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WORKSHOP ON INDICATORS FOR SUSTAINABLE ENERGY DEVELOPMENT
13 - 17 May 2002

Lithuanian Experiences Resulting from Other Indicator Projects

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Lithuanian experiences resulting from other indicator projects

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LITHUANIA

Territory: 64 thou km^2
Capital: Vilnius
Population: 3.7 mln.
Population density:
57 inhab/km^2
PPP GDP: 6336 USD'98
TPES in 2000: 7.24 Mtoe
The share of renewables in TPES: 6.2%
Electricity production in 2000: 11,43 TWh

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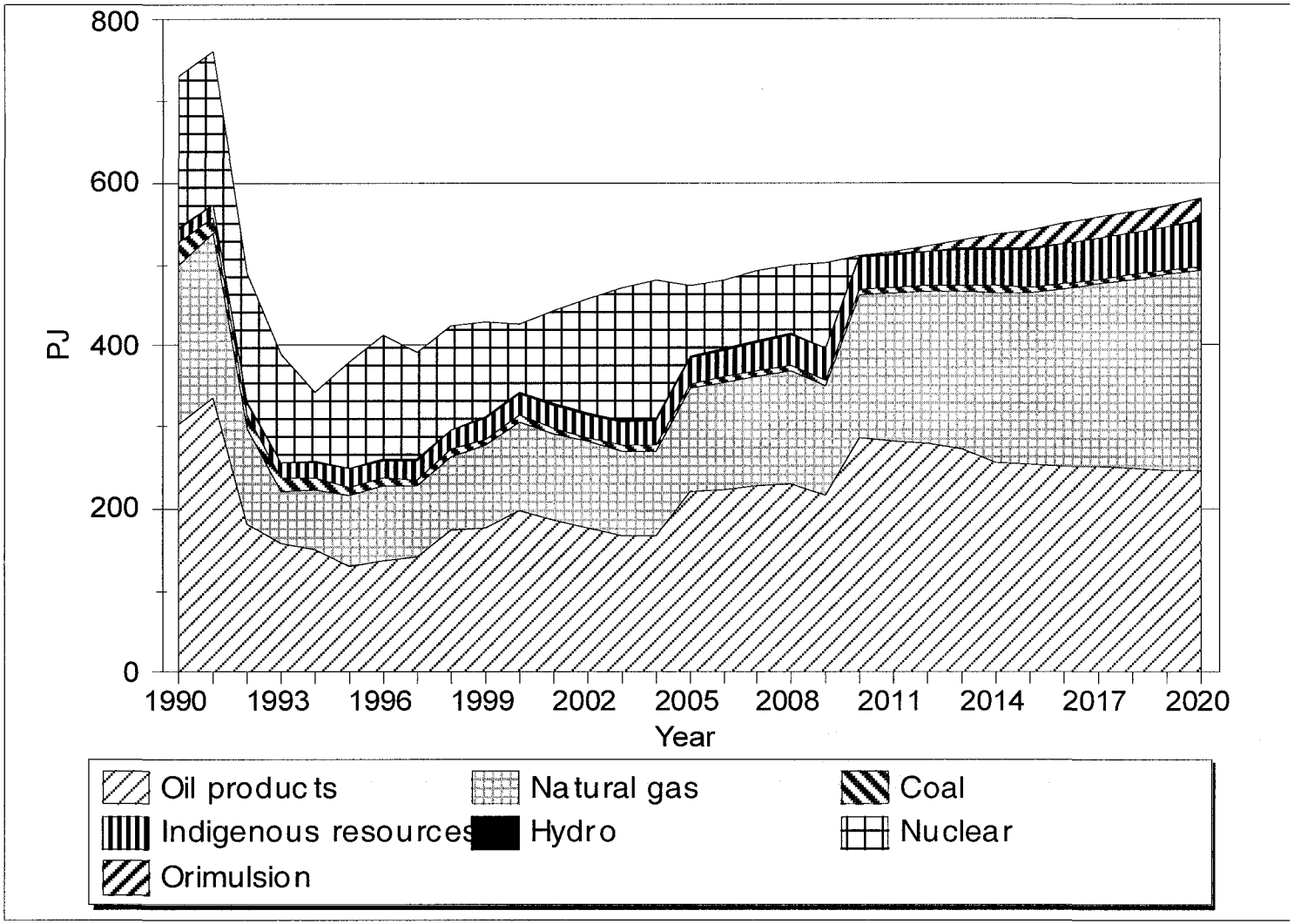
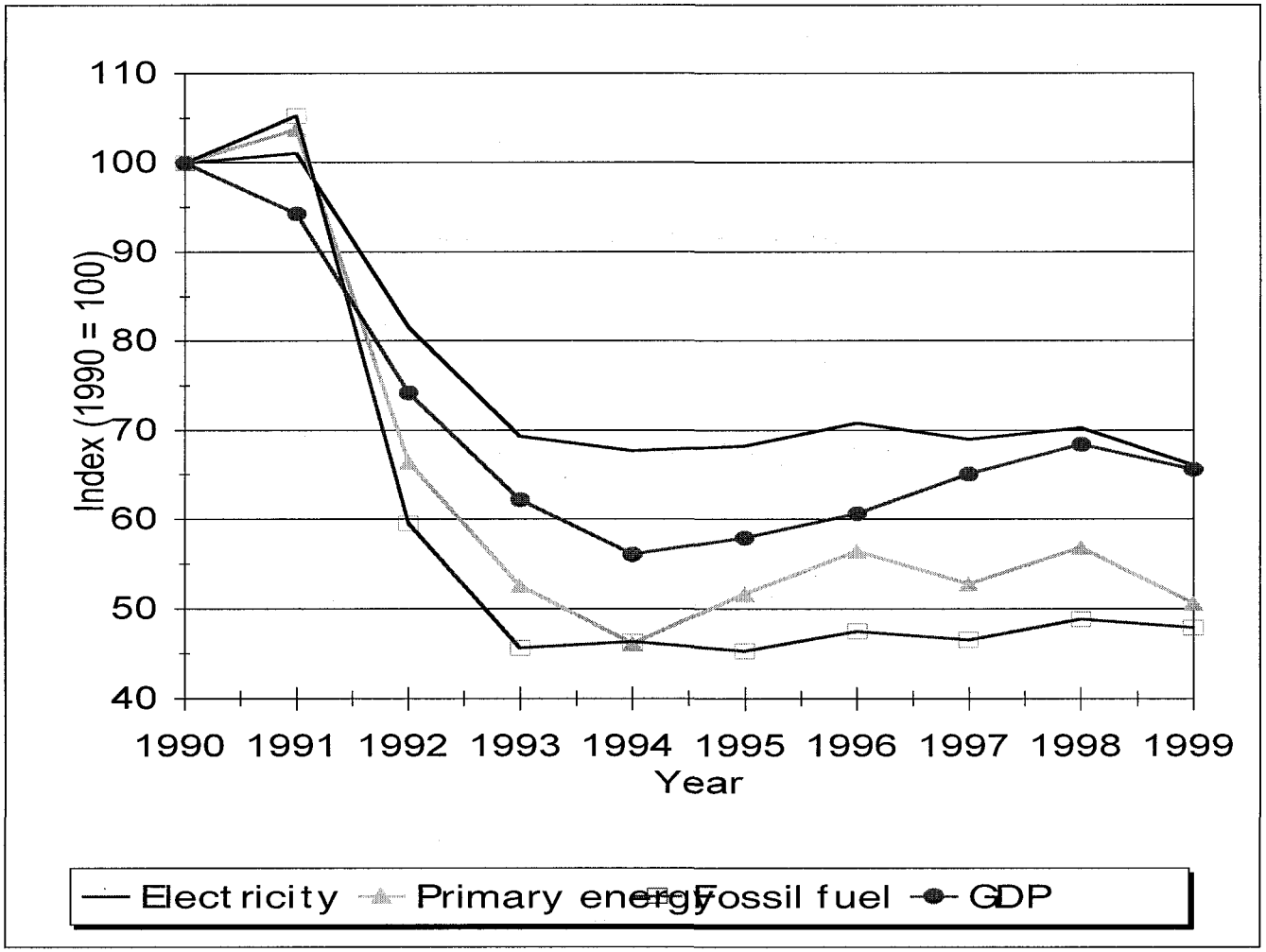
Primary energy supply for basic scenario: both units of the Ignalina NPP are decommissioned by 2010

