

Integration of national and regional energy development programs in Baltic States

V. Klevas^{a,*}, M. Antinucci^{b,c}

^a *Department of Regional Energy Development, Lithuanian Energy Institute, Breslaujos str. 3, LT-03035 Kaunas, Lithuania*

^b *ECUBA srl, Via Cestello 4, 40124 Bologna, Italy*

^c *Local Agency for Sustainable Development of the Modena, Via Razzaboni 80, 4100 Modena, Italy*

Abstract

The report is dedicated to the presentation of the general framework of regional energy planning activities in Baltic States. The objective is to provide information on the context, in which regional energy policy instruments have to operate, and which has to be taken into consideration when compiling energy development measures for regional development and structural funds. The major issue of the publication is to discuss perspective of the formation methodology for energy management integration into development of regional planning documents. The main objective of this publication is to make a brief overview of what are the prospects of regional energy development.

The place of municipal and regional energy development programs in general energy investment strategy is defined. The guidelines for regional energy programs are presented.

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1. Introduction

Regional development initiatives financed by the Structural Funds must meet the specific needs identified on ground by regions or Member States. Implementation is decentralized, which means that it is mainly the responsibility of the national and regional authorities.

All three Baltic states—Lithuania, Latvia and Estonia—expect to become the European Union (EU) member states in 2004. After accession they will receive financial support from Structural Funds. According NUTS specification all three Baltic countries will get into NUTS-II group, so all territories of each country will be treated as one region. So Lithuanian, Latvian and Estonian Governments will decide which regions of the country are to be supported. However irrespective of the type of financial assistance from the Structural Funds this support complement, but do not replace national efforts and national financing. It means that

Union funding is always added to national funding so that the country may overcome the limit imposed by its own financial capacity. Community funding is not provided as a means for countries to make savings in the national budgets.

Lithuania, Latvia and Estonia must elaborate regional energy policy and foresee necessary funding from budget and other sources.

However it is a rather complicated problem even in EU member states. “The gap between expertise of energy experts in energy agencies and regional and local energy experts exists. This gap is particularly reprehensible as a lot of EU resources of Structural Funds are managed at regional and local level, and only a very small share has been utilized for energy efficiency and renewable energy projects up to now.

For bridging this gap European project called PENELOPE-BACCHUS, co-funded by the EU programme SAVE II has been provided. The BACCHUS subproject is aimed at transferring information between a group of energy agencies and the EURADA network, representing RDA in all the EU member states. The overall goal of this specific action is to raise and increase

*Corresponding author. Tel.: 370-37-401936; fax: 370-37-401971.

E-mail addresses: klevas@isag.lei.lt (V. Klevas), agenzia.energia@comune.modena.it (M. Antinucci).

Table 1
Selected energy indicators

	Population, mill	GDP (PPP) ^a Bill 90USD	Net ^b imports, Mtoe	TPES ^c Mtoe	Net import/ TPES, %	TPES/GDP (PPP) toe/000 90USD energy intensity	GDP (PPP)/ pop 90USD/ capita	GPD (PPP)/ pop as percent of EU average %
Estonia	1.46	10.46	1.77	5.56	31	0.53	7164	41
Latvia	2.47	10.90	2.64	4.46	50	0.41	4413	25
Lithuania	3.71	13.11	8.04	8.81	91	0.67	3537	20
EU total or average	374.15	6475	699.93	1425.17	49	0.22	17306	100

Source: International Energy Agency (1999). Key world energy statistics from IAE.

^a PPP—purchasing power parity. In this case GDP is recalculated according PPP in order to achieve comparable data among countries.

^b Net imports = imports–exports.

^c TPES—total primary energy supply—is made up of indigenous production + imports–exports–international marine bunkers ± stock change.

the capacity of European regions to develop projects, financed by the Structural Funds, in the field of energy efficiency and renewable energies” (Antinucci et al., 2002).

This project is also designed to meet the needs of Baltic countries region, which are affording the pre-accession phase in view of the EU enlargement. These countries have been facing severe constraints in managing their energy policy, since the decentralization and privatization process started. With this specific aim in mind the Lithuanian Energy Institute is taking part in the project, coordinating a team of Baltic States development agencies.

The main problem in EU Member states is how to increase this percentage use of energy investments in Structural Funds.

“The first key is to introduce energy elements horizontally in the other measures dealing with rural development, urban development, enterprise start up and growth, infrastructures for productive sites. Energy efficiency and use of renewables, introduced in projects related to any of these areas, should always be encouraged giving significant and explicit priority for financial incentives.

