

Energy Saving Policy Development in Lithuania

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Synopsis

Experience in implementation of the first National Energy Efficiency Programme is analysed, its drawbacks and achievements are discussed. The newly revised and approved Programme is analysed.

Abstract

Energy conservation and improvement of energy efficiency became very important issues with increased energy prices in Lithuania in 1992. During the following four year period an institutional structure for implementation of the first *National Energy Efficiency Programme* was established and several Governmental Decrees stimulating implementation of various proposed steps were passed.

Installation of energy meters (district heating, hot and cold water and also of gas) created incentives for the consumers to save energy as it directly impacted their energy bills. Therefore, the majority of residential consumers installed gas and water meters and district heat meters were installed in half of multifamily houses. Significant step was made in a broader use of local energy resources, mostly wood and wood waste.

Nevertheless, potential for energy saving in Lithuania is still big, but requires significant investments. For example, insulation of the living houses would enable to save up to 45% of the heat energy used for heating of these houses. But it requires investments of \$5,5 billion and the payback period could reach 29 years. Therefore, more realistic are measures which need lower investments and have a shorter payback period.

In order to utilise at least a part of this potential a revised *National Energy Efficiency Programme* was completed in 1996. It evaluated drawbacks and achievements of the previous Programme and proposed the legal, institutional and regulatory background for implementation of the revised Programme.

Introduction

The first *National Energy Efficiency Programme* was approved by the Government of Lithuania on January 31, 1992 by its Decision No 73 [1]. It was the first national programme since Lithuania regained independence. In the Programme it was assessed the status of the national economy, energy production and consumption, and the priority directions of energy conservation were defined.

The four following years after the approval of the first Programme brought essential changes in the economy as also in the energy sector. Transition from a centrally planned towards a free market based economy caused a deep economic crisis. The Lithuanian gross domestic product (GDP) during this four year period decreased more than twice, industrial output decreased even more. Structure of the national economy was affected by serious changes: share of industry and agriculture shrank but share of trade and services increased.

All that changes affected the levels of energy production and consumption, as also structure of the consumption. Share of the industrial final energy consumption decreased, and at the same time share of the residential energy consumption increased from 22% in 1991 to 52% in 1995. With that essential changes in energy consumption (as

also production) energy saving potential and ways of its implementation have changed. Therefore in 1996 the *National Energy Efficiency Programme* was revised and adjusted, using inputs from the other recent projects and studies, plans of different sectors and having in mind fast changes in the national economy [2].

This article analyses achievements and failures in implementation of the first National Energy Efficiency Programme and presents the main findings and conclusions of the revised Programme.

1. Implementation of the first National Energy Efficiency Programme

The first *National energy efficiency programme* was approved on January 31, 1992 by the Governmental decision No. 73. Implementation of the Programme at present is going by the 5 priority directions approved on May 9, 1994 by the Governmental decision No. 351. They are:

1. Formation of the economic, legal and state regulation system for energy production, consumption and conservation.
2. Use of domestic energy resources and alternative energy sources.
3. Installation and metrological provision of devices and systems used for water, gas, electricity and heat metering and control.
4. Restructuring of the building materials industry and its technical modernisation.
5. Renovation of the existing buildings, modernisation of energy distribution installations in buildings and construction of new energy efficient buildings.

Putting into practice the Programme research and development projects were performed by various research and education institutions, experts, specialists. During 1992 - 1995 about 100 research studies and projects were completed.

Implementation of the Programme is coordinated with the Ministry of Construction and Urban Planning, Ministry of Industry and Trade, Ministry of Forestry, Ministry of Agriculture, Ministry of Environment Protection.

1.1 Formation of the economic, legal and state regulation system for energy production, consumption and conservation

Energy saving issues were analysed and proposals prepared as soon as Lithuania became independent, and in 1991 the National Energy Efficiency Programme was prepared. But the Programme was developed for the then existing economic system, and increase of energy prices as other structural changes with introduction of a market economy were just a matter of possible future development.

Changes were rapid and deep and it caused a necessity to revise the Programme in line with these changes. Therefore during the following two years the Programme was essentially revised, and a legal, institutional and regulatory system necessary for an implementation of the Programme was developed and defined.