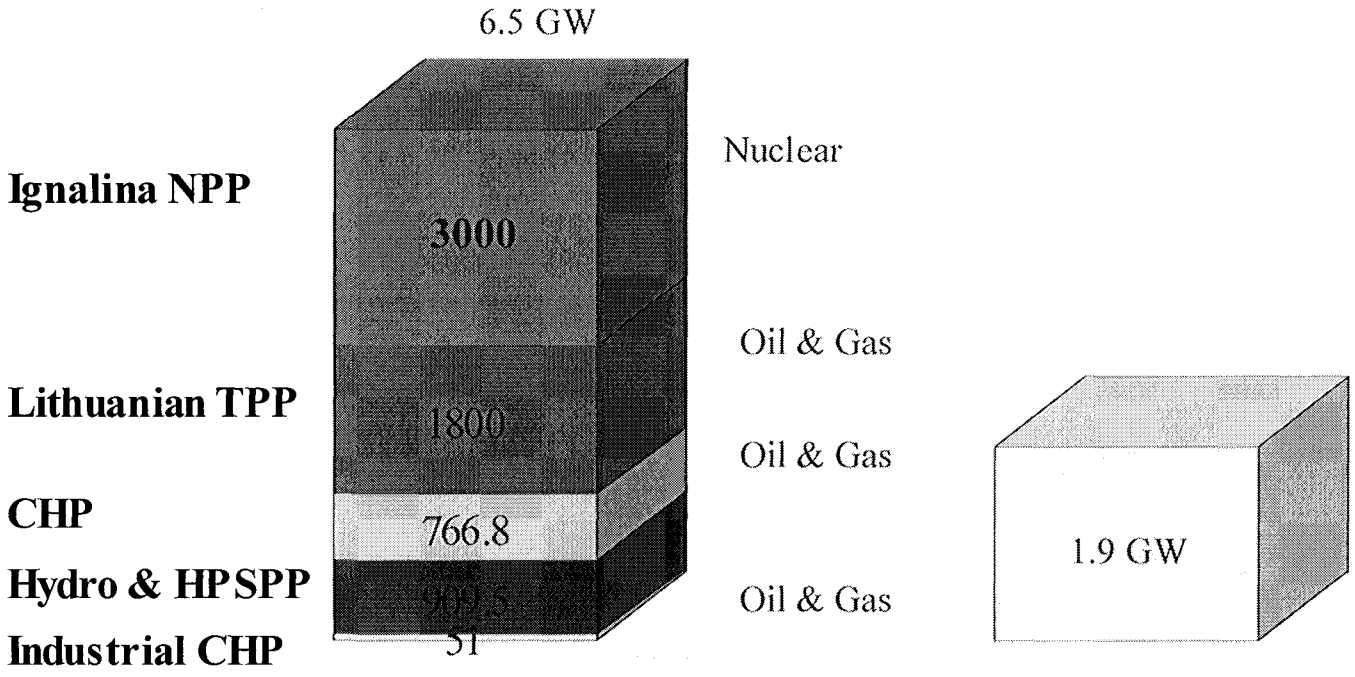


Changes of energy demand and GDP growth



Lithuanian power system in 2000

Installed capacity ***Domestic demand***



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Projects on environmental indicators

"1st Baltic State of the environment report based on environmental indicators". Baltic Environmental Forum, 1998.

"2nd Baltic State of the environment report based on environmental indicators". Baltic Environmental Forum, 2000.

"Economic transition: environment transition. A case study of the Baltic States based on headline indicators". Baltic Environmental Forum, The Regional Environmental Center for Central and East Europe, 2001.

The first phase of the project "Indicators for Sustainable Energy Development" Data collecting for the set of 41 ISED.

Methodological approach of Baltic State of the Environment reports

•OECD has been prominent in developing a common framework and common indicators for its Member countries. Several countries and international organisations have extended the P-S-R framework developed by OECD: in particular, the European Environment Agency uses a five-part framework, incorporating: driving forces, pressures, state, impacts and responses.

•The European Commission, EUROSTAT, and the European Environment Agency have developed the set of environmental headline indicators which clearly and simply illustrate the key environmental trends and provide an indication of the state of EU member states environment.

•The current set of 10 headline indicators have been categorised by the environmental problem they measure, such as climate change and air quality, in line with the priorities highlighted by the 6th EAP.