The second key is to propose new ideas where clean energy investments can catalyse new economic activities: this has been demonstrated in several cases (e.g. biomass cycle exploitation, ecological industrial infrastructures for new productive settlements, performance contracting for public buildings)” (Antinucci et al., 2002).

These problems are to be solved in Baltic countries as well.

The main dimension of the paper is the process of preparation the regions of Lithuania and other Baltic States (Estonia, Latvia) for the European Union’s structural funds. This is the process, which comprises creating of methodology, development of adequate energy planning capacities and skills, strengthening of

institutions, adoption of legal mechanisms that will enable Lithuania, Latvia and Estonia to receive European Union’s financial support in the future.

2. Typology of energy problems and guidelines of possible solution to overcome the problems in Lithuania, Latvia and Estonia

Key energy-economic data of Baltic Countries—Lithuania, Latvia, Estonia and EU average are presented in Table 1, prepared according data of International Energy Agency (1999).

Energy intensity (TPES/GDP (PPP)) is 2–3 times higher than EU average.

Net imports as share of TPES is 31% in Estonia, 59% in Latvia and 91% in Lithuania, so Lithuania has most difficulties in ensuring the security of energy supply. Moreover such a high ranges of Net import of energy sources and products cause negative impact to foreign trade balance of Lithuania—about 2.5 billion Litas per year and consequently—lower GDP at the same range.

The guidelines for possible solutions for energy problems revealed in the framework of international investigations, particularly in Baltic 21 project.

The task for Baltic 21-Energy (one of seven co-operation areas) is to point out a sustainable development path for the energy sector, supporting the political vision of long-lasting energy security and sustainable development for the Baltic Sea Region.

Analysis of current energy situation and future prognosis was carried out by building a sustainable development scenario through 2030 in Baltic 21. The scenario method could be described as back-casting—it is used to show a path, leading to fulfilment of the goals.

Emphasis has been made on action elements, which are considered feasible taking present infrastructure,

Table 2
Forecasts of main energy indicators

Indicators	Measures	Estonia		Latvia		Lithuania	
		1995	2030	1995	2030	1995	2030
Population	Mill	1.48	1.48	2.51	2.51	3.71	3.71
GDP	Bill USD	7.80	29.60	9.60	50.20	12.30	74.20
GDP/Population	USD/capita	5270	20 000	3825	20 000	3315	20 000
Primary energy (TPES)	PJ	228	181	188	286	363	420
Final energy	PJ	113	135	153	229	202	335
Transformation and transmission efficiency (final energy/primary energy)		0.50	0.75	0.81	0.8	0.58	0.80
Overall efficiency Netto energy/primary energy		0.38	0.71	0.52	0.72	0.39	0.69
Renewables	PJ	12	51	31	111	10	105
Renewables % to primary energy	%	5	28	17	39	3	25
CO ₂	Mton	20	9	11	11	15	21

Source: Baltic 21-Energy (1998). Sustainable energy development in the Baltic Sea Region.

Table 3
Evaluation of total energy conservation potential in Lithuania

	Branch of economy or energy consumption sphere	Consumed in 1999 TWh	Total annual saving potential TWh	Necessary investment MEUR
1	Buildings (thermal energy) ^a			
	Residential (multiflat)	9.5	4	295
	Residential (1-2 flat)	19.9	5	347
	Public ^b	3.4	1.3	35
2	Industry	9.73	2.3	130
3	Transport	13.7	1.8	173
4	Agriculture	1.31	0.63	66
	Total	57.5	15.03	1046
	Renewable energy sources	7.6 ^c	17.9 ^d	n.a.

Source: Lithuanian Ministry of Economy (2001). National Energy Consumption Efficiency Program. Staff Report, Vilnius.

^aTheoretical potential of heat consumption.

^bSaving potential for modernization of heat supply and consumption systems in the buildings.

^cRES produced in 1999.

^dPotential of RES.

technologies, national policies and economic considerations into account, in the sustainable energy development scenario.

“Model calculations indicate that if the long-term goal, regarding consumption of fossil fuels and emissions are to be achieved in a viable way, a development strategy must address: (i) energy savings in all sectors, (ii) reduction of losses in energy transformation, both locally and in the electricity and district heating sectors, and (iii) increased use of renewable energy sources (RES) and natural gas” (Baltic 21-Energy, 1998). The scenario does not include nuclear power. That is why forecasts of energy consumption by the types of fuel through 2030 are very interesting from the point of view of using RES in long-term perspective, in case of closure of Ignalina NPP. These forecasts are shown in Table 2, prepared according to data presented in Baltic 21 project.

