



APPLICATION OF ISED FOR THE PREPARATION OF LITHUANIAN SUSTAINABLE ENERGY STRATEGY

Lithuanian case study

Third Research Coordination Meeting/Workshop

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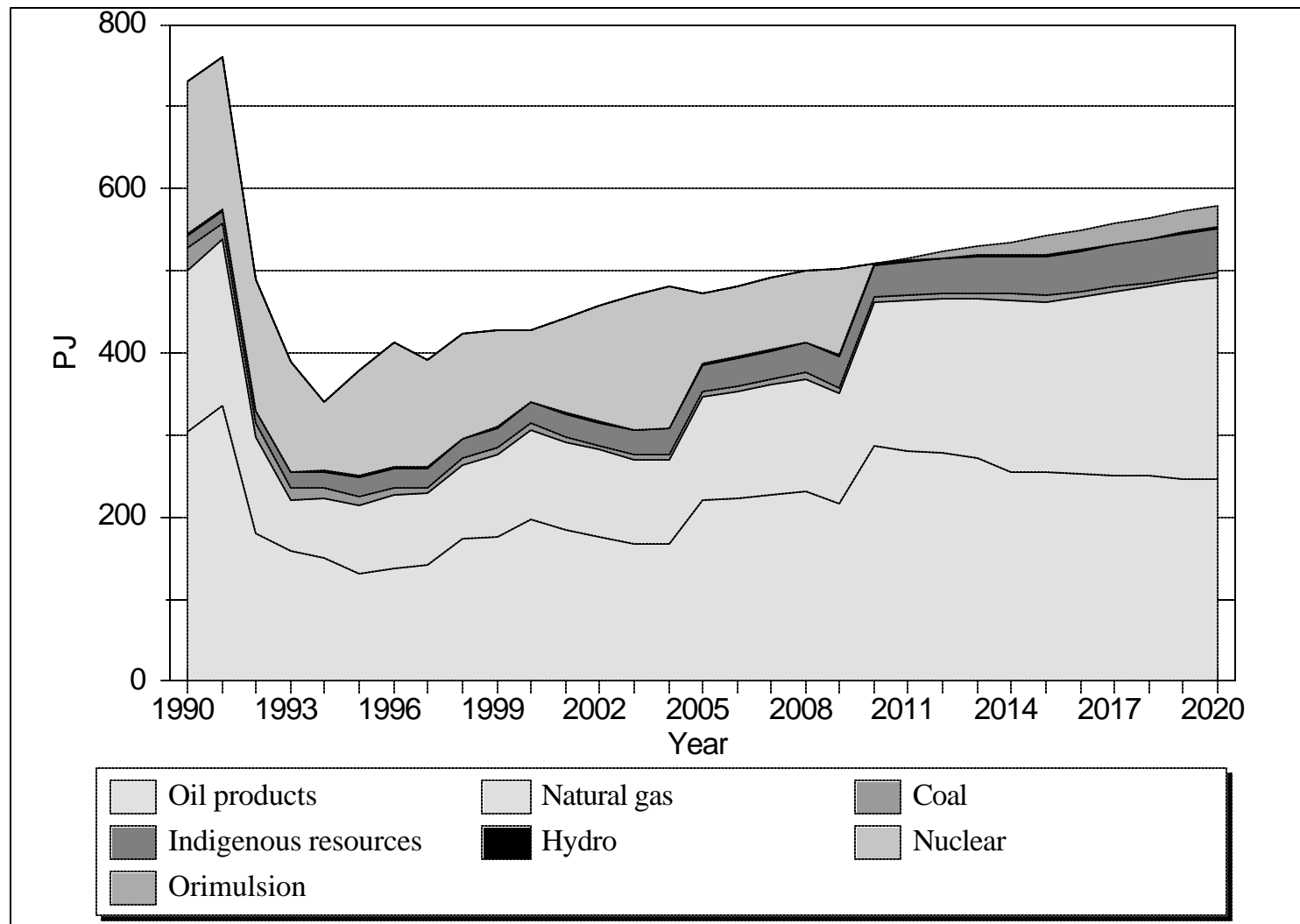
The structure of presentation

- **Overview of Lithuanian energy sector**
- **Lithuanian energy sector priorities**
- **Implementation of ISED framework**
- **Analysis of trends in priority areas**
- **Overview of current policies in priority areas**
- **Impact and linkages between indicators in implemented ISED framework**
- **Formulation of new policies**
- **Conclusion**

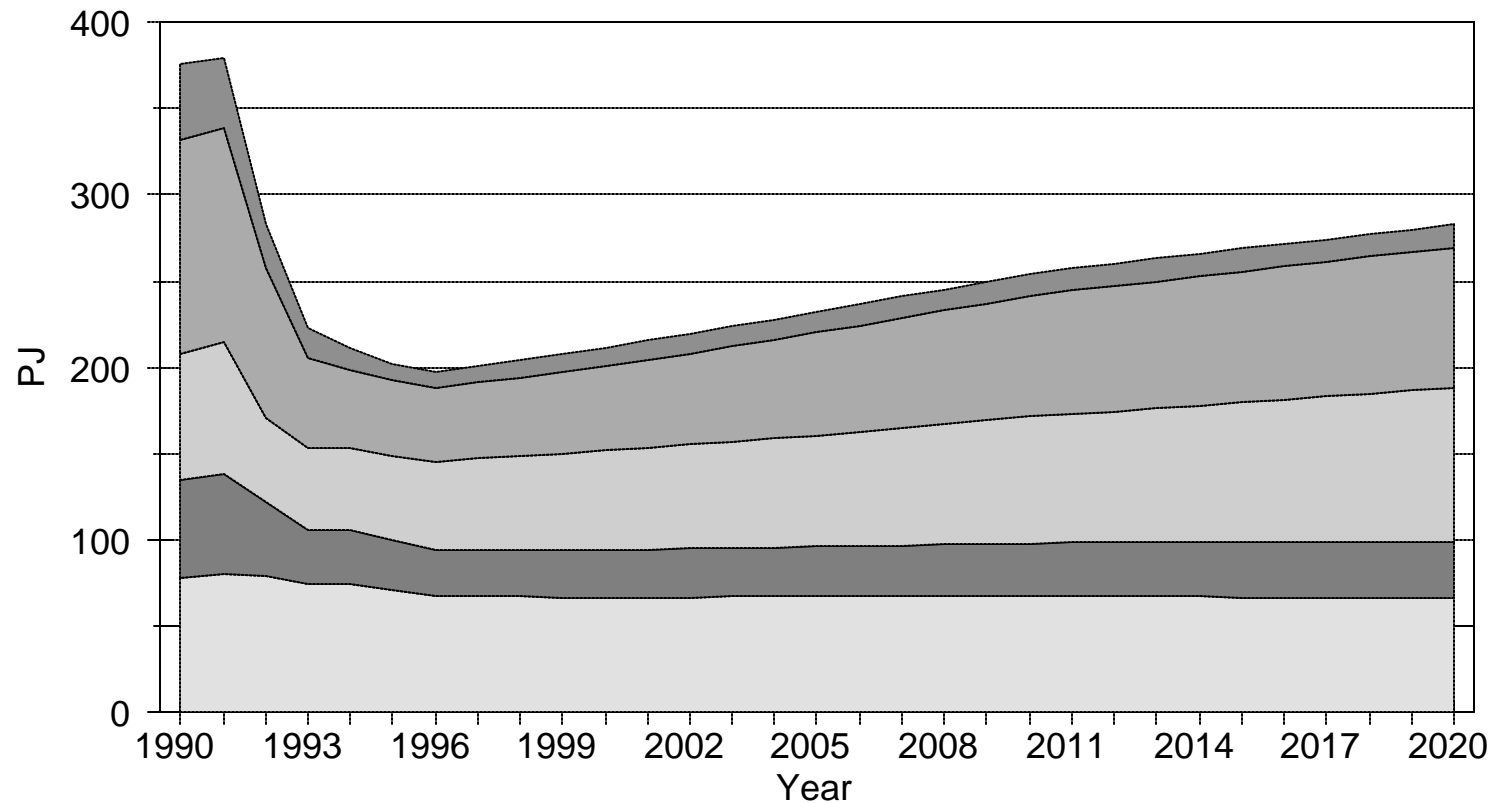
Overview of Lithuanian energy sector

- **Primary energy supply forecast**
- **Final energy demand forecast**
- **Capacities of Lithuanian power system and**
- **Domestic electricity demand**