•**The Baltic State of the Environment reports** also employs this framework and aims to practice harmonized methodologies and help Baltic States to fulfill requirements of the European Environment Agency's reports.

•**The 1st Baltic State of the Environment report published in 1998** reflects priority environmental problems and environmental policy aftermath of Soviet occupation, such as water and waste management, biodiversity and resource management.

•**The 2st Baltic State of the Environment report published in 2000** reflects several international environmental problems such as climate change, nuclear risks and ozone-depleting substances.

•Environmental indicators related to energy sector were included under the rubric of Climate change. Such indicators **as final energy consumption by sectors, share of fossil fuel in energy supply, CO_2 emissions generated by combustion of fossil fuels for energy production, energy productivity, excise tax on fuel, CO_2 tax etc. were presented in the study.**

The Baltic Environmental Indicators Set has been kept in accordance with environmental problems and divided into 13 groups:

Climate Change;
Urban Air Quality;
Eutropohication;
Waste;
Hazardous Substances;
Oil Spills;
Radiation and Nuclear Risks;
Landscape;
Biodiversity;
Forest resources;
Peat Resources;
Water Resources;
Fish Resources.

Energy related environmental indicators from indicators set of Baltic State of Environment Report

Driving force	Pressure	State/impacts	Response
1. Climate change			
Final energy consumption by sectors	CO_2 emissions	Date of ice-breaking	Excise tax on fuel
Share of fossil fuel in energy supply		Mean annual temperature	CO_2 emission tax
Energy productivit y			
2. Urban Air Quality			
Traffic intensity	Total NOx emissions and share of mobile source in it	SO_2, NO_2, tropospheric O_3 concentrations in capital cities	
Car fleet age structure			
3. Oil Sp ills			
Cargo turnover of crude oil and oil products.	Annual amount of recorder pilled oil.	Share of oiled birds from the number of dead birds.	Implementation of national oil spill contingency plants.
Number of ship calls in the ports.			Pollution fine for illegal discharges.
			Captain fine for illegal discharges.
			Aerial surveillance.
4. Radiation and Nuclear Risks			
Share of nuclear energy in electricity generation.	Facilities with nuclear risks.	Cs137 level in soil.	Number of on-line monitoring stations.
	Registered facilities using radiation sources.		Supervision capacity.

Climate Change indicators from Baltic State of the Environment Report

Driving force indicators:

- the total primary energy necessary to generate one unit of GDP can be used as an overall driving force indicator reflecting the energy productivity of the national economy;
- final energy consumption by economic sectors indicates the contribution of each economic sector;
- The share of different fuels in the primary energy supply shows how large the share of fuel types is which generate GHG.

Pressure indicators: CO_2 emissions generated by the combustion of fossil fuels for energy production. Comparing this indicator to the number of inhabitants and the economic output (gross domestic product), the indicators of GHG intensity depending on economy and lifestyle are obtained.

Impact indicators: t he date of ice-breaking in spring and mean annual temperature reflect the possible effects of increasing CO_2 concentrations in atmosphere.

Response indicator: the coverage and the size of energy or carbon dioxide taxes.

•**"Economic transition: environment transition. A case study of the Baltic States based on headline indicators"** carried out in 2001 comparing with BEF' "Second Baltic State of the Environment Report" which provides much greater detail on environmental conditions and trends in the three Baltic states seeks to use a small number **of indicators to highlight key linkages between economic changes and the environment** in the three Baltic States – Estonia, Latvia and Lithuania.

•Headline indicators presented in the study synthesise complex data, in order to communicate vital information about the environment **to officials, politicians, and the public.**

•The criteria constrained the choice of indicators for this study was identified the same as defined by OECD: **policy relevance, analytical soundness and measurability.**

•A few indicators relevant to ISED were proposed in the study: **energy intensity of economy, conversion losses, CO_2 emissions from fuel combustion.**

A case study of the Baltic States based on headline indicators

•This study focus on **economy/environment linkages using environmental intensity of economics indicators** and follows a different approach than other headline indicator sets. Initial EU headline indicators focus on environmental issues, such as climate change and surface water quality, and relate current levels to policy targets. The targets are specified by EU environmental directives;

•The **sectoral approach is vital for policy integration** – indeed, both OECD and EU are working on sectoral indicators. Sectoral indicators will likely be added to the EU headline indicator set;