Certainly, above prognoses especially for increasing RES implementation are rather optimistic, and their implementation will require especially favourable legal and economic assumptions.

However investigations have proved that prognoses are realistic. There is high-energy savings potential in all sectors of economics in Baltic countries. Evaluations of energy savings potential in Lithuania are presented in Table 3, prepared according data of National Energy Consumption Efficiency Programme. It was prepared by large group of experts in 1992. Programme was revised in 1996 and 2000, and has defined energy savings potential in all sectors, energy production efficiency potential in electricity and district heating sectors as well as RES mastering potential.

Energy demand is divided into five major consuming sectors: industry, transport, residential, service and agriculture. Country representatives of the energy

Table 4
Measures for improvement of energy efficiency

Pricing mechanism, promotion of investments in energy saving measures, awareness and information comparing, norms and standards		
Lithuania	Latvia	Estonia
2. Preparation and implementation of the Energy Conservation Law	1. Measuring and collection of data related to energy production and consumption	Energy conservation is a priority both in electricity and heat sectors. When considering the climate and peculiarities of the existing structures as well as their technical level, it seems that main attention should be paid for further improvement of energy saving in heat economy, both by industrial and household consumers
3. Implementation of the energy pricing policy promoting energy conservation	2. Part of foreign credits with government guarantees and funds obtained from privatization will be forwarded for projects of efficiency improvement and use of domestic energy resources. The same type of projects will be financed by (rather restricted) available state budget sources. Privatization is considered to be desirable and it would raise efficiency of energy utilities, develop competition and attract private capital investment	To the improvement of efficiency both political measures (tariffs, standards, penalties, incentives, information) as well as technical innovations, which together provide a strong basis for energy saving both in economy and in the residential sector are implemented. The saving policy becomes more attractive and gives immediate benefit with the reliable feedback provided by the organization of the system of energy audits
4. Promotion of information distribution about energy conservation	3. The reconstruction of DHS adjusting them for the use of cheaper (local, as well) fuel, improvement of heat insulation of pipelines	Energy efficiency is closely connected with making up a rational set of standards, norms and decrees for Estonia, which specifies the framework for keeping the energy indices on the acceptable level in the production, distribution and consumption stages
5. Implementation of equal or even better conditions for investments in the field of energy conservation if compare with other investments	4. Introduction of co-generation by installation of power generators at existing boiler houses	
6. Establishment of necessary regulatory and executive bodies for implementation of energy conservation	5. Heat metering and control in buildings	
	6. Preparation of buildings' codes to obtain a consistent set of standards for higher efficiency, high quality buildings	
	7. Introduce different innovative approaches on financing energy efficiency projects	
	8. Continue awareness and information campaign and implementation of Demand Side Management	
	9. Complex training programme for appropriate specialists on effective energy management	

Source: PHARE Multi-Country Programme (1998). Assistance to the Baltic Council of Ministers Committee of Energy. Staff report, Vilnius.

network had supplied national information. Supply side input (regarding the power and district heating sectors) has been collected from various national sources, including national statistics and reports.

The potential for energy savings was quantified for each sector. In National energy demand efficiency program energy savings are defined as measures that will reduce the final energy demand at relatively low costs (2–3 years payback period).

Energy savings can be achieved by reduced demand for energy due to changes in energy consuming devices and technologies.

“The method of comparing current energy consumption with technically achievable was mainly used by defining energy saving potential. Energy saving potential was considered to be achievable in relation to the

current demand of energy in all sectors due to changes in energy consuming devices and technologies.

Examples of changes in technology are as follows: reduction of heat losses in dwellings, more efficient energy consuming equipment, energy efficient industrial technologies, model changes in transport, etc.” (Lithuanian Ministry of Economy, 2001).

Data, presented in Table 3 show that most energy is consumed for heating of buildings and here is the greatest energy saving potential.

With regard to RES such increase in using of renewables is hardly imaginary without an extremely substantial political and economic efforts.

The energy efficiency, energy saving and implementation of RES in three Baltic States are declared by the Governments as one of the energy policy priorities. In

the framework of PHARE Multi-country programme “Assistance to the Baltic Council of Ministers Committee of Energy” the main measures for improvement of energy efficiency were formulated, as it is shown in Table 4, prepared according PHARE Multi-Country Programme (1998).

