



CENTRAL BALTIC
INTERREG IV A
PROGRAMME
2007-2013



EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND
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PURE
BIOMASS

Summary



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A study of legal aspects of biomass at national, regional, and local level

Use of renewable energy sources (RES) is one of the most essential planning components of national and global environmental policy, connected with solving of local and regional (air pollution), and global (climate change) environmental problems. Only some renewable energy sources – sun, wind, and water – are inexhaustible. RES like biomass from farming and forestry are renewable, but not inexhaustible energy sources, which must be taken into account when intensifying their use.

Development of political discourse for the development of RES use in the European Union has begun with emphasis on intensification of biomass utilization without considering sustainable use criteria of these energy sources, which has influenced production and use of first-generation biofuel.

Energy sector and renewable energy as a part of basic infrastructure necessary to ensure development play a vital role in planning of development. A regional bioenergy strategy can serve not only as an answer to environmental problem issues topical in the region, but also gain international context by promoting transfer of technologies and knowledge and positioning the region as a significant international player in development of bioenergy. Sustainable development criteria, as well as structure and problems of energy sector can be most effectively assessed at regional level.

The main conclusions:

- to ensure availability of biomass resources, attention must be paid to increase of delivery potential of resources, which can be implemented by establishing plantations of energy wood, using energy wood from tending young growth, performing artificial renewal of forests;
- planning of energy policy is currently in the process of change in Latvia. Not only politically set goals are necessary, but also mutually connected implementation instruments that comprise infrastructural, economic, legislative, planning, and communications aspects;
- legislation is one of the factors that promotes production and use of biomass resources the most, however, the RES law has not been passed yet. The first stage of support – obligatory procurement in electric power sector and subsidies for producers of biofuel has ended, and new support schemes for promotion of use of RES are being presented;
- the new discourse envisages to direct national investment support in the form of large investments only towards projects dealing with implementation of promotion measures of energy efficiency and use of renewable energy both in centralized and individual heat supply systems. In production of electric power, a minimum RES proportion in the total portfolio of electrical power for large energy dealers should be set. However, it causes concern whether support will be sufficient to achieve the

ambitious goals (to ensure a 50% proportion of RES in the total gross energy consumption by 2030);

- Kurzeme planning region, while elaborating new spatial development planning documents – a sustainable development strategy and development program – should consider a possibility to evaluate biomass resources in agriculture and forestry, as well as in heat supply, transport, electric power production, and waste management sectors in the context of bioenergy use;
- to consider a possibility for the largest cities of Kurzeme planning region (for example, Ventspils and Liepaja) and regions to join the Covenant of Mayors and elaborate sustainable energy action plans;
- one of the important instruments in development and implementation of regional bioenergy strategies, as well as involving of target groups is cooperation with a professional energy agency in the region.

Cost – benefit analysis of biomass utilization

Development scenario of Kurzeme planning region, similar to Latvia in general, is connected with increase of efficiency in energy use, obtaining and use of RES, and progress of technologies. Though it goes without saying that use of local energy resources that are also RES and thus – replacement for imported fossil fuel is favourable for development of Latvia and its residents, there is no unanimity in society regarding usefulness of RES use. Currently, municipalities of Kurzeme planning region have a unique opportunity to use this situation for development of science and education, increase of safety of energy supply, and economic growth, while simultaneously helping Latvia to maintain reputation of responsible country by changing over to a vaster use of RES more rapidly.

Data of the Central Statistics Bureau about forest resources in 2011 show that the total area of forests in Latvia was 3221 thousand ha, of which 752.3 thousand ha were in Kurzeme planning region, of which 401.2 thousand ha were coniferous forests and 340.1 thousand ha – deciduous forests. In separate regions there is considerable mean stock volume per territorial hectare, but in other regions it could be increased. Regions with the largest proportional stock volume are Ventspils, Alsunga, Grobina, Paviļosta, Roja, and Mersrags regions, but with absolute stock volume – Ventspils, Talsi, and Kuldīga. It can be considered that there are more qualitative stands in Kurzeme region as compared with the rest of Latvia, besides, forest coverage in Kurzeme planning region is, on average, higher than elsewhere in Latvia. At the same time, relative demand for forest resources for deciduous trees in the entire Kurzeme region is sufficiently low and, therefore, special attention should be paid to additional use of it. Deciduous trees could be a potential source for production of energy wood, and this potential is not used sufficiently in Latvia.

