprodukty", Kherson, Ukraine. Position: Leading Engineer.	Ukraine	Development of: - estimate documentation of the sites of construction, reconstruction and technical re-equipment, overhauls and current repairs; - environment impact assessment.
1997 – 1999	State JSC "Khlib Ukrainy", Kherson Branch, Kherson, Ukraine. Position: Leading Engineer.	Ukraine	Development of: - estimate documentation of the sites of construction, reconstruction and technical re-equipment, overhauls and current repairs; - environment impact assessment.

Adequacy for the Assignment:

Detailed Tasks Assigned on Consultant's Team of Experts:	**Reference to Prior Work/Assignments that Best Illustrates Capability to Handle the Assigned Tasks**
Environmentalist, economist All projects passed State Construction Expertise in areas of ecology and budget estimates, and received positive conclusions.	2016. Leading Engineer School of Arts No.1, Kherson, Ukraine, Construction of the school building Responsibilities: - Development of budget estimate documentation. - Environment impact assessment.
	2015. Leading Engineer Pilot Project "Green School" (Grant of the Finnish Government), urban village Antonivka, Kherson, Ukraine Construction of internal and external networks of the school building Responsibilities: - Development of budget estimate documentation. - Environment impact assessment.
	2015. Leading Engineer Regional territorial center of emergency medical care and disaster medicine, Kherson, Ukraine Construction of the building Responsibilities: - Development of budget estimate documentation.

	- Environment impact assessment.
	2014. Leading Engineer Aeration tanks of the waste treatment facilities, Kherson, Ukraine Modification of the aeration tanks of the waste treatment facilities Responsibilities: - Development of budget estimate documentation. - Environment impact assessment.
	2013. Leading Engineer Oil product depot in 14, Domobudivelna street, Kherson, Ukraine Construction of the oil product depot Responsibilities: - Development of budget estimate documentation. - Environment impact assessment.
	2012. Leading Engineer Plant for sunflower seed processing, LLC “AT Cargill”, Kakhovka, Kherson region, Ukraine Construction of the plant for sunflower seed processing Responsibilities: - Development of budget estimate documentation. - Environment impact assessment.
	2011. Leading Engineer Kalanchak Wind Power Plant (WPP) with a capacity of 300 MW in the area of Perekop Gulf, Ukraine Construction of the Kalanchak Wind Power Plant Responsibilities: - Environment impact assessment.
	2011. Leading Engineer Warehouse distribution center, LLC “Epicenter”, Kherson, Ukraine Construction of the warehouse distribution center Responsibilities: - Environment impact assessment.
	2010. Leading Engineer Plant for the production of fuel pellets (biological granules) from waste wood, Belozerka Kherson region, Ukraine. Construction of the plant for production of fuel Pellets Responsibilities: - Development of budget estimate documentation. - Environment impact assessment.
	2009. Leading Engineer The industrial complex for the production of plastic products of "Hlobart" in the village Liubymivka, Kakhovka district, Kherson region, Ukraine Responsibilities: - Development of budget estimate documentation. - Environment impact assessment.

	2008. Leading Engineer The plot of tomato production and processing tomatoes in quantities of 2,000 tons / day of JSC "Chumak" in. Kakhovka, Ukraine Responsibilities: - Development of budget estimate documentation. - Environment impact assessment.
	2007. Leading Engineer Plant for the production of wall materials in lightweight concrete. New Kakhovka, Ukraine Responsibilities: - Development of budget estimate documentation. - Environment impact assessment.

Tatyana Plokhaia - Local technical specialist, DH engineer

Name of Staff	**Plokhaia Tetiana**
Name of Firm	GARDE
Date of Birth	1977-01-16
Nationality	Ukrainian

Education:

Educational Establishment	*Degree*	*Year obtained*
Kherson Agrarian University	Faculty: Building-irrigation and drainage Specialist - hydraulic engineer	2001

Other training:

Years	*Training component*
1992-1996	Kherson Marine Engineering Technical School Junior specialist on radio-and-machinery construction
2005	Training workshop on KAN-therm system
2007	Workshop on technical solutions of company Danfoss Modern heating units
2015	Workshops on technical solutions and equipment of firm Standartpark

Languages

1 – poor, 5 - fluent

Language	*Reading*	*Speaking*	*Writing*
English	3	3	3
Russian	5	5	5
Ukrainian	native		

Other skills (for example, computer literacy, etc.):

Good command on MSOffice, AutoCAD and ArchiCAD.

Key Qualifications

Ms. Tetiana Plokhaia has 15-year experience of work in design of utility networks of public and residential buildings and industrial structures. She took part in design and implementation of many projects of industrial and public engineering. Since 2014 she is one of the design developers of energy efficiency projects (namely regarding installation of ITPs and heating systems reconstruction) in residential and public buildings in the following cities: Vinnytsia, Kakhovka, Kherson, Cherkasy and Lutsk.