In this field each of the countries has elaborated various projects, so there is need for a wider exchange of experience with regard to successful projects as for creation of a bank containing information data on the completed energy efficiency projects and their careful analysis. Technologies in energy generation and end-use sectors are very similar in all three Baltic States, so it is possible to implement common basis for application of regional technological solutions.

All three Baltic states have developed their plans for energy efficiency, which are financed by private and state resources. A number of projects are also financed through multilateral and bilateral loans.

“However even when top priority has been given to energy efficiency, at least in policy and strategy documents, it is a fundamental problem that very little state budget is made available to implement the policies formulations. The budget decreases continuously and tremendous efforts will be needed either at fiscal or budgetary level to reverse the present trends” (PHARE Multi-Country Programme, 1998).

Possible solution of financing problem could be partly solved in future after accession into European Union. However the preparatory work must be done in the framework of regional development by formation of energy projects financed by Structural funds, integrated in the local and regional development process.

First of all we must clarify and answer the following questions:

1. What is the content of regional energy programs in the framework of Structural Funds policy?
2. How regional energy program could be related to country energy strategy?
3. How energy projects may be integrated (in terms of methodology) into regional development process?

3. The content of regional energy programmes in the framework of Structural Funds policy

We can state that regional energy development programs should be integrated part of National energy documents in Lithuania, Latvia and Estonia. The bottom-up approach should be implemented into energy development strategy.

“Regional policy should supplement sectoral economic policies by identifying regional prospective and by adding certain additional components, that could be

within the province of regional administrations” (Petkevicius, 2000).

It is evident that the structure of regional energy programmes should comply with the demands of financial support from Structural Funds and other financial sources. This principle was implemented by preparing Lithuanian National Regional Development Programme. Its implementation is financed by the means of PHARE Social and Economic Cohesion.

Moreover “In the EU-Countries, the politics of Structural Funds plays a considerable role in the development of regions, as well as the determination of the priorities and strategies for regions.” (Thomassen and Serapinaite, 2001).

One of the priorities of the current Structural Funds’ programs is the promotion of energy efficiency and RES. The new regulations on Structural Funds programming require particular attention to be paid to the integration of energy and environmental aspects in all sectors programs.

Fortunately for Baltic Countries EU financial support has been allocated to energy projects, which had been outlined above as most feasible for solving energy problems in the future.

In less developed regions, investments for energy under the Structural Funds should concentrate on: “Energy networks: Completing interconnections with special emphasis on the TENs, improving electricity grids and the completion and improvement of gas transmission and distribution networks are priorities. Particular priority should be given to interconnections that will contribute to the opening up of the electricity and gas markets and that will be operated in accordance with the competition rules of the Treaty” (INFOR-EGIO: http://www.inforegio.cec.eu.int/comm./regional-policy/index_en.htm).

3.1. Vidzeme region (Latvia) example

During 1987–1988, in the Aluksne district research was carried out, it was planned to establish two branches Kalpaki—Ape and Veclaicene—Alūksne. The project was prepared, but practical implementation has not started yet, because of lack of investment. In the middle and the end of the eighties a subproject was worked out for gas transportation from St. Petersburg and Byelorussia to the Baltic countries—the building of the main gas pipeline Rauna—Valmiera—Tallinn. The goal for this branch was to provide transportation of the gas from Byelorussia to Latvia and Estonia, including also the possibility to transport it to Scandinavia and other countries. Within the framework of this project it was necessary to review the projects and pre-project researches worked out during the eighties. The project for transportation of natural gas to Estonia and Scandinavian countries could gain the new significance

at this time. The international project “Northern dimension” envisages forming of the united circle of the energy supply from the places of the output to the main consuming places in Northern Europe, including the Baltic sea countries and Western Russia. In the future, the possibility exists to utilize two potential gas storage facilities in the Valmiera district.

If the gas supply pipelines are not built, the existing situation remains: utilization of the more expensive fuel—liquefied gas and less effective fuel—wood pulp. This increases the costs of fuel, and the product cost in the region increases and creates more environmental pollution with the emissions from the burning process. It seems that this project could gain financing from SF in the future.

“Energy Efficiency: In order to avoid unnecessary increases in energy production capacity, measures should initially focus on the demand side: targeted aid could be used to promote the production of energy efficient equipment, its acquisition by SMEs, and the use of such equipment in households and public buildings. Support for investment by industry in energy efficient and innovative technologies, such as Combines Heat and Power (CHP) or cooling and power, could be coupled with voluntary agreements, energy audits, the use of labelling and best practice initiatives. Investment in energy efficient technologies can usefully be accompanied by related training measures”(INFOREGIO: http://www.inforegio.cec.eu.int/comm./regionalpolicy/index_en.htm).

