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Deliverable 4. 2

Abstract version of Master Plan

for innovative energy structures in Nova Sol Region in Poland, which could be feasible for funding in the Structural Funds Programmes in the period 2007- 2013.

Elaborated by SEGI AT, November 2007

1. Background

Objectives

The general objective of this Master Plan is to implement efficient and sustainable energy management patterns in the target region of Nowa Sol County. Thus, the document aims at undertaking actions to maximize energy-related autarchy of the region and to enhance use of locally available natural resources for the purpose of energy production.

The main goal of the Master Plan is to **increase share of renewables in the total electricity and heat production in the coming 15 years by up to 40%**. Specifically, provided that the Master Plan suggestions are realized, significant improvement in air quality is expected, mainly as a result of SO₂ and NO_x emissions reduction. Besides, it is intended to introduce different energy efficiency measures and thus save energy especially in the municipal sector. The realization of the Energy Vision, which is the integral part of the Master Plan, and selected investments listed in the document, will also create new jobs in the renewable energy sector as well as its supply chains. It will also boost local RES infrastructure and all connected branches taking advantage of the EU Structural Funds that seem to be of great interest for the investor in the field of RES.

Finally, it is desirable that the proposed actions listed in the Master Plan (or at least some of them) will be virtually implemented in the target region and will not only improve the existing energy-related infrastructure, but will also affect the public awareness in this regard.

Cooperative Approach

In the region all main stakeholders were brought together for a successful and efficient definition of innovative energy actions in the respective region. The E4C actor cycle includes municipalities, households, media, capital provider and financial experts. Within this actor cycle Polish project partner SEGI was responsible for the coordination of the different actors, and the preparation of the regional Master Plan. Main focus was put to integrate suggestions and ideas existing in the region rather than exposing priorities from outside.

2. Master Plan Structure

Comprehensive investigations were undertaken, starting from an abstract and general view on the regions, leading to concrete innovative energy set-ups, consisting of a range of RE and EE projects. A comprehensive and detailed methodology was used, including 3 main elements:

1. **Target region portrait** – As a first step the target region has been thoroughly analyzed and described putting special emphasis on the energy-related data. The description of Nowa Sol Region has been based upon available statistical data, existing reports as well as on information collected on site in co-operation with Polish Ecological Club – a local branch of one of the most famous environmental NGOs in Poland. Both the natural and socio-economic features of the region are presented in chapter 2 along with the detailed energy balance for the county. In addition available financing opportunities for renewable energy (RE) and energy efficiency (EE) projects, especially in the framework of Structural Funds have been explored in detail in order to design an optimal financing scheme for the local projects.
2. **Energy Vision of Kaunas Region** - Furthermore, a concept for improvement of energy management and enhancing use of renewables in Nowa Sol County has been developed in chapter 3, so called “Energy Vision”. It contains the overall objectives (qualitative and quantitative) as well as suggested measures (so called milestones) aiming at achieving the fixed goals.
3. **Identification of concrete actions or action bundles** – Finally, after having interviewed some interested stakeholders from the region and taking into account available background information several pilot projects have been selected as the most prospective ones for further realization and presented briefly in the end of chapter 3. They are supposed to serve as Best Practise examples for the future investments in and outside of the target region. A pre-feasibility study has been elaborated for 3 projects (chapter 4, 5 and 6) taking into account the technical, social and economic aspects, thus proving the sustainable character of the planned investments. Along with the basic technical description certain financial engineering for each project has been suggested. Each subchapter includes a thorough study on how various EU Structural Funds might contribute to the successful realization of the particular projects. Future possible advantages and profits of the projects for the region, especially of social and environmental nature, are presented in addition.