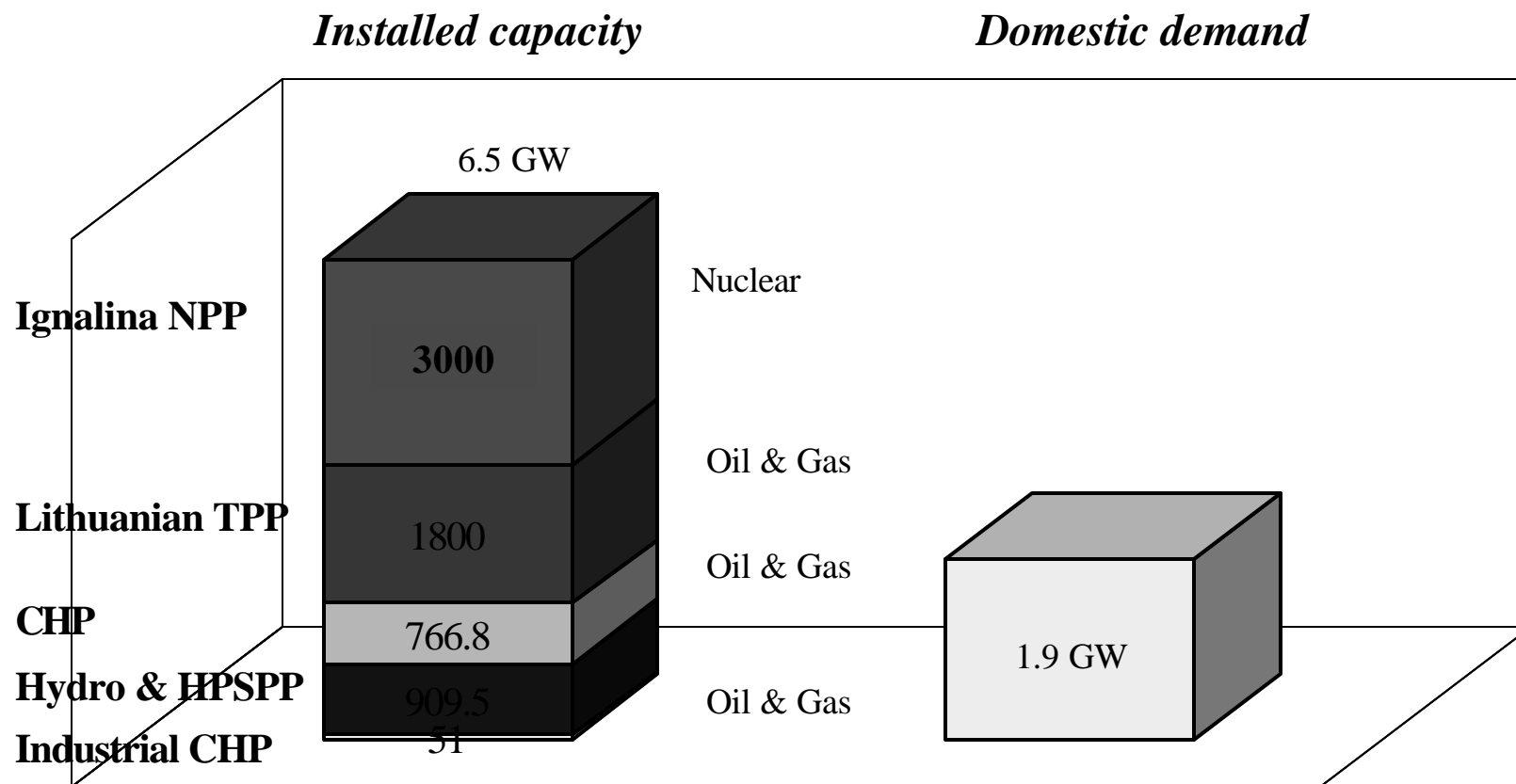
*Primary energy supply for basic scenario:
Ignalina NPP is shut down by 2010*



Final energy demand forecast for base scenario



Lithuanian power system in 2001



Lithuanian energy priority areas

- ✓ **Energy consumption**
- ✓ **Energy intensities**
- ✓ **Structure of economy**
- ✓ **Energy security**
- ✓ **Energy prices**
- ✓ **Environmental energy situation**

Implementation of ISED framework

- For the review the state of energy priorities the relevant indicators from ISED list were selected and analysis of trends and impacts from energy policies was conducted.
- **Targeted driving force indicators were selected to address priorities:**
 - #3 Energy prices;
 - #4 Shares of sectors in GDP value added;
 - #9 Energy intensities of economic sectors;
 - #11 Energy mix;
 - #12 Energy supply efficiency;
- The response actions only on **targeted driving force economic indicators** were identified based on analysis of trends and effects of policies implemented. They could positively affect a number of other indicators through a chain of influences therefore their impact on other dimension indicators within priority areas were investigated.

ISED framework

- **Indirect driving force economic indicators :** (#1 Population growth, #2 GDP/capita; #3 Energy prices; #4 Shares of sectors in GDP value added);
- **Indirect driving force economic dimension indicators within energy sector:** (#9 Energy intensities of economic sectors; #11 Energy mix; #12 Energy supply efficiency);
- **Direct driving force economic dimension indicators within energy sector** (#14 Energy use per unit GDP)
- **State economic dimension indicators within energy sector:** (#16 Energy consumption per capita; #17 Indigenous energy; production; #18 Net energy import dependency);
- **Social indirect and direct driving force indicators** on income inequality (#19) and energy affordability (#20, #21) were selected
- **Environmental direct driving force indicators:** (#23 SO₂ and NO_x emissions and #26 CO₂ emissions)