3.2. Lithuanian example

Analysis of power and heat costs in the network permit us to make single meaning conclusion: concentrated power production defines extremely huge losses in power networks and huge costs differentiation in separate regions where power and heat consumption density are lower than country average.

After introduction of nuclear power plant CHP plants operate as boiler-houses most of time. “That’s why costs of produced energy-power and heat in such regions are high and disseminated power generation, direction, when power on heat production is distributed among big number of small plants is more promising. This corresponds to modern energy development tendencies abroad and makes assumptions for competition, increased reliability of energy supply. This direction could also permit to solve the district heating efficiency and use of RES potential problems” (PHARE Project, 1997).

The role of mini CHP will increase, as it is one of the most significant technical ways to reduce heat price. However categorical solutions and recommendations cannot be given, as true market for disseminated cogeneration is not known. For this purpose more

detailed investigations are needed, which are possible during formation of regional energy programmes. The new obligation concerning closure of the 1st unit of Ignalina NPP will inevitably have huge impact on increasing energy efficiency, though it needs proper legal and organizational conditions.

A number of municipalities in Lithuania have provided such investigations for improving district heating sector.

3.3. Case Ida-Virumaa region (Estonia)

Preliminary stage of elaboration of the heating Development Plan of Ida-Virumaa has been elaborated.

- (A) Evaluation of heat pipe systems for towns and settlements as well as of situation in housing sector. Justification of their economical expediency and reorganization.
- (B) Elaboration of development scenario of district heating for 2002–2015 taking into account specifics of different towns and their development prospects as well as possibilities of alternative heat systems usage, besides the shale.
- (C) Development of long-term forecast of price calculation for heat power. Estonian example shows the right regional way for solving the problem of district heating system. This problem exists in all Baltic Countries. However the problem is complicated because of the realization that heat saving potential in buildings is closely connected with the necessity for technical reconstruction of district heating systems.

“RES: Targeted aid could be used to promote the acquisition of renewable energy equipment in SMEs, for instance in the tourism sector, where there is considerable potential for the use of renewables. With this regard, the Commission’s “White paper on a Community Strategy and Action Plan for RES”, calls on Member States to guarantee that at least 12% of the global budget of the energy sub-programmes is used to support RES”. (INFOREGIO: http://www.inforegio.cec.eu.int/comm./regionalpolicy/index_en.htm).

Consequently, investment here would tend to focus on small-scale innovative infrastructure projects. Priorities include investments to promote the use of RES, investment aid for reducing SO₂ and CO₂ emissions, the use of energy audits and the promotion of efficient energy management in SMEs, towns and cities (and in rural areas). However there are serious problems in all countries concerning implementation of RES.

“Regardless of the type of renewable source of energy, it has to bear in mind that there are barriers of structural nature to its’ development. The economic and social system is based on centralized development

around conventional sources of energy (coal, oil, natural gas and nuclear) and above all around the generation of electricity” (Commission of the European Communities, 2000).

However the most important problem is financial. Some renewables need significant initial investment, as was the case for that matter with other energy sources, such as coal, oil, natural gas and nuclear energy.

“The renewable energy market in the European Union cannot be expected to develop regularly without a valid tariff policy in the medium term on the part of public authorities. This policy could fall within a range of decisions stretching from drastic fiscal measures in favour of RES or the obligation on the part of electricity producers and distributors to purchase a minimum percentage of electricity produced from renewable sources of energy through to aid to research or to financing mechanisms, interest subsidies, guarantee funds, parafiscal tax on other sources of energy” (Commission of the European Communities, 2000).

So for renewable sources of energy voluntarism policy or fiscal incentives are needed. It seems that best solutions could be found in the framework of regional development process. The reason for such a statement is that advantages of RES could reveal in regional scale.

Why specifically in the framework of regional programs?

Projects for energy savings, energy efficiency and RES, which are viable in the medium or long term, are often not carried out due to financial or environmental difficulties. The main problem in financing of investment because of the following reasons:

1. Usually such projects are rather small and scattered through the country. For private investment such projects are usually not attractive because of non-

internalising of externalities, in case project efficiency is not sufficient for fast payback of the investment.

2. It is difficult to receive bank loans for small projects, it is also difficult to prepare business plan and interest rate is too high.

One incentive to promote these projects is financial support (grants and guarantees) from national and EU Structural Funds. Support for the projects must be coordinated in order to ensure efficiency and to give priority to the right projects. The attempts of regional energy programs decide if the flow of benefit is greater than the flow of costs, measured according to broader socio-economic criteria. Factors, such as employment effects, environmental impacts, balance of payments effects and poverty alleviation might be taken into account.