But changes of the legal, institutional and regulatory system were slow and had many obstacles. Only when the Parliament passed the Energy Law (March 28, 1995) at last and independent Energy Pricing Commission was created and an Energy Saving Fund was established.

Nevertheless, major part of the projects ordered and done for the Energy Saving Directorate in 1992 - 1993 were implemented into practice, though the implementation process was slower than it was anticipated. Some proposals required significant investments, large bureaucratic structure, very centralised management, therefore were not put into practice. In some studies even energy saving policy was required to be implemented not as only priority energy policy but as the only one. On the other hand some projects were untimely: first projects required very centralised management and huge investments, the latest - required decentralisation which is going on very slowly.

Later (in 1994 - 1995) projects were developed on certain specific issues of stimulation the energy saving measures, e. g. how to stimulate production of energy saving materials, devices and equipment or how to support the use of domestic fuels with introducing marginal fuel prices. It was proposed a structure and objectives of a consultant and information system on energy saving measures and principles of energy saving programme for a rural region were determined.

The last two projects are still not implemented as the first one requires essential restructuring of the existing data collection, storing and analysis system, and for the second one decentralisation of the energy sector is necessary.

In general, after evaluation of all the package of projects on legal, institutional and regulatory issues of the energy sector, the corresponding Governmental Decisions, one must say - it was done a serious job when the starting point was an empty place. Nevertheless many proposals were not implemented as they were far from reality, required large investments, essential restructuring of economy, were untimely, etc. Planning the future work on this direction the Energy Saving Directorate should pay more attention on implementation of concrete projects.

1.2 Use of domestic energy resources and alternative energy sources

Broader use of indigenous and renewable energy resources in the country started with the development of wood-fuel utilisation. With increased imported fuels prices wood processing and forestry industries started to use wood-fuel to cover their heat demand. During the last two years it were introduced woodfuel fired boilers with the 50 MW total capacity, it makes up 17% of the total capacity potential available using this fuel. With the assistance of the Danish and Swedish companies, funded by their Governments, wood fuel was introduced at several district heating plants in small towns and settlements. Production of this fuel was commenced by several local companies.

Economic situation of the wood processing industries was very hard, they had lack of the working capital and conditions for loans were unfavourable. It hindered development of the wood fuel use. Demand for indigenous fuels would increase with its use in the district heating systems. Restructuring (decentralisation) of the district heating management, privatisation of boiler houses will create more favourable conditions for municipalities to use local fuels. It is also a need to revise the peat fuel development programme preparing proposals for utilisation of old and new bogs and determining conditions under which exports of wood and peat is profitable to the country.

Together with the local fuel use with an assistance of foreign countries demonstration and pilot projects started utilising biogas, geothermal, small hydro, Solar and wind energy. Society was permanently informed using mass media (radio, TV, press), there were seminars and conferences organised, publications prepared.

With the further development of the indigenous fuel use it is a need to adopt legal documents giving priority to the energy produced using indigenous and renewable energy sources, accumulate means in the energy saving fund for investments in projects utilising these energy sources, revise tax privileges and use other measures.

1.3 Installation and metrological provision of devices and systems used for water, gas, electricity and heat metering and control

In general, projects on implementation of energy metering and control devices, ordered by the Energy Conservation Directorate were well-timed and urgent. They were in line with the goals of the *National energy efficiency programme*. At present the mostly needed metrologic documents are prepared and approved, new standards approved. There were several Governmental decrees adopted stimulating production of meters and other tools in Lithuania and introducing privileges to consumers with heat, cold and hot water meters installed.

Summarising the process of implementation of the energy metering and control devices one can say that despite many efforts in that area the process goes insufficiently fast. Until the second half of 1996 number of multifamily living houses (supplied with district heating) with heat meters installed was only about 50% of total houses. Well defined economically based programme for implementation of the meters is not determined. Without this pro-

gramme and without a reliable energy saving data storage and analysis system (energy saving monitoring system) today is almost impossible to evaluate an economic result (savings in monetary units) for the country incurred by certain actions. E.g. what was a result (savings or losses) of installation of natural gas meters in every kitchen where tenants use gas for cooking only, when gas meters cost was included into the natural gas tariff. Municipalities of some towns (Kaunas, Vilnius) took the other extreme position paying too much attention to installation of cold and hot water meters in flats of multifamily houses despite the fact that 70% of these houses have no heat meters for the house. This process was speeded up with a new billing rule since October 1994: for heat consumption consumers pay according to their flat area heated, for hot water consumption consumers pay on volume of hot water consumed. Since this moment it has occurred that significant share of heat energy is not included into the heat tariff (so called "commercial losses").