So that municipalities of Kurzeme planning region were able to prognosticate price tendencies of fuel woodchips and economic stability of heat supply systems in future, it is necessary to assess also other possible types of biomass resources that could be used in perspective – to replace current forestry resources of energy wood.

Reserves of traditional energy wood product resources in Latvia after 2014 will be practically exhausted, which will cause price increase in the segment of higher quality wood resources. However, the increase will not be uneven because the decrease in demand and low prices in pulpwood market, together with the increasing local demand from energy sector allow Latvia to increase the resource base of fuel wood at the expense of lower quality wood products that were being exported up to now.

The abovementioned conclusions are important when evaluating the resource base of fuel wood also in Kurzeme planning region. However, when assessing overall development directions of biomass use it is essential to analyse also other biomass resources in Kurzeme planning region so that a wider base of raw materials for the consumption of the residents and heat supply companies could be ensured, thus guaranteeing a more stable price policy and heat supply rates in future in the entire Kurzeme planning region.

There are several obstacles hindering wider environmentally friendly and efficient use of biomass in heating systems in Kurzeme planning region and in the entire Latvia:

- lack of knowledge and information about efficiency of biomass burning equipment and environmental benefits;
- lack of effective coordination to encourage a dialogue between the involved organizations and final consumer that would clearly define the duties of each institution in implementation of biomass use policy;
- lack of economic stimulus for wider use of transitional measures;
- difficulty in obtaining cheap financial resources for effective implementation of such measures;
- lack of regulatory enactments to promote more rapid implementation of biomass use measures;
- problems in organizing energy consumers in apartment houses.

Elaboration of a technical solution to encourage transition in municipal heat supply systems to the use of biomass is possible by limiting the abovementioned obstacles in an efficient manner. Taking into account that such measures in Kurzeme planning region have been implemented several times in the period of last 20 years, it is necessary to study the situation of each particular municipality and the experience of previous projects in order to offer a solution feasible in the actual situation.

The main factors influencing the provisions for elaboration of theoretical models of heat supply systems are:

- the necessary load;
- expenses of investing in the equipment;
- expenses of maintaining the equipment;

- technological solution of location of equipment and woodchip or wood site;
- availability of biomass resources;
- competing energy sources and consumer-determined conditions.

By assessing the available technological solutions, the following technological solutions for biomass use can be separated:

- a) *micro model* – high-efficiency wood or pellet automatic boilers; a pellet boiler within its limits has been optimized for operation with various types of pellets; maximum use of standardized, market-tested solutions; optimum capacity of up to 100 kW;
- b) *mini model* – possibilities to use co-generation or micro-generation equipment have been considered; high-efficiency automatic feeding woodchip or pellet boilers for a separate group of houses; solutions for various regionally available types of biomass have been considered and envisaged; possibilities to conclude a long-term agreement with woodchip or pellet suppliers have been considered; optimum capacity of 100 to 500 kW, long-term warranty for all system elements; maximum use of standardized, market-tested solutions;
- c) *midi model* – co-generation or micro-generation equipment; solutions for various regionally available types of biomass have been considered and envisaged, deliveries for a year and a season have been planned; high-efficiency technologies with automatic feeding solution; planning of regular and potential heat supply consumers; a public procurement procedure for selection of the most suitable solution; selection of suitable equipment maintenance company; optimum capacity over 500 kW, not exceeding 10 MW; long-term warranty for all system elements.

In developing this study, a model for municipalities was also prepared to compare current situation with the perspective project; it can be used by municipal specialists for simplified comparison of new solutions. This model provides information about the expected current net value of investments in heat supply, the period of recoupment, and cost/benefit indicators. Advantage of this model is its simplicity, as a result of which it can be used not only by professionals, but also by project managers in small municipalities without the help of external experts.

Conclusions of cost-benefit analysis of cultivation of various types of biomass in Kurzeme region.