To increase the quality and profitability of such projects a regional energy savings and efficiency market could be built, competing on equal terms for soft financing and grants.

“Establishing a regional market rather than national renewable energy market could help to ensure a market of a sufficient size and enhance competition. In addition, a regional approach could be an important element in the Kyoto follow-up work, as an efficient option for joint implementation contributing to development of renewable in the new democracies also” (Baltic 21-Energy, 1998).

4. The content and place of regional energy programs in general investment strategy

The optimal reciprocity (interaction) of different National Energy policy levels you can imagine aiding scheme below (Fig. 1).

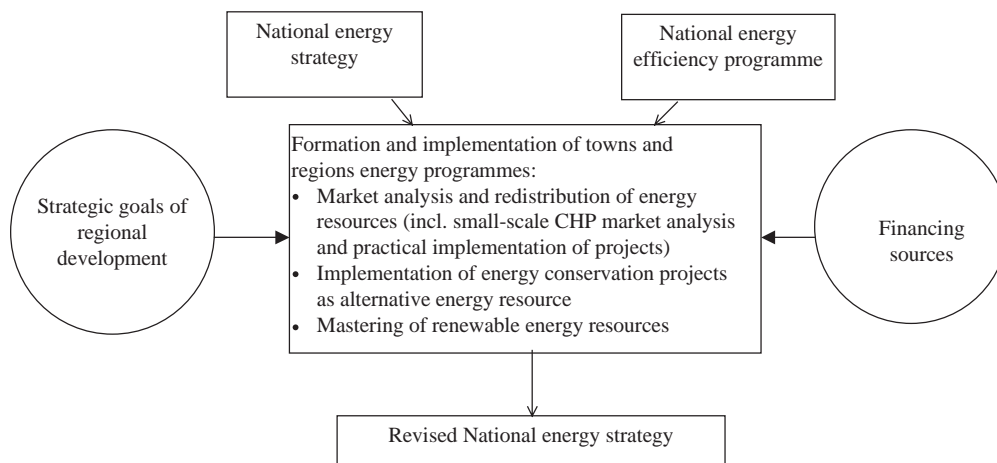


Fig. 1. Interaction of national energy policy levels.

The main principle of integration of regional energy programs into general energy investment strategy is as follows:

- Following a bottom up approach each region promote energy efficiency and renewable energy projects thorough a programming process that involves institutional, economic subjects and consumers as well.

In any case it is inevitable to define the place of towns and regions development programs and tasks in general energy investment strategy. At present those investment ranges, defined in various programs, various directions of strategic energy development in total are unrealistically high.

The differences exist in approaches in the Baltic States, i.e. regional development agencies and regional planning exist in Latvia and Estonia, meanwhile Lithuania has national development plan for Lithuania as a whole and there is only National Regional Development Agency. However according to the Law on Regional Development the counties (districts) are identified as regions (there are 10 regions in Lithuania) and regional development planning process has been starting.

4.1. Case Lithuania

Formed National Energy Strategy and National Energy Efficiency Programme, adopted by the Government, in theory became the background to prepare municipal and regional energy programs. However, they are not differentiated even for regions, to say nothing of separate towns. Up till now the issue on the link between municipal or regional programs and optimal strategy of the whole Lithuania's energy sector is not defined. The assumption is made that municipal and regional energy supply is the matter of regional authorities. However municipal and regional energy optimization programs may have and must have sound correcting impact for National Energy development strategy and also National Energy Efficiency Programme.

We can make conclusion that top-down approach was not successful in Lithuania. In ideal case preparing of regional energy development programs and especially financial support possibility could afford an opportunity for energy strategy revising by approximation to actual energy markets.

The conclusion can be made that regional and local (municipal) energy programs are missing the elements of National Energy Policy. Moreover, regional energy programs could be indispensable condition for the use of EU financial support in the field of green consuming (RES and energy efficiency).

4.2. Case Latvia (Vidzeme region) and Estonia (Ida-Virumaa County)

Latvia and Estonia have promising experience. Vidzeme Region Agency (Latvia) has prepared complex energy plan.

In order to choose scientifically well-founded scenario for the development of the central part of the Ida-Virumaa county (Estonia), a preliminary stage of elaboration of the Heating Development Plan has already begun. This will make a platform for the development of a long-term regional programme of local authorities and help to merge heat-producing enterprises during 2002–2015.