3. Proposed Energy Project Proposals for Nova Sol Region

Project Proposal 1 – Biogas plant in Niedoradz, Otyń Municipality
Proposal concerns construction of a biogas plant in Niedoradz. The main input would be pig slurry from a large pig farm in Niedoradz. Amount of produced slurry is ca. 30.000 t annually. Additional input would be grain, silage and organic waste from external suppliers.
Current state
The farm currently disposes of all waste biomass by using it on its own fields and paying specialised companies to dispose of the surplus. The company operating the farm is looking for a solution to the problem of large quantities of waste. We suggest a biogas CHP plant.
Technological solution
Biogas plant construction – company ZENERIS (Poznan, Poland) <i>Technical parameters of the biogas station:</i> Installed capacity: ca. 1.000 kWe Number of CHP units: 1 Annual heat production: 35.000 GJ Annual power production: 7.500 MWh Inputs consumption: 50.000 t biomass (slurry + grain)
Investors
Company Pol-Lean Sp. z o. o.
Benefiting groups
Farm owner Pol-Lean – own heat and electricity supply leads to substantial energy costs reduction; disposal of troublesome residues from animal husbandry; additional profit from disposal of slurry delivered by local farmers and from RES green certificates, improved image of the company in the region Local farmers: solution for the troublesome farming waste, source of high quality fertilizer in the form of fermentation residues Local population: reduction of environmental hazards due to the migration of slurry products to groundwater as well as reduction of CH ₄ emissions Expected fossil fuel savings: ca. 1.500 t coal which corresponds to ca. 3.000 t CO ₂ emissions
Logistics
Pig slurry will be supplied from the farm itself as well as from neighboring farms. The fermentation residues from biogas plant will be used as fertilizer.
Financing
Pol-Lean will apply for subsidy from EU Structural Funds OP “Innovative Economy” (50% of

eligible costs); additional support from National Fund for Environmental Protection and Water Management will be applied for. The rest of costs will be covered by own sources and bank loan.
Expected investment costs
ca. 2 Mio Euro
Expected implementation time
Year 2008

<p>Project Proposal 2 – Small hydropower plant in Leszno Dolne, Municipality Szprotawa</p>
<p>Proposal concerns construction of a small hydropower plant in Leszno Dolne, on the Bobr river, in the neighboring county.</p>
<p>Current state</p>
<p>Hydrotechnical installation is not used for energy production at the moment.</p>
<p>Technological solution</p>
<p>Small hydropower plant (SHP) – company “Hydroenergia”</p> <p><i>Technical parameters of the SHP:</i></p> <p>River flow: 30 m³/s</p> <p>Descent: 3 m</p> <p>Installed capacity: ca. 900 kWe</p> <p>Annual power production: 7.200 MWh</p>
<p>Investors</p>
<p>SEGI-AT Sp. z o. o. – private company</p> <p>Zygmunt Gackowski – technical support</p>
<p>Benefiting groups</p>
<p>ENEA S.A. energy supplier in the region – fulfillment of legal obligation to prove the RES share in the total energy production</p> <p>SEGI-AT – additional profit, new area of activity, presence and good image in the region, creation of new jobs</p> <p>Zygmunt Gackowski – profit from consultancy, additional professional experience</p> <p>Expected fossil fuels savings: ca. 1.100 t coal which represents savings of 2.250 t CO₂ emissions</p>
<p>Logistics</p>
<p>n.a.</p>
<p>Financing</p>
<p>SEGI-AT will apply for a preferential loan from the sources of National and Regional Fund for Environmental Protection and Water Management. The rest of costs will be covered by own sources of SEGI and Zygmunt Gackowski as well as bank loan (Bank Ochrony Środowiska).</p>
<p>Expected investment costs</p>

ca. 1,5 Mio euro
Expected implementation time
Year 2010

<p>Project Proposal 3 – Gasification of municipal waste for heat production, Nowa Sol municipality</p>
<p>Proposal concerns construction of a gasification plant in Nowa Sol with 5MW thermal output which would substitute one of the coal-fired boilers. The main input will be segregated municipal waste without the organic fraction. Amount of input waste is estimated for ca. 7.000 t annually. Additional input would be biomass from local energy plantations and any other available organic waste.</p>
<p>Current state</p>
<p>The municipal heating plant with the total energy output of 15 MW is currently fired with the lowest quality fine coal. Conversion of one boiler from traditional fossil fuel to alternative fuel will decrease emissions of SO₂ and other pollutants (dust, NO_x etc.) and substantially improve air quality in the town.</p>
<p>Technological solution</p>
<p>Gasification plant: design and construction – company MTF Sp. z o. o.</p> <p><i>Technical parameters of the gasification plant:</i></p> <p>Installed capacity: ca. 5 MWth</p> <p>Annual heat production: 145.000 GJ</p> <p>Input consumption: 8.000 t (waste + additional biomass)</p>
<p>Investors</p>
<p>Municipality Nowa Sol</p> <p>Energetyka Ciepna Opole - heat supplier</p>
<p>Benefiting groups</p>
<p>Municipality Nowa Sol – own independent source of energy based on the local input, reduction of heat production costs, CO₂ and SO₂ emissions reduction, contribution to the green image of the municipality, reduction of the biodegradable fraction of municipal waste sent to the landfill (fulfillment of legal obligations)</p> <p>Residents of Nowa Sol – improved ambient air quality, new employment opportunities</p> <p>MTF Sp. z o. o. – profit, new experiences</p> <p>Municipal services company in Nowa Sol – manager of landfill in Kielcz - reduction of the non-organic fraction of municipal waste sent to the landfill (fulfillment of legal obligations)</p> <p>Expected fossil fuels savings: ca. 6.300 t of low quality coal</p>