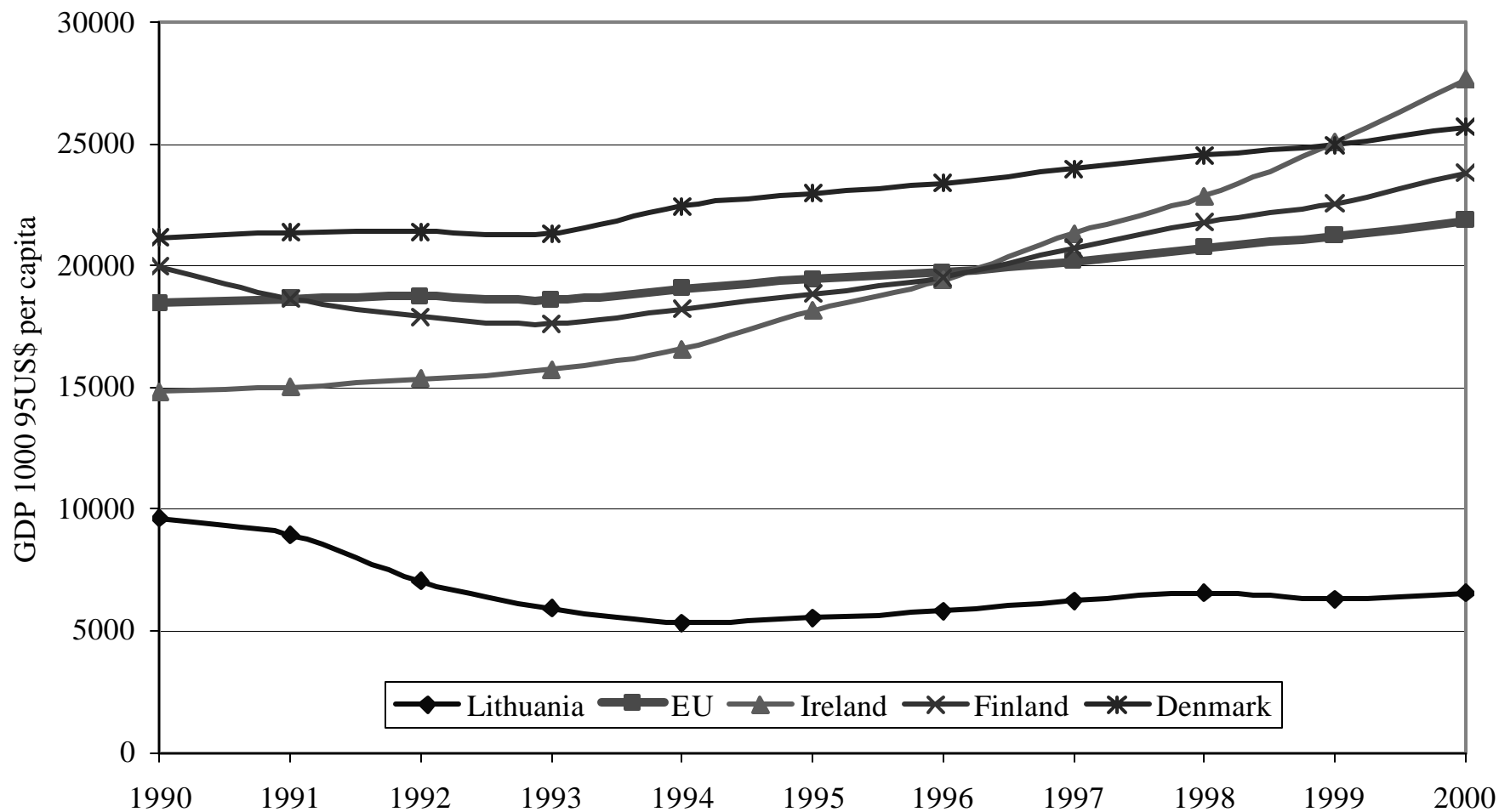
Analysis of trends in priority areas

- **Economic dimension indictors (indirect driving force)**
- **Economic dimension indicators within energy sector (indirect & direct driving force and state indicators)**
- **Environmental indicators (direct driving force indicators)**
- **Social indicators (driving force and state indicators)**

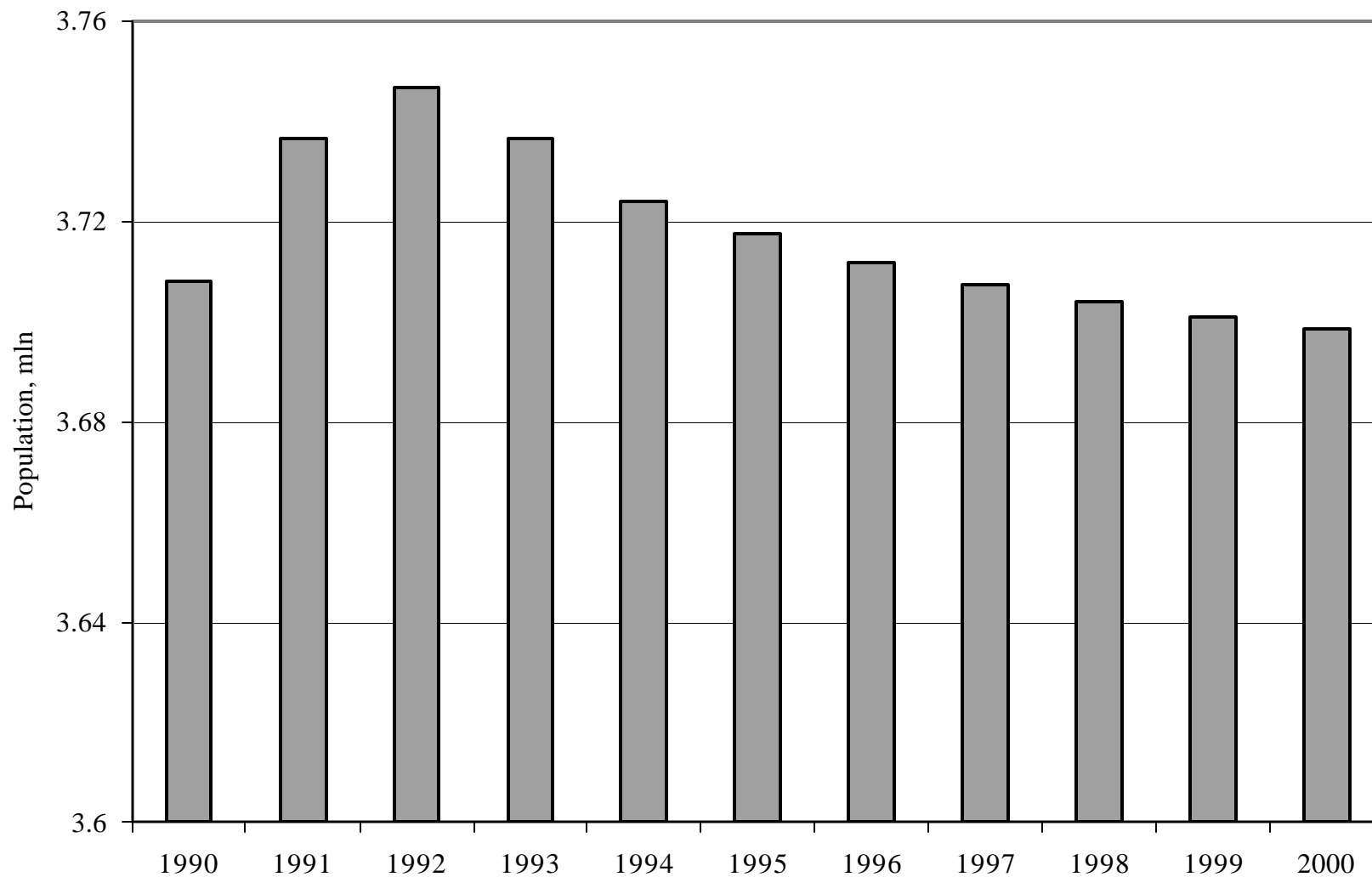
Indirect driving force indicators of economic dimension

- *Population (Indicator #1)*
- *GDP per capita (Indicator #2)*
- *Energy prices (Indicator #3)*
- *Shares of sectors in GDP value added (Indicator #4)*

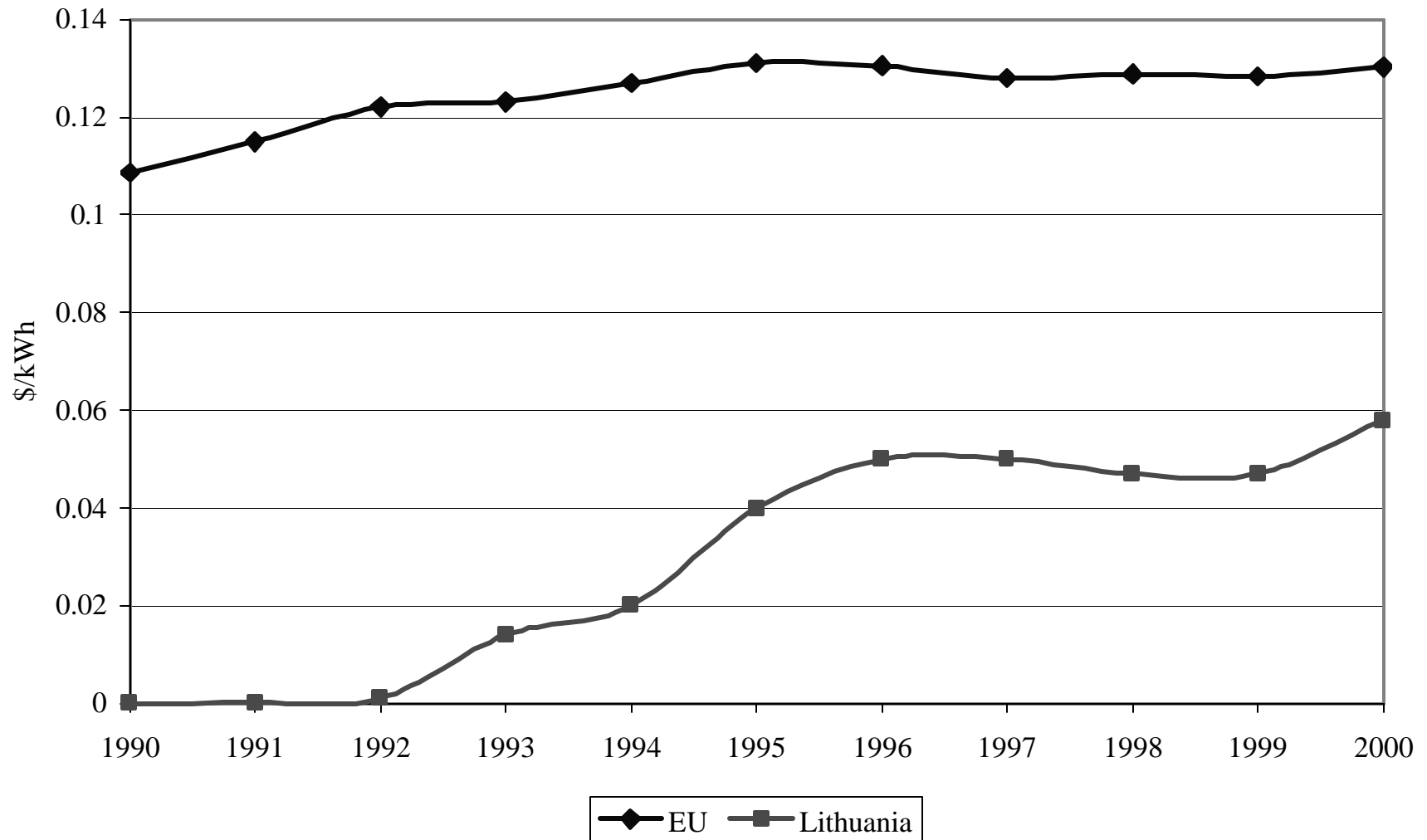
GDP per capita (Indicator #2)