The Governmental Decision that gave some privileges to manufacturers producing control and metering devices was not efficient. In the second half of 1995 LEI together with the Ministry of Industry and Trade organised a poll of industrial enterprises. It revealed that privileges envisaged in the Decision were not sufficient and did not give a stimulus to the Lithuanian electronic and power engineering industries to start production of modern energy metering and control devices. The only newly established company produces heat meters and two old companies continue production of electronic jet pumps, cold and hot water meters and hot water temperature controls.

Electricity metering is in a better shape. A new factory "Elgama" producing modern multitariff electricity meters is built, meters are produced at the older factory "Skaiteks". These factories nevertheless have their difficulties in winning markets competing with imported meters.

All that shows that a revision of energy metering and control devices production and installation process is urgently needed. An economically justified plan for implementation of these devices should be prepared with additions to the existing Governmental decisions.

1.4 Restructuring of the building materials industry and its technical modernisation

During the period 1992 - 1995 it was a big work done on the restructuring the building materials industry. The projects performed match with the priority tasks given in the *National Energy Efficiency Programme* but implementation of these projects is far behind from time of implementation foreseen in the Programme.

Table 1.1 Energy saving potential (in PJ) in the building materials industry

Production	Energy consumption per unit of production, GJ/t		Savings %	Investment per 1. technol. line, MLt
	in 1994	With new technologies		
1. Cement	7,4	4,1	44	38
2. Lime	5,8	3,1	55	19
3. Ceramic wall materials	4,2	1,8	2,4 time	12
4. Liquid glass	21,5	5,3	3 time	1
5. Other efficient materials				15
Total	x	x	x	58

During the period from 1990 to 1995 output of the building materials industry was reduced fourfold and there was no essential restructuring of the building materials industry. With the growth of the energy prices demand for insulation materials increased, but this demand was covered mostly by imported materials exceed the domestic demand and part of production was exported, but in 1995 significant share of insulation materials was imported.

As industrial plants were operated at reduced capacity, energy intensity (energy consumption per unit of output) in the building materials industry increased. For example, in 1993 fuel and energy cost in the total production cost made up 46% and increased by 3,2 times in comparison with 1990.

For the further restructuring of the building materials industry it is necessary to evaluate the latest experience in Lithuania and abroad. The main research area should be production of efficient insulation materials produced using local raw materials. It could be mineral wool and glass fiber products, products made from local raw materials, industrial waste, woodchips, gypsum cement, gypsum cardboard and composite materials. Putting into practice production of these materials would allow to change the structure of the building materials industry, to have sufficient production of domestic insulation materials with reduction production of traditional energy intensive materials.

1.5 Renovation of the existing buildings, modernisation of energy distribution installations in buildings and construction of new energy efficient buildings

One can see that during the period from 1990 to 1995 it was done a huge organisation work on renovation and insulation of houses. Nevertheless, implementation of these measures was slow and did not meet goals given in the first *National Energy Efficiency Programme*

Analysing the process of renovation and insulation of houses one can conclude that goals defined in the first Programme were not very realistic, economic crisis was deeper than expected, investment possibilities were overestimated.

At the beginning of this evaluation it was mentioned that the complex refurbishment of the existing houses, including improved insulation of outer walls, roofs and floors, changing of windows, etc. will require from 22 to 25 billion of investments. Such huge investments would be a problem not only for Lithuania but for a rich Western country also. Therefore, it is hard to expect significant changes in this area.

At present, two main issues are solved: laws and decrees on establishment of associations of the multifamily house owners and on crediting renovation and insulation of the living houses were passed, they will stimulate process of renovation and insulation.

In further organisational, education and agitation campaigns are needed. Owners of flats and their associations, scientific institutions, ministries and municipalities should take an active role in these campaigns. They need to convince flat owners to save energy using correct, clear and precise information on efficiency of various energy saving measures and economic feasibility of their implementation.