Logistics
Combustible fraction of municipal waste will be sorted out from the waste stream at the landfill area in Kielcz (ca 10 km away from the town) and then transported back to the heating plant in the town of Nowa Sol. Similarly, any additional biomass from the municipal plantations of energy willow will be collected on the premises of the district heating plant. Since the plant is located close to the residential area it will not be possible to store large reserves of input material and the deliveries must be performed regularly. Ashes will be transported back to the landfill.
Financing
EC Opole will apply for subsidy from EU Structural Funds OP “Innovative Economy” (ca. 50% of eligible costs). The rest of costs will be covered by own sources of project developer.
Expected investment costs
ca. 3 Mio euro
Expected implementation time
Year 2008-2009

Project Proposal 4 – Refurbishment of municipal buildings, Nowa Sol County
Proposal concerns energy efficiency measures to reduce energy demand of three municipal buildings: Secondary School Complex, Social Care Centre and Town Hall in Nowa Sol. The savings of ca. 40% on average could be expected annually.
Current state
Most of the public buildings owned by the Nowa Sol County have already been modernized and their energy efficiency parameters have substantially improved. However, there are still 3 of them which remained not modernized with very bad energy-related technical parameters.
Technological solution
Scope of works: modernization of the heating system, insulation of roof and walls (inclusive elevation of the building), replacement of door and window frames as well as windows.
Investors
County Nowa Sol
Benefiting groups
Nowa Sol – lower energy demand for heating of public buildings, reduction of heating costs, CO ₂ and SO ₂ emissions reduction, contribution to the green image of the county and municipality Residents of Nowa Sol – improved ambient air quality
Expected savings on heat demand: ca. 40%
Logistics
n.a.
Financing
Nowa Sol county intends to apply for appropriate funding within the Regional OP for Lubuskie Voivodeship (up to 75% of eligible costs) or optionally from Norwegian Fund; the remaining costs will be covered by own sources of the county.
Expected investment costs
ca. 4.250.000 Euro
Expected implementation time
Year 2007/2008

4. Conclusion and Outlook

To sum up, Nowa Sol County offers a sufficient potential to develop the sector of renewable energy. Due to the specific characteristics of the region the most recommendable source of renewable energy is biomass in various forms. Furthermore, the most prospective directions for the development are: use of agricultural residues for heat and electricity production, gasification of combustible and calorific organic waste, solar heat collectors, energy crops' plantations. Other types of RES-technologies are rather not recommendable either due to very high investment costs (i.e. photovoltaic panels) or to the unfavourable conditions and lack of appropriate resources and (wind and hydro power, wooden biomass from the forestry or wood processing industry).

The first initiatives have already been undertaken in the region. Municipality Nowa Sol supplies some of their buildings with heat produced from the biomass, mainly in the form of energy crops from the own willow plantation as well as from other energy plants. The authorities of Nowa Sol County, on the other hand, implemented the energy efficiency measures in several public buildings. Wooden pellets were manufactured from saw dust, however, due to the shortages and unavailability of raw material an innovative concept is seriously considered, to start production of pellets from alternative input material which are mainly by-products from agriculture as well as energy crops. Those actions as Best Practise examples have created a good basis and starting point for future developments in this field.

After the Master Plan for Nowa Sol County has been elaborated in detail and the "Energy for Cohesion" project has been finalised, the local stakeholders intend to continue the actions started in the framework of the programme. The comprehensive feasibility studies will be performed for the selected actions and the European Structural Funds will be applied for in order to assure the financial stability of the project.

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