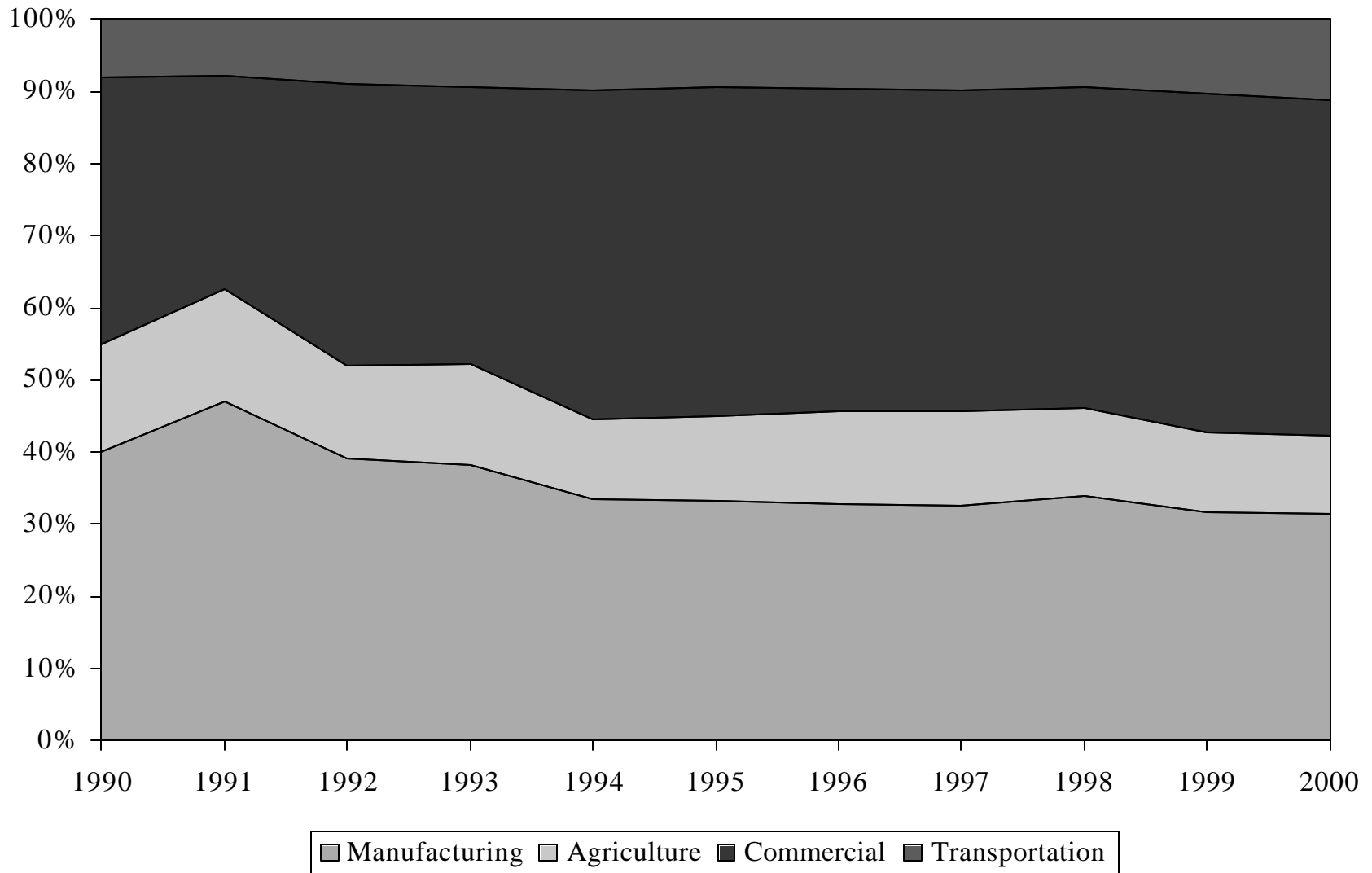
Population (Indicator #1)



Electricity prices for households (Indicator #3)



Shares of sectors in GDP value added (Indicator #4)