2. Energy saving policy

2.1 The total energy saving potential and its implementation

During the revision of the *National Energy Efficiency Programme* the energy saving potential in various sectors of the national economy was evaluated, as also as possible time period of its implementation and investments needed. It was determined that from 20% to 50% of the final energy consumed today could be saved (Table 2.1).

So the bulk of energy is consumed for space heating, consequently, it gives the largest energy saving potential - almost one third of the thermal energy used at present. Some energy saving measures need significant investments and their payback period is too long. For example, insulation of the living houses would enable to save up to 45% of the thermal energy used for the heating of these houses. But it requires investments of 22 billion Litas and the payback period could reach 29 years. Therefore more realistic are measures which need lower investments and have a shorter payback period. One measure of this type is a modernisation of the heating systems in houses. Payback period of this measure is from 1 to 2-5 years, and it could save almost 4 TWh of heat.

Table 2.1 Evaluation of the total energy saving potential

Sector of economy or area of energy consumption	Consumed in 1994, TWh	Total saving potential (per annum) TWh	Investments needed, bln. Lt
1. Buildings (thermal energy)			
- dwellings*	23,2	10,4	22
- public**	2,7	0,62	0,034
- industrial**	5,8	1,4	0,15
2. Industry	12,1	3,8	1,18
3. Transport	11,6	1,4	2,65
4. Agriculture	2,9	0,6	1,2
5. Residential sector (electricity)	1,6	0,7	0,53
6. Service sector (electricity)	1,8	0,5	0,32
Total at the consumers side	61,7	19,4	27,9
7. Energy generation and supply			
-fuel consumption in power plants	8,1	1,4	2,2
-fuel consumption at district heat plants	11,8	1,1	4,0
-district heating network***	4,1	2,8	0,74
Total in supply side	24	5,3	6,94
9. Utilisation of indigenous energy sources****	5,9	15,8	1,55

* considered average heat consumption

** saving potential in modernising heat supply systems within buildings

*** expert evaluation

**** potential energy production

Implementation of this energy saving programme will allow to save significant share of energy needed and to put into practice other important energy policy goals: reduction of the imported fuel share, increase of the indigenous and renewable energy share, reduction of an environmental impact, etc.

Implementation of the energy saving measures described in the Programme requires legal background for stimulation of the energy savings;
regulation of energy activities with an aim to improve energy efficiency;
institutional structure for implementation of the energy saving policy;
programme of financial investments in improving energy efficiency and saving energy;
information, education and training programmes to popularise energy saving and energy efficiency;
research and development and demonstration projects.

2.2 Legal framework of the energy saving policy

The Energy Law was passed by the Parliament on March 28, 1995. In the third article of the Law energy policy goals are defined and even three of them are dealing with the energy saving and energy efficiency. This Law also foresaw the energy saving fund and its rules. The third article of the Law deals with the renewable and secondary energy resources use.

The Energy Law together with the Law on Privatisation of the State and Municipal Property, passed the same year, give a background for the further reforms in the energy sector, restructuring it from an inefficient monopoly to a decentralised, demonopolised sector of the national economy, financially viable, its operation based on the financial principles.

The Energy Law is the basis for preparation and pass of the other laws necessary: on nuclear energy, on electricity supply, on heat supply, etc. As the Energy Law was discussed at the Parliament more than 3 years an Energy Committee at the Parliament is necessary (it was proposed two years ago - within the National Energy Strategy), and a group of experts drafting the laws needed. This issue will help to solve the PHARE programme financed project "Assistance in establishing the energy regulatory structure" commenced in 1996. Under this project an Energy regulatory working group of local experts will be established, it will assist in drafting new laws. This group will consider what laws are needed for the energy sector including a need for the Energy Saving Law which was proposed in one of the projects presented to the Energy Saving Programme Directorate.

2.3 Regulations in energy saving

According to the Energy Law energy activities within the country are regulated by the Ministry of Energy. It represents interests of the Government and implements the state energy policy goals. Preparation and implementation of the national energy strategy, energy efficiency and energy saving programmes, legal, economic and institutional measures in implementation the state policy on efficient energy use, drafting of laws and other legal documents is responsibility of the Energy Agency.

Implementation of the National Energy Efficiency Programme is organised and coordinated by the Energy Saving Programme Directorate reporting to the Energy Agency. In order to coordinate and control implementation of this programme the Energy Saving Commission was established. Commission consists of representatives of various ministries and departments, it reflects an intersectorial structure of the Programme. The Commission is an advisory body of the Government in energy saving policy.