Employment Record

Years	Name of Firm, Position taken
2013-ongoing	Garde. Southern Branch of UkrNDIinzhproekt, Ukraine, lead engineer
2013-2012	Architectural-Construction Alliance Ltd, first rank design engineer
2012-2011	Public Joint Stock Company "Ukrainian Institute for Design of Refining and Petrochemical Plants "UKRNAFTOKHIMPROECT", Kherson branch, second rank engineer of Department on Heat, Ventilation, Watersupply and Drainage
2011-2004	Private Joint Stock Company Kherson-Dipromisto, second rank engineer of sanitary engineering unit
2003-2001	public enterprise Forest-1, design engineer

Professional Experience

Years	Project Title, Client, Activities performed
2016	- Project Energy efficiency in public buildings in Lutsk – Feasibility Study. Inspection, analisys, verification of data, selection of technical solutions for ITP installation, hot water supply questions, pipes insulation
2016	- Project Energy efficiency in public buildings in Cherkasy city – Feasibility Study. Inspection, analisys, verification of data, selection of technical solutions for ITP installation, heat system balancing questions
2015	- Design of projects on reconstruction of heating unit inputs in industrial buildings of Ukrtelekom, cities of Kherson and Kakhovka. Inspection, analisys, selection of technical solutions, design of documentation.
2014	- Design of projects on reconstruction of heat units and inputs of heat units in residential buildings of city of Vinnytsia Mechanical part. Inspection, analisys, selection of technical solutions for ITP installation, design of documentation for thermal-mechanical and ventilation sections. - Taking part in design of project on boiler house modernization by applying alternative fuel (solid fuel, namely fuel brick) in comprehensive school in Tsentralna str., 16, Nadezhdivka village, Bilozerskyi district. Insperction, analisys, calculations, selection of equipment, approval of technical decisions and design of documentation for thermal-mechanical and ventilation sections.
2013	- Taking part in design of projects of religious architecture in Serhiivka City, Horlivka City Heating, ventilation. Calculation, selection of equipment, approval of technical decisions and design of documentation for heating and ventilation sections.
2012	- Project proposal for construction of Vaninsk Oil Refinery: administrative-domestic and laboratory building, operator room building. Calculations, selection of equipment, approval of technical decisions and design of documentation for heating, ventilation, and conditioning sections.
2004-2001	- Taking part in design of project on modernization and reconstruction of biosphere reserve Askania-Nova, Kherson region. Calculations, selection of equipment, approval of technical decisions and design of documentation for heating, ventilation, and conditioning sections. - Taking part in design of project on modernization and reconstruction of central representative bank in Kherson city Raiffeisen BANK AVAL Utility networks. Calculations, approval of technical decisions and drafting for laying of utility network - Preparation of construction design for brach of Prominvest Bank in Henichevsk city, Kherson oblast. Ventilation and conditioning. Calculations, selection of equipment, drafting for ventilation and conditioning systems. - Preparation of design of housing estate Youth Residential Complex Heating, ventilation Building insulation. Design of roof boiler houses. - Reconstruction of Svitanok camp, Schastlivtsevo village, Henichevsk district. Calculations, selection of equipment, approval of technical decisions , design of documentation for ventilation and heating sections.

	- Construction design of Nemo dolphinarium in Henichevsk city Ventilation. Calculations, selection of equipment, approval of technical decisions , design of documentation for ventilation sections. - Construction design of shopping center "Velyka lozhka" in Kherson City Calculations, selection of equipment, approval of technical decisions , design of documentation for section on ventilation, heating, and outer utility networks.

Expert's contact information: e-mail tatyana_plohaya@mail.ru, mobile phone +38 (067) 7117566

Irina Tsymbaliuk - Local coordinator, Interpreter

Name of Staff	**Tsymbaliuk Iryna -** Project Coordinator, Interpreter
Name of Firm	Development-consulting company GARDE
Date of Birth	1992-08-09
Nationality	Ukrainian
Contact Information	gardeconsulting@gmail.com, +380932283782

Education:

Educational Establishment	*Degree*	*Year obtained*
Zhytomyr Ivan Franko State University	Specialist degree, speciality "Translation", qualification of Philologist, Translator/Interpreter from the English and German Languages	2014

Languages

1 – poor, 5 - fluent

Language	*Reading*	*Speaking*	*Writing*
English	5	5	5
German	4	4	4
Russian	5	5	5
Ukrainian	native		

Key Qualifications

Irina Tsymbaliuk is responsible for maintaining the Garde company projects, coordination of consultant works, and company communications in English and Ukrainian languages. She takes part as a project coordinator in international investment projects related to energy efficiency and works under procurement under NEFCO rules. Ms. Tsymbaliuk has practice in providing consulting services for NEFCO in connection with the monitoring stage of the following projects:

1) Pavlograd. Thermo-modernization, heat pumps for Hot Water Supply (HWS), Individual Heating Points
2) Kramatorsk. Heat pumps for HWS, In/outdoor lights, New windows/doors
3) Druzhkovka. Street lighting.
4) Melitopol. Thermo modernization, Street lights
5) Chuguev. Thermo modernization of educational institutions.
6) Kherson. Thermo-modernization of the hospital
7) Kherson/Antonivka. Pilot "Green School" module
8) Berdychiv street lighting
9) Increasing energy efficiency in educational buildings of Cherkasy City
10) Renovation of Street lights with using LED technology in Kolomyia city.
11) Implementation of energy saving in three schools and energy management system in budget funded institutions of Rivne
12) Energy Efficiency in Public Buildings in the City of Cherkasy-Feasibility study
13) Energy Efficiency in Public Buildings in the City of Lutsk-Feasibility study

Employment Record

Years	Name of the Company/Position taken
2015-ongoing	Consulting company Garde, project coordinator, translator As project coordinator/translator performs the following duties: ➢ Project monitoring; ➢ Project management; ➢ Communication with city representatives; ➢ Reporting to NEFCO Consultants in Ukraine; ➢ Monitoring of e-mail information; ➢ Translation of correspondence, reports, project descriptions, interpreting; ➢ Providing consulting services related to design documentation; procurement under NEFCO's rules; submission of documents according to international standards; ➢ Coordination with the cities and consultants in order to gather data needed for projects implementation; ➢ Preparation of reports, improvement of technical documentation for the projects; ➢ Cooperation with contractors that won the tender for the implementation of energy efficiency measures, monitoring of compliance with completion schedules
2014-2015	Strokiv comprehensive school, English teacher, facilitator
2013-2014	Wedding agency Orhideia, translator/interpreter