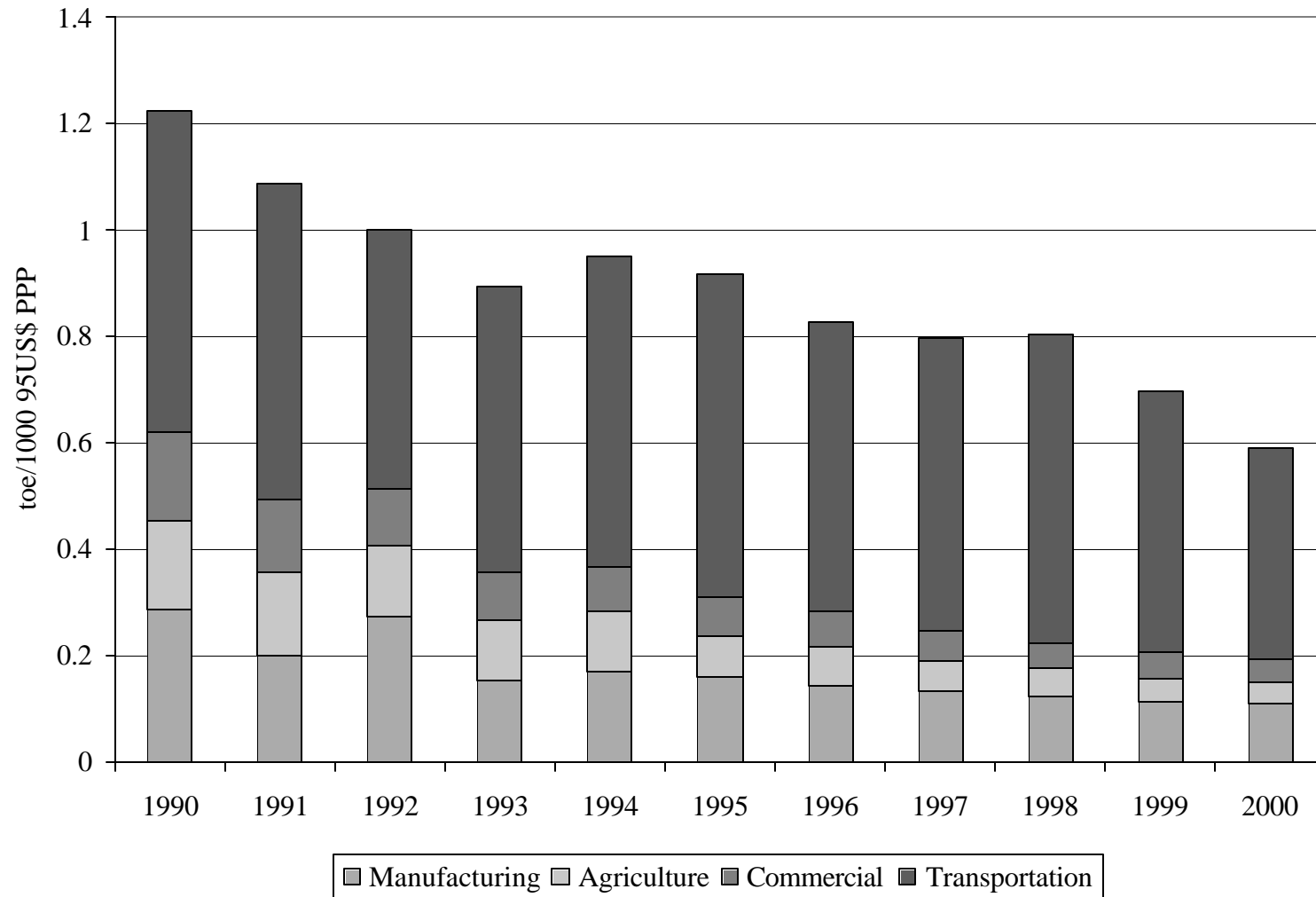


Indirect driving force indicators within energy sector

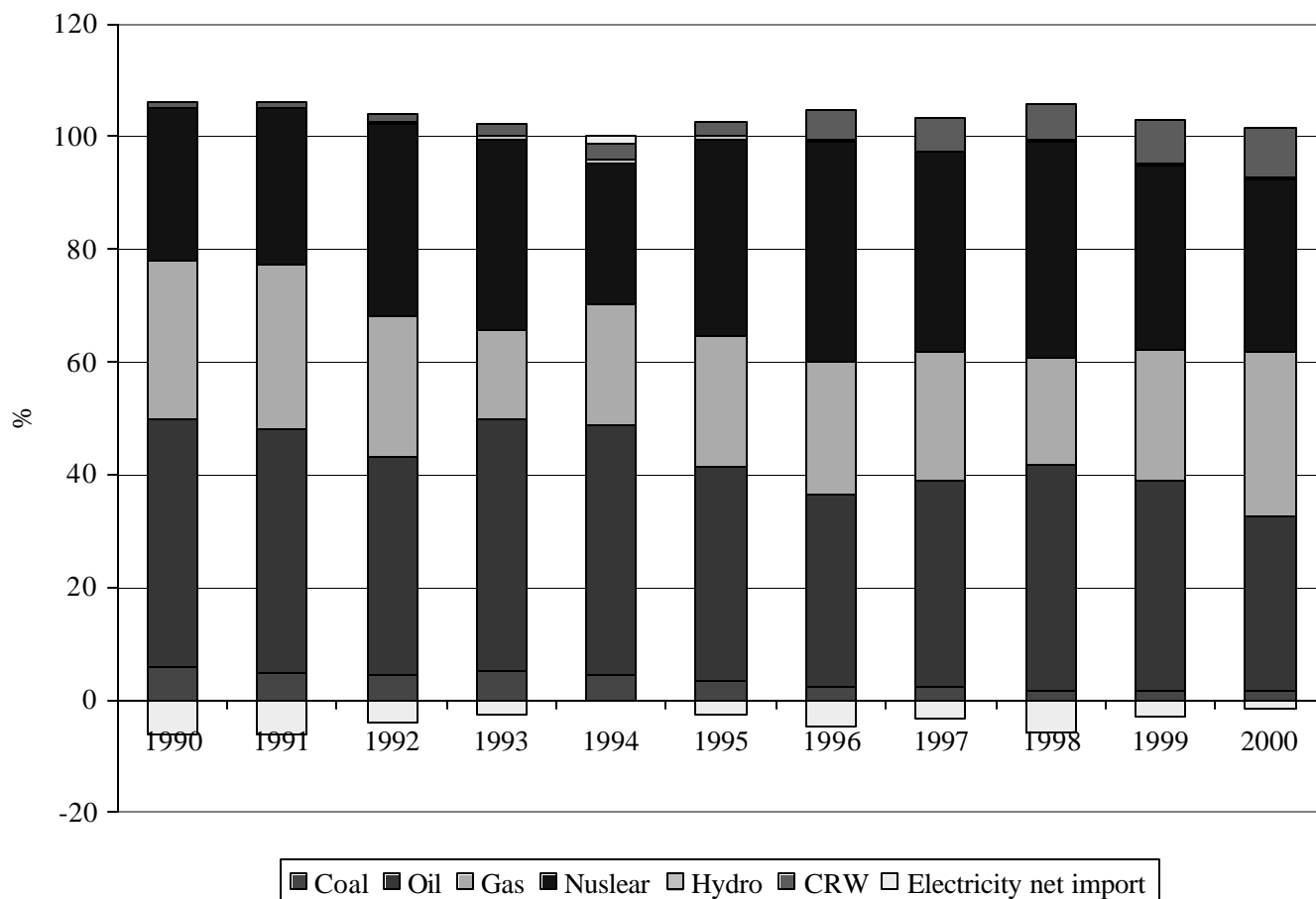
- *Energy intensities of economic sectors (Indicator #9);*
- *Energy mix (Indicator #11);*
- *Energy supply efficiency (Indicator #12)*

Final energy intensity by economic sectors

(Indicator #9)



Structure of TPES (Indicator #11)