•**Intensity indicators** are used, for example, in OECD's Environmental performance reviews of its member countries. Intensity is especially important for transition countries, whose economies used great amounts of natural resources and created high levels of pollution under inefficient centrally planned production;

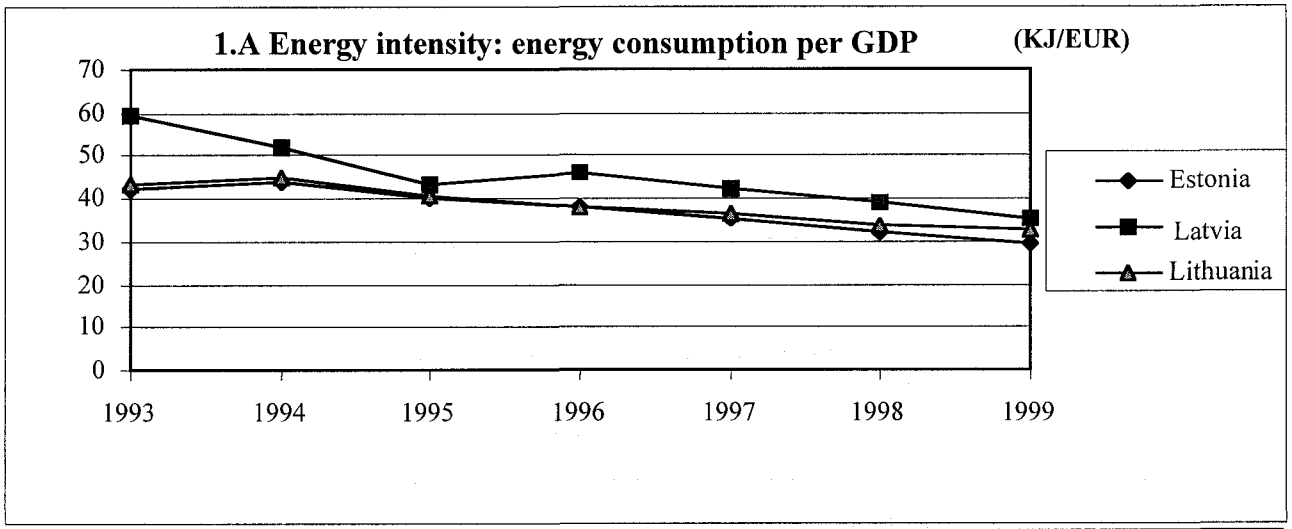
•Specific targets are usually not relevant for intensity indicators. At the same time, overall policy goals are clear: the three Baltic States need to pursue economic growth while protecting their environments – this means that **economic sectors need to reduce their environmental intensities.**

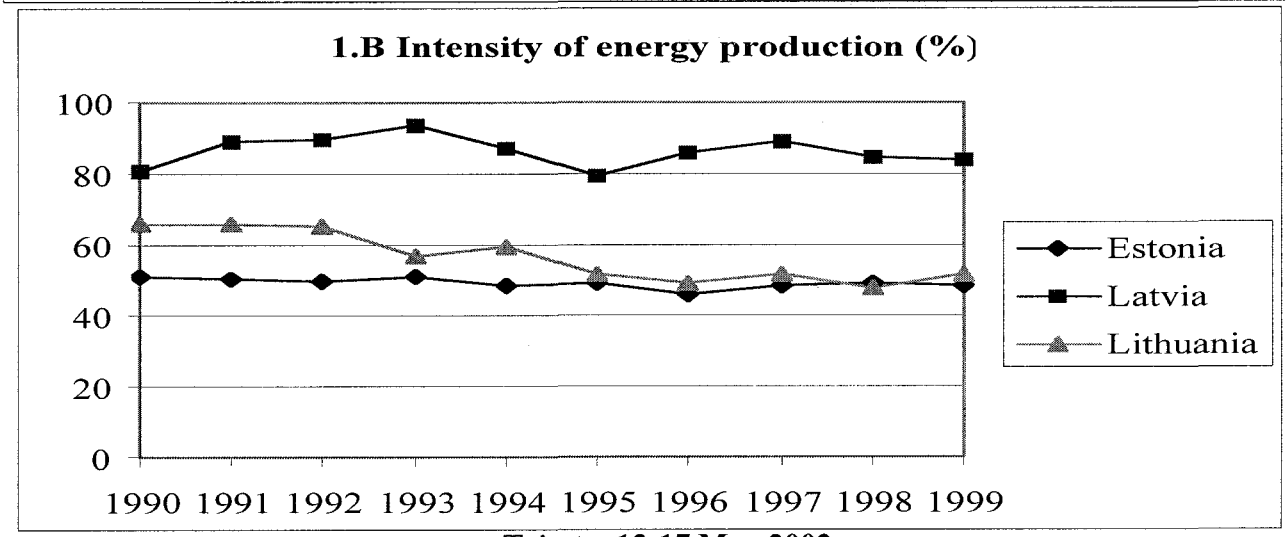
Proposed Baltic "Headline" Indicators from the Baltic States case study