We could state that just first steps are taken only. Financing problem still remains in all Baltic States. However, Vidzeme and Ida-Virumaa regions experience show that bottom-up approach is possible and useful.

Moreover it has proved that the most important task of regional energy programs is to define realistic market for various energy resources and to optimize investment, considering energy saving and RES as alternative energy resources and source for return of investment.

5. Formation of the methodology for making energy projects integrable into regional development process

5.1. Methodological approach

The main objectives of the National Regional Development Policy of Baltic countries are rather similar. For Lithuania they are as follows:

- (1) To promote economic restructuring and modernization in regions.
- (2) To promote sustainable development of regions.
- (3) To reduce social-economic differences among regions.
- (4) To reduce unemployment.
- (5) To develop rural areas by converting and restructuring their economies, reforming agricultural production, manufacturing industry and marketing structures, to promote establishment of new businesses and services in rural areas.

Being formulated as a series of principles in 1998–1999, regional policy has become an important tool of Lithuanian economic development policy in 2000. It is being addressed in various sectoral and comprehensive planning documents.

With regard to energy, the main methodological problem is to integrate energy projects into regional development procedures, so that energy elements may compile integral uniformity in terms of regional goals.

Table 5
Illustrative scheme of defining regional energy development scenaria

Directions of regional policy	Energy projects			
	Renewable energy sources (biomass, wind, solar, etc.)	Energy savings measures	Improvement of energy supply efficiency	—
Positive effect of solutions of social problems	a_1^1 ^a	a_1^2	a_1^3	—
Positive effect of support for agriculture	a_2^1	a_2^2	a_2^3	—
Positive effect of solutions of environmental problems	a_3^1	a_3^2	a_3^3	—
—	—	—	—	—
Total positive effect of energy projects implementation	x_1 ^b	x_2	x_3	x_i

^a a_i^n —value expression of positive effect of solution of energy projects implementation for social problems, support for agriculture, etc. in the region.

^b x_i —summarized total positive effect of energy projects implementation.

We shall present example, how in certain extent agriculture could be supported and environmental problems solved synchronically by implementing renewable energy projects. There are about 143 Thos. Ha of land area in Lithuania, which could be used for cereal crops for bio-fuel and bio-oil production. About 14.5% of diesel fuel consumed in Lithuania could be substituted by this amount of produced bio-fuel.

“Potential of biogas is about 0.4TWh per year in Lithuania. By using this renewable energy source instead of 63,000 t of heavy fuel oil, about 203 thousand tons CO₂ would not get into atmosphere” (Lithuanian Ministry of Economy, 2001).

Additional positive effect to energy saving, energy efficiency measures and RES most often compile with regional development objectives:

- “RES, being indigenous sources of energy improve the security of energy supply and diversity of the fuel mix.
- RES have considerable advantages for regions, in which power and heat supply costs are considerably higher than average costs in the country. Thus use of RES—electricity and heat in small isolated systems can also help to avoid or delay expensive extensions to the grid.
- Some RES are a labour intensive form of industry and create jobs especially at location sites in rural areas” (Commission of the European Communities, 1998).

These above named advantages ought to be included into evaluation process in feasibility studies. However most often decisions, made by municipal and regional administrations, energy distribution companies, power supply companies, are based on feasibility studies, dealing with particular investments either in energy conversion or in end-use system, or in the system of energy sources production. Decisions based on such

partial feasibility studies may not result in least cost solutions for the system as a whole.

We could imagine the scheme of energy projects integration into regional development policy as it is shown in Table 5.

The most difficult problem is to define possible external positive effect (a_i^n) of energy projects in framework of regional policy directions and summarize these effects as total energy projects implementation input x_i .

However for selection of scenario of regional energy development it is necessary to assess total positive effect of renewable energy projects, energy saving measures and improvement of energy supply efficiency. Based on feasible and needed studies regional authorities have to impact the decision-making by economic means. This could be done via tax exemptions and subsidies from budget. The government could remove financial barriers for the investments and make the sufficient purpose-oriented financial means available via the capital market and banks.

Fig. 2 presents principal scheme for formation of municipal and regional energy programs, which are considered as synthesis of energy saving, improvement of energy efficiency and implementation of RES.

In present situation strategic solutions can be rather optimally justified by more comprehensive analysis of energy supply and energy consumption in regions and towns, in other words on the basis of optimal market. Evident example is development of so-called autonomous power and heat generation, as alternative to concentrated (now existing) energy sector. In fact, potential market for co-generation plants in Lithuania, Latvia and Estonia is known neither at present, nor in future. Everything is still in the discussions or propaganda level until differentiated tariffs for power, heat and gas are adopted according to formed conditions and present energy infrastructure.