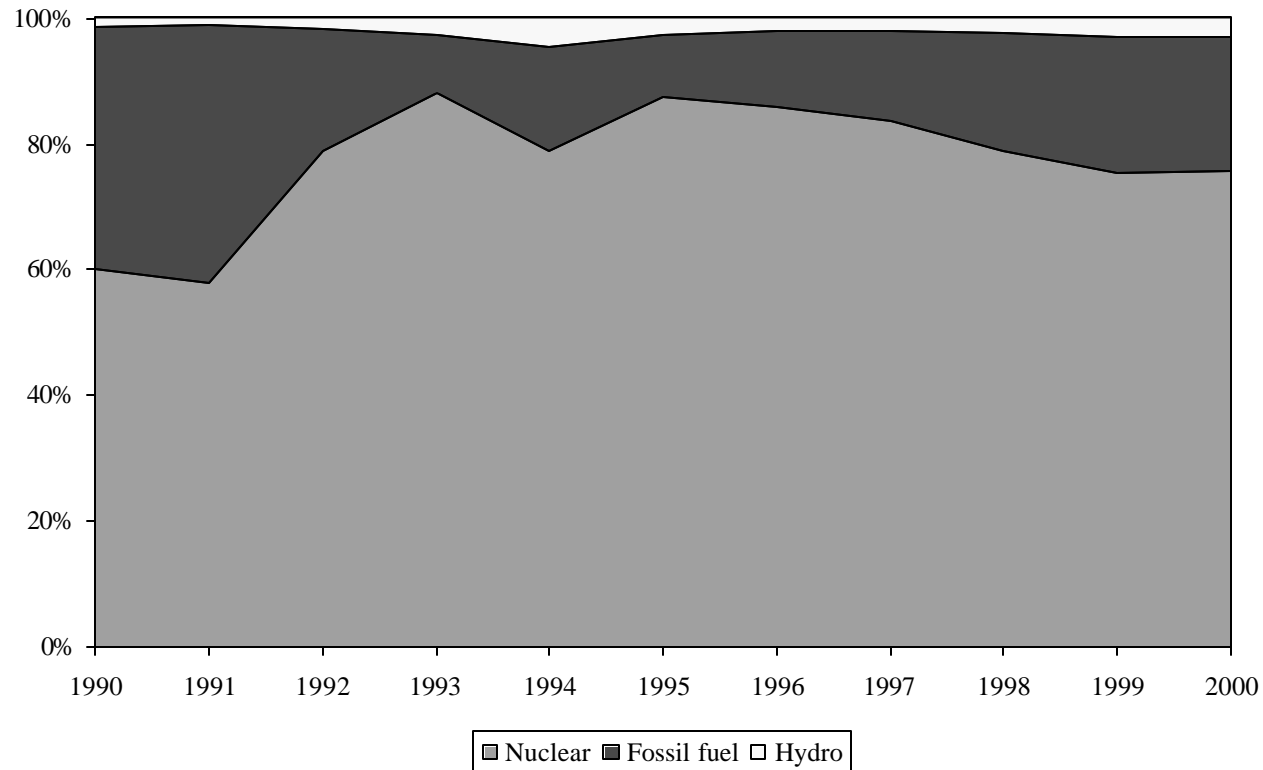


In 2000 - 8.7%
of CRW and 0.5
% of hydro

Total - 9.2%

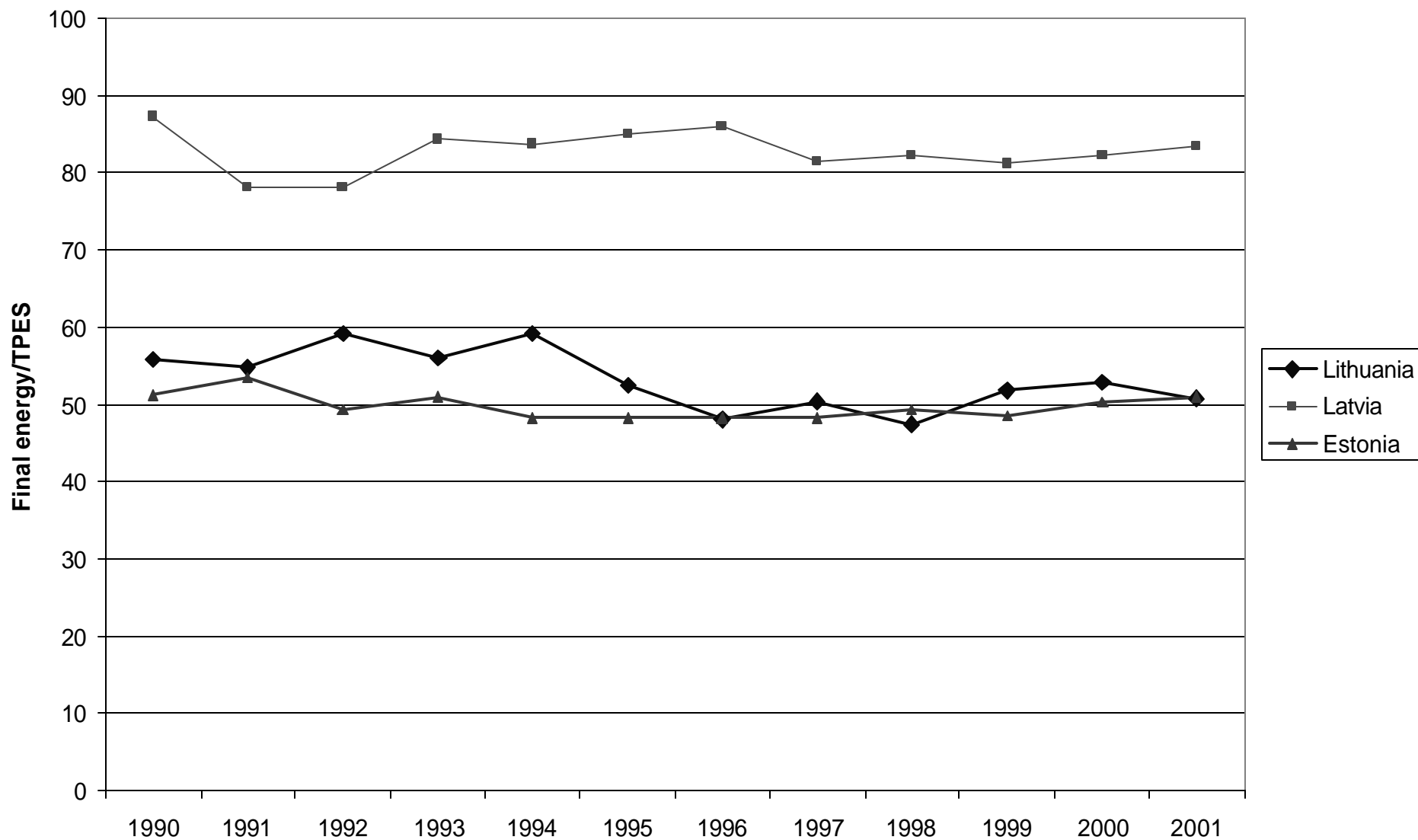
2010 – 12%

Structure of electricity production (Indicator #11)



In 2000 - 3%
of renewables
2010 – 10%

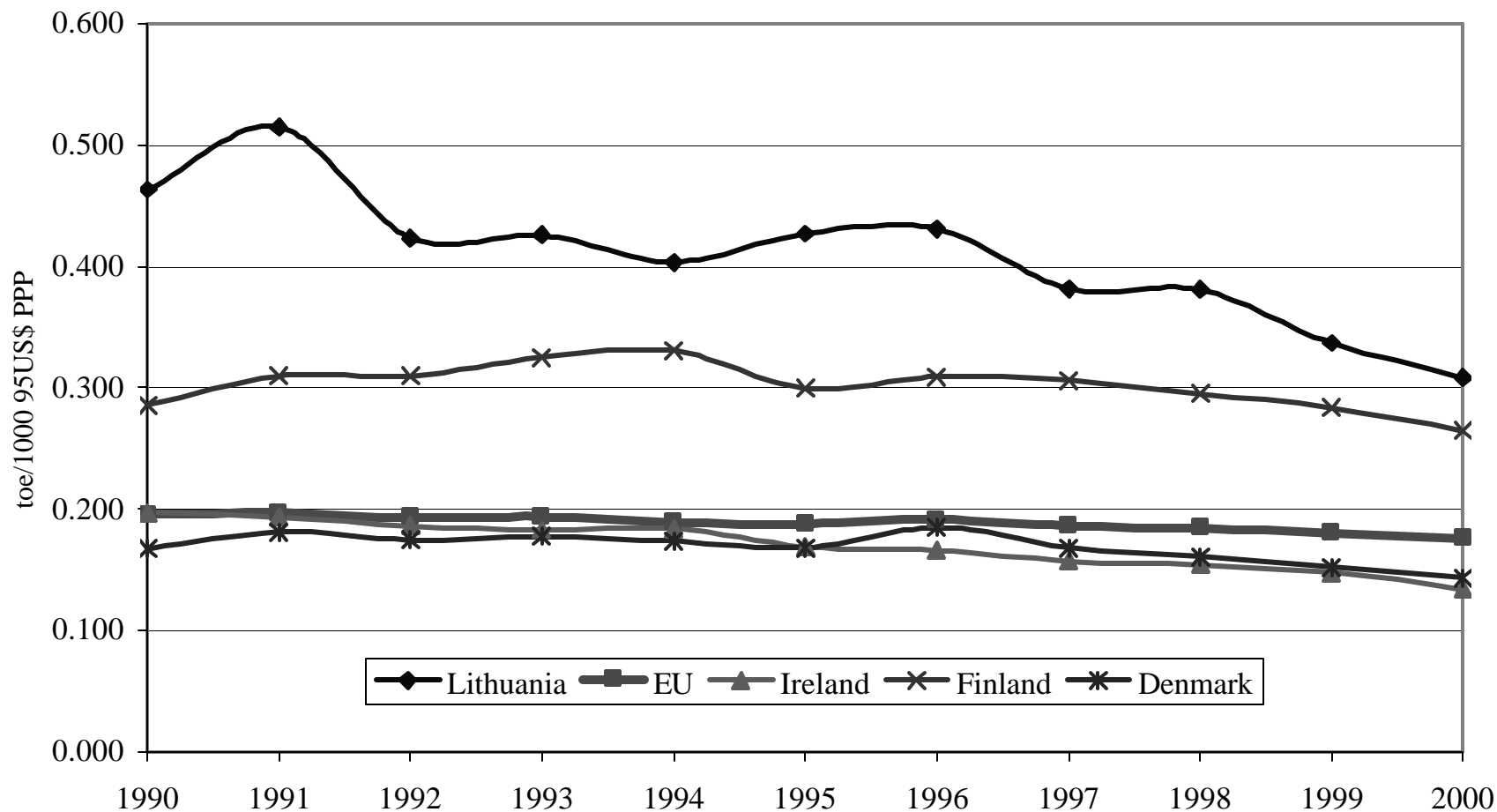
Energy supply efficiency (Indicator #12)