Economic sectors	
Energy	Energy efficiency of economy(GDP per unit of energy used) energy losses
Manufacturing	Intensity (output vs. SO_2, NO_x emissions, BOD discharges, water use)
Transport	Transport development (public transport; number of motor vehicles)
Forestry	Productivity (felling vs. sector output) and intensity (felling vs. increment)
Agriculture	Intensity (output vs. sown area and fertiliser use)
Health-related issues	
Air pollution/quality	National SO_2, NO_x emissions; SO_2, NO_x concentrations in the capital cities National SO_2, NO_x emissions per GDP
Drinking water	*[to be determined]*
Global issues	
Climate change	CO_2 emissions per GDP

Headline indicators for Energy sector:

1A Energy intensity of economy is defined as the final energy consumed to generate a unit of GDP
1B Intensity of energy production is defined as final energy consumption compared to total primary energy supply





Headline indicators for Climate change:

CO_2 emission intensity

Share of renewables in primary energy supply

Table.1: CO_2 emission intensity in 1997 (GDP at current prices)

	Estonia	Latvia	Lithuania	Sweden	Poland
CO_2 per GDP (kg/euro)	5.04	2.39	2.18	0.20	1.55
CO_2 per TPES (kg/MJ)	89.12	65.35	50.26	24.33	56.78

Table.2: Share of renewable resources in primary energy supply, (% of TPES)

Country	1990	1995	1996	1997
Estonia	1.9	9	9.8	10.5
Latvia	13.5	25.0	30.8	32.0
Lithuania	1.5	3.1	3.3	6.2
Denmark	6.3	7.3	6.8	8.0
Sweden	24.6	25.6	22.7	26.7

The first phase of the project "Indicators for Sustainable Energy Development"

During the first stage of this project 41 ISED indicators were collected using available data from Lithuanian statistics for year 1995;

The list of 41 ISED indicators (among them 23 core indicators) include:

- **Economic Dimension of sustainable development:**

  Economic activity levels, energy production, supply and consumption

  Energy pricing, taxation and subsidies;

  End-se energy intensities, energysupply efficiency, energy security

- **Social dimension of sustainable development:**

  Energy disparities, energy affordability and accessibility.

- **Environmental dimension of sustainable development :**

  Climate change;air, water pollution and waste;

  Energy resource depletion, land use, deforestation;

  Accident risk.

Project invoked the useful tested methodological framework of i ndicators:

Driving force – State –Response

ISED Economic Dimension Indicators

Indicator	Measurability & analytical soundness	Policy relevance
Indirect (population, GDP per capita, end use energy prices with and without tax/subsidy, shares of sectors in GDP, distance traveled per capita, freight transport activity, floor area per capita, etc (1-8)	Consistent and comparable data is not available **for prices, subsidies and taxes.**	Not clear link to sustainable development
Indirect within energy sector (energy intensity of sectors, final energy intensity of selected energy intensive products, energy mix, energy supply efficiency, status of deployment of pollution abatement technology (PAT)) (9-13)	There are no official statistical data **for final energy intensity of selected energy intensive products** and for example **fossil fuel efficiency for electricity generation can** be calculated only assuming fuel consumption for heat generation at CHP, there are no **flue gas desulphurisation** and other PAT	Consistent basis is needed for international comparison. Does not reflect energy quality, useful to track performance over time
Direct (energy per unit of GDP, expenditures on energy sector) (14-15)	There are no official statistical data on **expenditures in energy sector for environmental control, hydrocarbon exploration, RD&D, net energy import expenses**	Expenditures should be normal.ized according to GDP for internationl comparison
State (energy consumption per capita, indigenous energy production, net energy import dependence (16-18)	There are uncertainties when allocating **nuclear fuel** to domestic or imported fuels	Cost of lower energy dependence should be measured