In 1995 an independent State Commission on Energy Pricing and Control of Energy Activities was established. It discusses important economic issues of the energy sector, including investments, sets up principles of energy pricing, prepares for the Governmental approval electricity, heat and gas tariffs. It also controls implementation of the National Energy Efficiency Programme.

In the recently completed project "Consultation in restructuring and management of the Lithuanian State Power System" Western consultants proposed gradually demonopolise and decentralise this utility, separating heat supply facilities, power plants and commercialising this utility. Implementation of these plans of restructuring will require to establish new regulatory institutions. Rules and procedures for the market activities, energy purchase procedures, network standards, financial viability of the utilities should be established and put into practice.

With the decentralisation of the Lithuanian Power Company, separation energy production and supply a need for implementation of demand side measures will arise. As producers want to produce and sell as many kilowatt-hours of electricity as possible, suppliers want to meet the needs of customers, not only to sell more kilowatt-hours. It was shown in the Chapter 4 that implementation of the demand side measures will result in significant energy savings. Implementation of these measures could be a responsibility of the energy supply company (separated from producers) or of a new regulatory office. This office would have a goal to implement an integrated resource planning, i. e. all the decisions on development of energy production should be analysed together with possible implementation of energy saving measures.

One of the possible responsibilities of this regulatory office could be an introduction of the energy standards for the domestic electric appliances (refrigerators, vacuum cleaners, washing machines, etc.). Imported appliances should have energy labels defining energy consumption by this device.

As heat saving in buildings potential is huge it should be regulated and promoted by the building standards. New building standard RSN-143-92 is valid since 1992. Buildings built according to this new standard consume by 45% less of heat than if they were built according to the old standard. Not many buildings are built under the new standard but it played an important role - civil engineers become acquainted with this stricter standard and started its implementation.

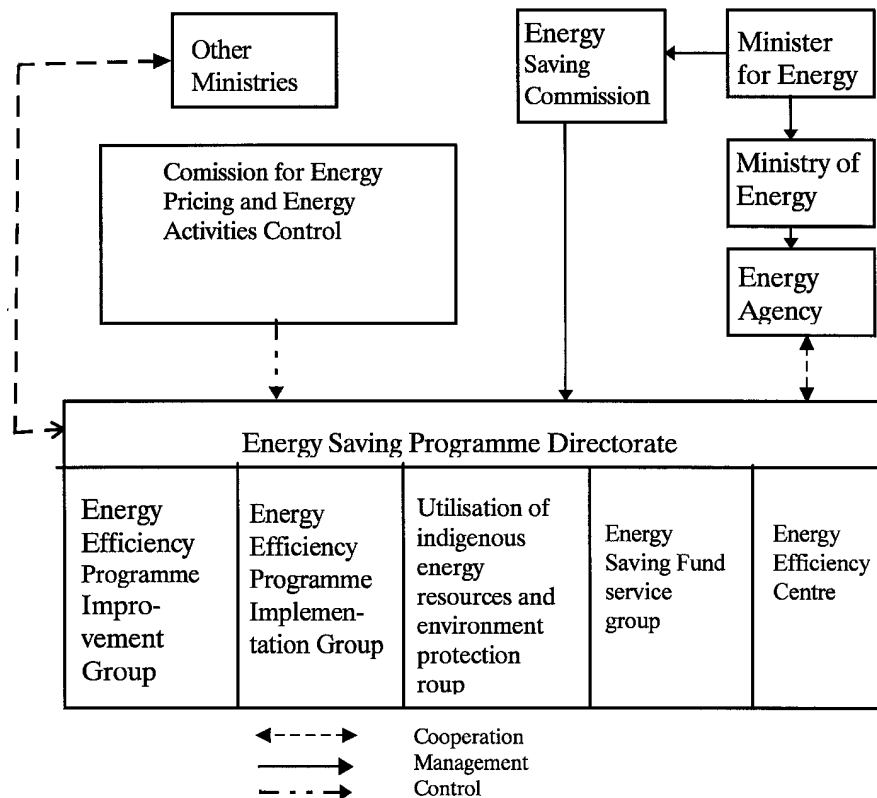


Fig 2.1. Institutional structure suggested for an implementation of the Energy Efficiency Program

Draft of a new building standard is under preparation, it will be based on common for the European Union standards and approaches. New standards should be prepared for the newly renovated and refurbished buildings. In long term energy certificates should be introduced for buildings, they would reflect all the thermal characteristics of the building.