To determine the most efficient solution for cultivation of biomass in the territory of Kurzeme region, various scenarios that differ with their proportion between several types of biomass being cultivated were assessed:

- a) *basic scenario* that envisages cultivation of the abovementioned types of biomass resources in equal areas. Use of the total area in the amount of 25 thousand ha will create additional energy resources in the region in the amount of 486 thousand bulk

m³ of woodchip resources per year, as well as 171 thousand bulk m³ in pellet resources. This scenario will create net current value of 8.341 thousand Latvian lats, thus, over a 10 year period, additional net current value of nearly 10 million Latvian lats will be created;

- b) *scenario No. 1* – directed towards additional cultivation of plant cultures, with smaller emphasis on promotion of osier and hybrid aspen cultivation (this situation would be theoretically possible if these cultures received additional support for energy acquisition). Use of total area in the region in the amount of 25 thousand ha would create additional 97 thousand bulk m³ of woodchip resources per year, as well as additional 261 thousand bulk m³ in pellet resources, which is a 390 thousand bulk m³ reduction in woodchip resources and a 90 thousand bulk m³ increase in pellet resources. In this scenario, net current value indicator would improve to 14 million Latvian lats over a 10 year period;
- c) *scenario No. 2* - increased yield of woodchip resources – cultivation areas for osiers and aspens are increased, while the area of energy plants is reduced. Use of the total area in the amount of 25 thousand ha as compared with the basic scenario will create additional energy resources in the region in the amount of 875 thousand bulk m³ in woodchip resources per year, as well as 80 thousand bulk m³ in pellet resources, which is an increase of 389 thousand bulk m³ in woodchip resources and a decrease of 81 thousand bulk m³ in pellet resources. The net current value indicator as compared with the initial scenario has worsened – to 5.5 million Latvian lats over a 10 year period.

The analysis shows that any perspective type of biomass resources in the territory of Kurzeme planning region has sufficient potential for its cultivation when critically evaluating their cost-benefit potential.

The materials and models elaborated within the project “Potential of biomass as a source of energy and competitiveness in the Central Baltic Sea region” have been prepared using information available to the experts of „Ekoncepti” Ltd. at the beginning of 2013. Taking into account that report prepared by other project experts about actual cost-benefit analysis in the territory of Kurzeme planning region that will be based on data from experimental territories will only be available at the end of 2013, these model data can be reviewed and, if necessary, updated, which would be a benefit to the municipalities of Kurzeme planning region.

Cost-benefit analysis of use of biowaste in municipal heating systems

Elaboration of cost-benefit analysis of use of biowaste in municipal heating systems has no justification, because biomass resources for this kind of project will practically be unavailable in the territory of Kurzeme planning region in the following 10 years.

Economic analysis of use of industrial waste in small-scale heating networks

Industrial waste with the potential to create energy generated in the territory of Kurzeme region are rather limited, moreover, there is a minimal number of manufacturing companies in the region whose technological manufacturing processes could generate sufficient remainder of energy resources;

Cost-benefit analysis of use of algae

The considerable frost season and the low level of concentration of solar energy would be a notable limiting factor for cultivation of algae in Latvia. Currently use of algae for obtaining of bioenergy in Latvia and Kurzeme planning region has notable limiting factors and its utilization is not competitive with other biomass acquisition technologies under Latvian climatic conditions. Transportation of algae masses that form in the territories of larger coastal beaches for processing together with the existing green waste mass could be considered as a separate possibility, thus creating additional positive effect to sustainability of waste management (with obtaining energy), yet it is already clear that this will be limited notably by collection and transportation costs;

A study about biodiesel as an alternative product from biomass

Production possibilities of second-generation biodiesel in Kurzeme region are connected with technological capabilities to process it. Currently, only one company operates in production of biofuel, and further development of the sector, following the reduction of state subsidies, is problematic. As long as there is no sufficient demand for biofuel and/or support policy in Latvia, processing of energy cultures into biofuel is inefficient, because much larger manufacturing capacities are required for effective production process. Such manufacturing capacity is too large for current consumption in Latvia, while factory of smaller capacity would require considerably larger operating expenses.