Direct driving force indicators within energy sector

- *Energy per GDP (Indicator #14)*

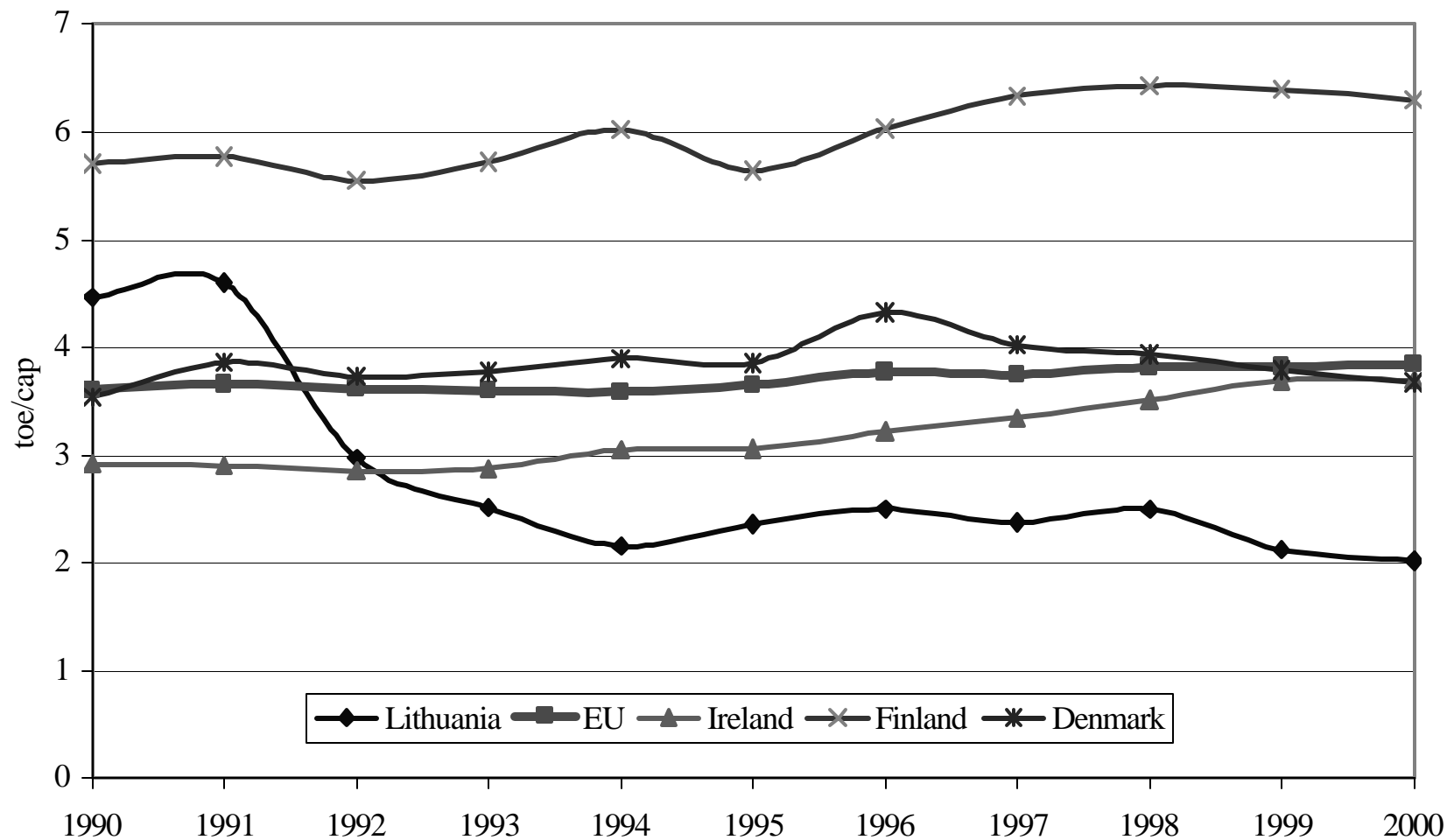
Energy per GDP (Indicator #14)



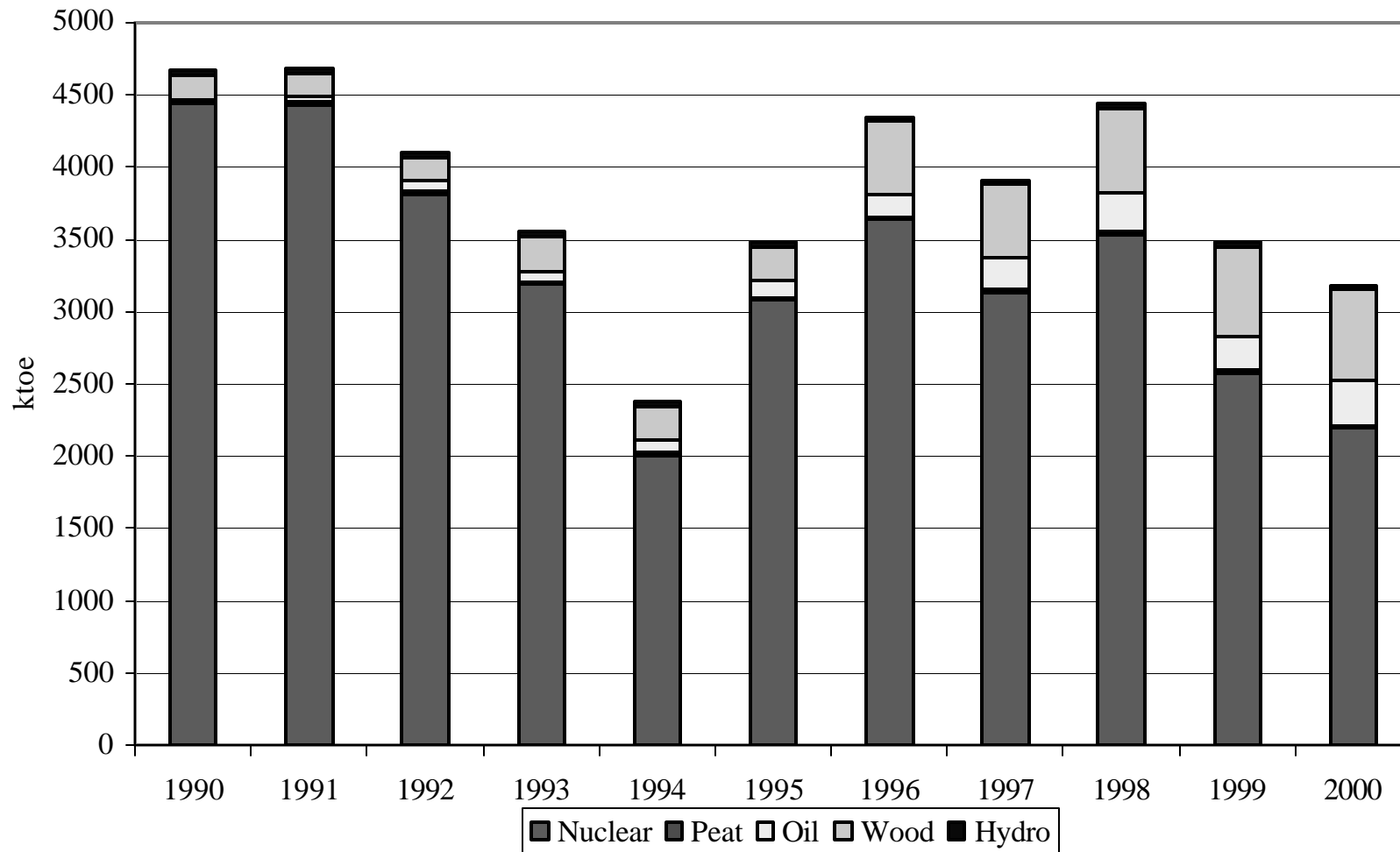
State indicators of economic dimensions within energy sector