ISED Social Dimension Indicators

Indicator	Measurability & analytical soundness	Policy relevance
Indirect (income inequality) (19)	Consistent basis is needed for the international comparison	Too general and not related with energy use directly
Indirect within energy sector(Ratio of daily disposable income/private consumption per capita of 20 poorest households to the prices of electricity and major households fuels (20)	Consistent basis is needed for the international comparison but national statistics provides different data, for example for private consumption to the prices of electricity, fuels, flat rent etc.	Target values for policy makes are necessary
Direct (Fraction of disposable income/private consumption per capita spent on fuel and electricity by average and group of poorest population) (21)	There are no consistent official statistical data on percentage of income spent for energy by average and poor population	Target values for policy makes are necessary
State (Fraction of households heavily dependent on non commercial energy and without electricity) (22)	There are no official statistical data about fraction of population heavily dependent on non-commercial energy or w/o electricity	Also inadequate electricity supply should be evaluated and type of non commercial energy

ISED Environmental Dimension Indicators

Indicator	Measurability	Policy relevance
Direct: SO2, NOx, PM, CO, VOC emissions, GHG emissions (23, 26) **State:** Ambient concentration of SO2, NOx, PM, CO, ozone, land area where acidification exceeds critical loads CL (24-25)	There are no data on **CO and ozone concentrations in urban areas and land area with exceeded CL**	Most important are GHG and PM, so intensity of pollution for these pollutants is important
Direct : Discharges of waste water, radionuclides, oil into coastal area (28)	There was no data about **discharges of radionuclides, oil into coastal area**	Relevance for energy is more micro and indicators should focus on that level
Direct Generation of solid waste, radioactive waste (29, 31) **State:** Accumulated quantity of solid wastes to be managed, accumulated solid waste awaiting disposal (30, 32)	There was no general statistical data about **waste** in 1995	Impact is micro because important is the suitability of disposal site
Direct: Land area taken up by energy facilities, fraction of technically exploitable capability of hydropower (33, 35)	There are no information about total **land area taken by energy facilities**	Main issue is related with resettlement of population because of HPP construction
State: Fatalities due to accidents with breakdown of fuel chains (34),	There was no consistent data about **fatalities** in 1995	Should be normalized per GWh for international comparison
Direct: Proven recoverable fossil fuel reserves, proven uranium reserves (36, .38) **State:** Life time of proven fossil fuel reserves, lifetime of proven uranium reserves (37, 39)	There was no information about **proven oil reserves** in Lithuania	Proven reserves depends on exploration activity, the share of renewable energy should be included
Direct: Intensity of use of forest resources as fuel wood (40) **State**: Rate of deforestation (41)	There was no information about **deforestation** because of cutting forest for fuelwood	The role of energy in deforestation vary by region so role of energy should be more clarified

Conclusions and findings

- There are problems with data consistency especially for social dimension indicators in different countries. These indicators are the most difficult to obtain and compare because of different social support systems available in the countries;
- No response actions for social dimension indicators are defined;
- Social response indicators needs targeted values for policy makers (for example percentage of income spent on energy by poor);
- More clear definitions for some indicators are needed (for example non commercial energy);
- Some indicators should be applicable for the micro level (for example discharges of pollution into the water or suitability of waste disposal site) ;
- Measures of cost effectiveness to evaluate responses that reduce indicators are necessary (for example how much did the reduction in emissions cost per unit of change)

Further work & expectations

- The objective of the project is to apply ISED in the preparation of the third Lithuanian national energy strategy for the establishment of quantified sustainable energy sector development targets and analysis of their implementation results and evaluation of the success of the previous strategies.
- The third National energy strategy to be prepared in the next year can significantly benefit from the application of ISED.
- Appropriate ISED selected for the Lithuanian sustainable energy strategy development would address priority concerns or strategic priorities with defined headline targets and relevant Response Actions that correspond to indicators selected.
- The Response actions on Targeted Indicator would define the possible policy measures and actions to be implemented seeking to achieve progress upon headline targets.
- The most important for Sustainable energy strategy development is to define targeted values for the selected most relevant indicators from ISED list.