For the purpose of preparation and implementation of regional and municipal energy programs functions for

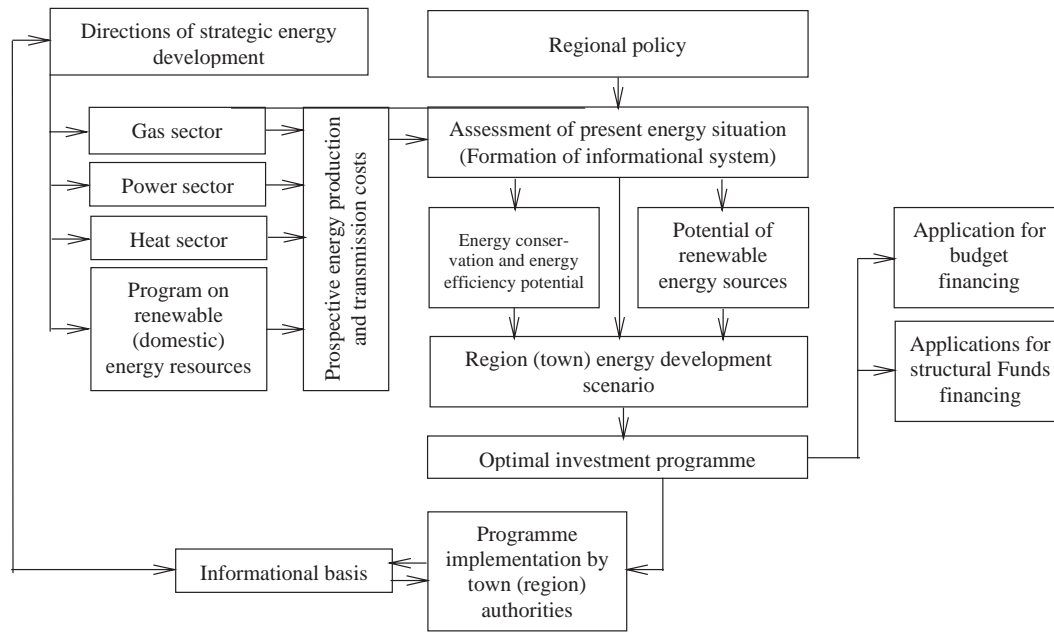


Fig. 2. Scheme for formation towns (regions) energy programmes.

regional and municipal authorities should be formed and legally implemented.

5.2. Organizational problems

The preparation for the European Union's structural funds comprises the development of adequate energy planning capacities and skills, strengthening of institutions, adoption of legal mechanisms.

A special attention should be paid by the regional service in charge to the programming process in the field of energy, to the definition and implementing of the laws, secondary legislation and regulations.

Evaluating even rather limited legal and economic possibilities of the municipal authorities, we highlight those functions that should be implemented and performed during the reform of energy sector. These are as follows: preparing, support, control and revision of municipal and regional complex programs for energy sector, establishment and support of informational and consultancy system, harmonized with the program.

To avoid market failures of monopolistic sectors, keeping citizens in the long run, the privatization and liberalization needs to go hand in hand with regulatory actions including national and regional energy planning. Energy company managers in energy sub-sectors, in municipalities and utility companies must be empowered to play an important role in the development, thus enabling their commitment and responsibility in the strategic process and encouraging their contribution to perspectives for energy efficiency.

For accomplishing the goals of the regional development plans, the regional government has to establish a sub-division for financing assistance focus on the implementation of energy projects.

There is very successful example of such good practice—the Housing and Urban Development Foundation in Lithuania.

The intention of this project is to form renovation system for multi-flat residential houses. The terms to take and return loans are really attractive in the framework of this project. At the moment this fund is operating very efficiently.

6. Conclusion

The government of Lithuania, Latvia and Estonia are working towards the restructuring, liberalization and privatization of energy sectors. But the situation in regions and towns with regards to energy planning makes it clear that there is still a long way to go. The institutional situation is not supportive to achieve an optimal energy supply and demand structure:

- There is almost no co-ordination between the supply of heat, electricity, and natural gas.
- The process of energy planning in regions and towns only started.
- In general there is a lack of incentive to increase energy efficiency, implement energy savings measures and RES.
- The involved parties have modest possibilities to finance the required large investments.

The organizational and methodical model of regional energy planning by using experience of Baltic and EU States, must be prepared.

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