The Energy Saving Programme Directorate implementing the state energy saving policy should collect, store and analyse information on implementation of the National Energy Programme. It would enable the Directorate to response quickly to the changed circumstances, to notice deficiencies within the Programme or in its implementation and possible remove or change their.

Plans of the energy sector (or its subsectors) development should be based on the least cost and integrated resource planning principles, i. e. development of the energy supply should be considered together with an implementation of energy saving measures and approaches (they could be in future approved by Government decisions). The recently completed Least Cost Power Sector Development Programme was based on these principles.

2.4 Investments in energy saving measures

The main financial policy measures in stimulation of energy saving are

- establishment of an energy saving fund;
- implementation of main conditions enabling to attract local and foreign investments;
- implementation of tax reductions or exemptions on energy saving investments.

Establishment of an energy saving fund is foreseen in the Energy Law. This fund should be used to finance energy saving and energy efficiency programmes, implementation of renewable and secondary energy resources use and development. The Fund was established by the Governmental Decision No. 119 from January 23, 1996. This Decision determined the possible fund sources and rules of the fund use.

In order to attract investments the Government should use political measures:

- provide guaranties to international institutions investing in energy efficiency measures,
- participate in bilateral contracts with investors establishing collateral funds, reducing risks connected with the investments in energy efficiency measures,
- establish legal and financial structures stimulating activities of companies implementing energy saving measures.

The state encourages implementation of the energy saving policy using various measures, including prices, taxes, duties, interests on loans and other. There should be at least equal conditions for the products produced in the country in comparison with the imported ones. It is hard to explain why all markets are conquered by imported meters, devices, insulation materials when all that could be produced within the country. Having in mind all the positive factors of the domestic production (new working places, reduction of the foreign trade deficit, use of skillful workers, etc.), this should be supported by various taxes and duties.

2.5 Information, education and training programmes

Important measures in stimulating energy saving is information of public, training of specialists, education. All the public information measures (radio, television, press, schools) could and should be used. One may say that the Energy Saving Programme Directorate have done significant job in this area: a special television programme is arranged, the television competition was organized, energy saving awareness campaign was conducted (together with the Western experts), brochures were printed.

In the nearest future a new Efficient Energy Centre at the Energy Agency will start its activities. It will, together with the earlier established centre at the Lithuanian Energy Institute, consult and inform energy consumers on all the energy saving issues. These two energy centres together with the EU Energy Centre should coordinate their activities possibly separating their areas of interest. For example, the Lithuanian Energy Institute Energy Centre having highly qualified scientists could arrange lectures and seminars. The Energy Agency Centre could popularise the state policy on energy efficiency.

Very efficient way of education is a use of good examples, therefore demonstration and pilot projects, showing efficiency of various approaches, should be broadly advertised, and information on these successes should be available for a broad public.

2.6 Research and development studies

Energy saving and energy efficiency is often tightly connected with modern technologies, therefore Western countries pay serious attention to the research and development studies on the alternative energy sources use and on energy efficiency.

Having in mind very limited state budget allocations to the Lithuanian science and research, the main attention should be focused on the research studies with the shortest period of their practical implementation and short payback period, as also on various demonstration projects, implemented possibly with Western experts working under international program.

Conclusions

1. After the evaluation of the first *National Energy Efficiency Programme* and all the package of measures for its implementation, one must say - it was done a serious job when the starting point was an empty place. Nevertheless many proposals were not implemented as they were far from reality, required large investments, essential restructuring of economy, were untimely, as energy saving policy was planned to implement using the centralised planning, financing and control measures. Therefore many proposals being in fact correct were not implemented as they required significant resources, structural changes, etc.
2. Implementation of the newly revised and approved Programme requires:
 - legal background for stimulation of the energy savings;
 - regulation of energy activities with an aim to improve energy efficiency;
 - institutional structure for implementation of the energy saving policy;
 - programme of financial investments in improving energy efficiency and saving energy;
 - information, education and training programmes to popularise energy saving and energy efficiency;
 - research and development and demonstration projects.

References

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