- *Energy consumption per capita (Indicator #16);*
- *Indigenous energy production (Indicator #17);*
- *Net energy import dependency (Indicator #18).*

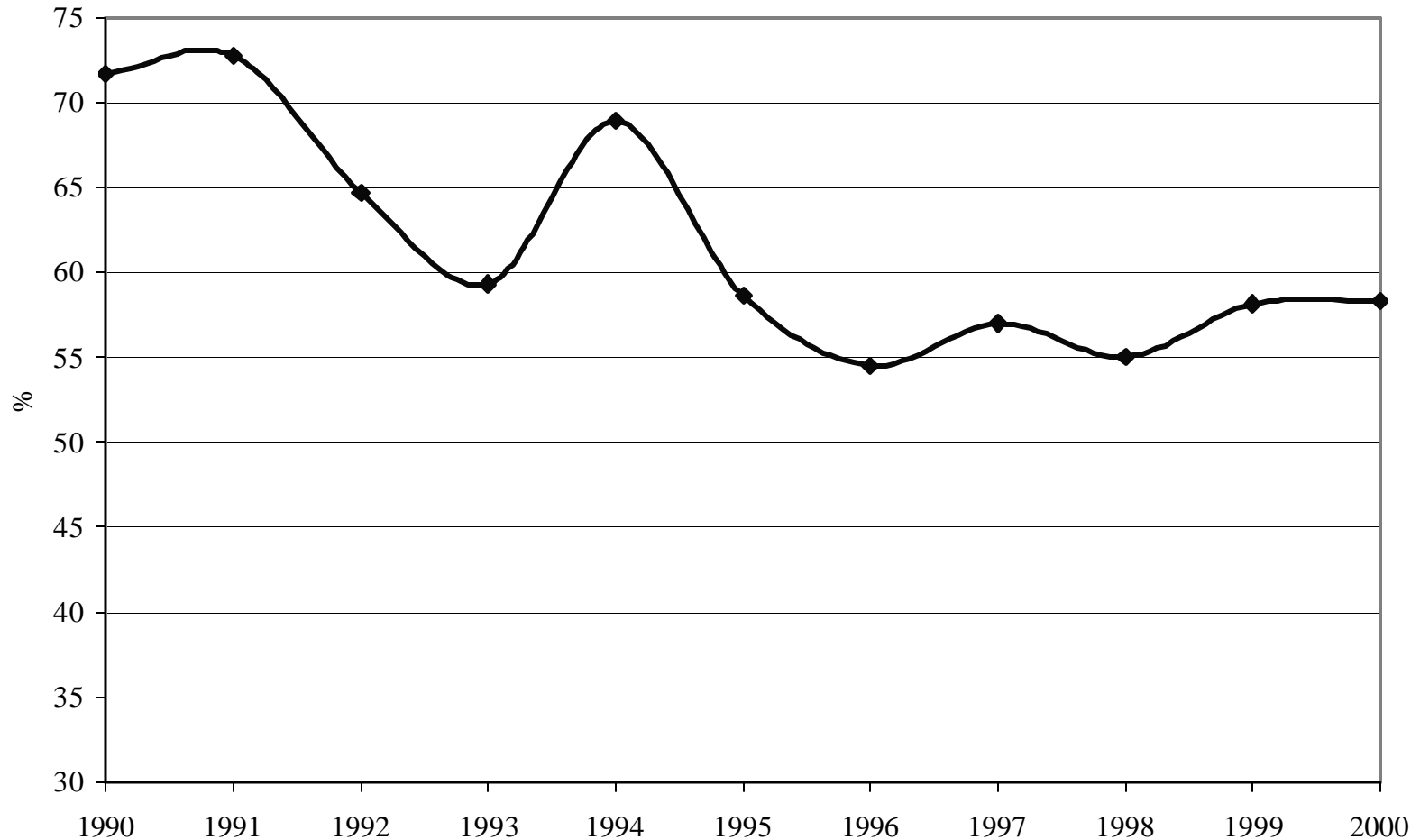
TPES per capita (Indicator #16)



Indigenous energy production # 17



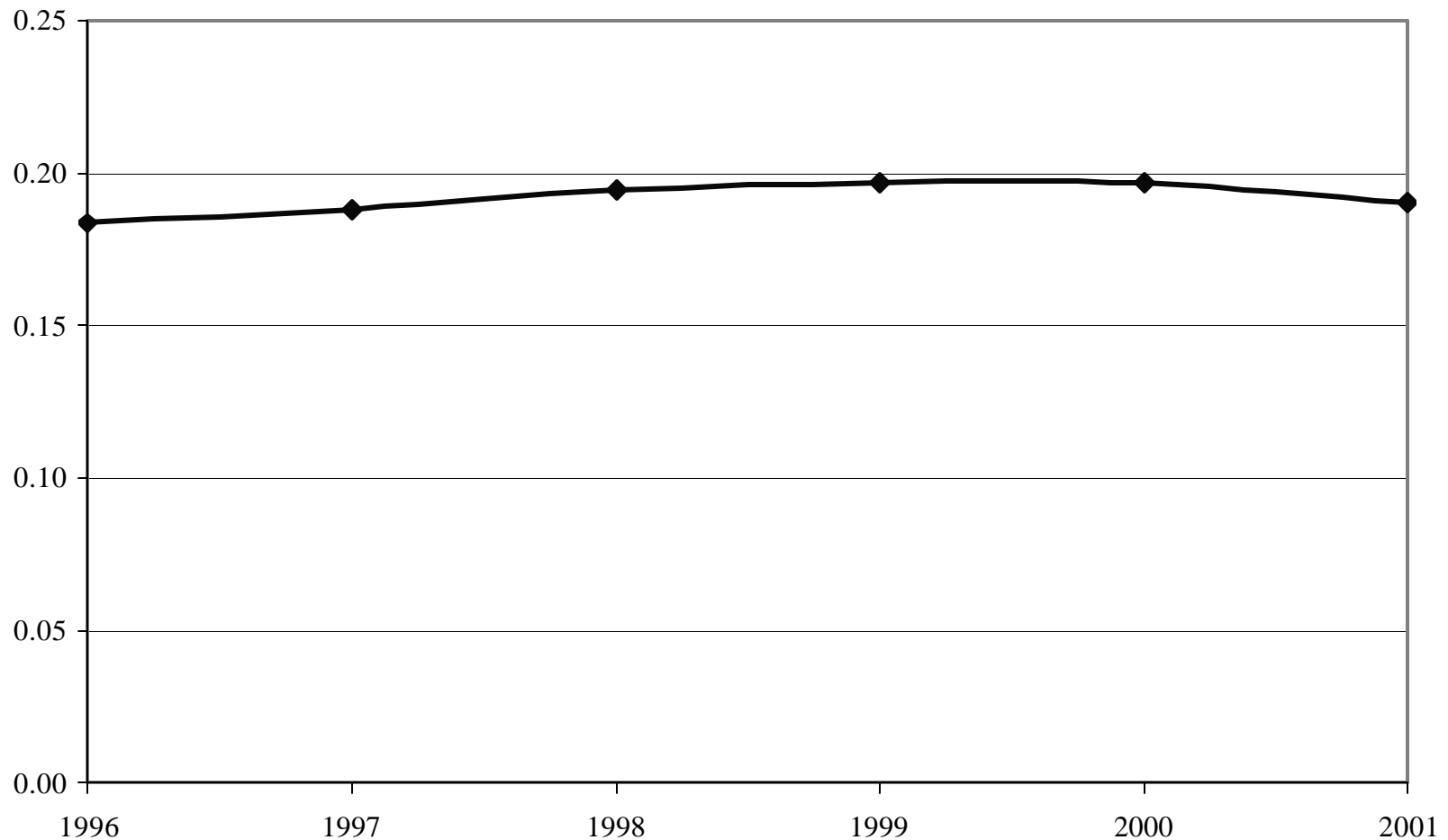
Energy net import dependency (Indicator #18)



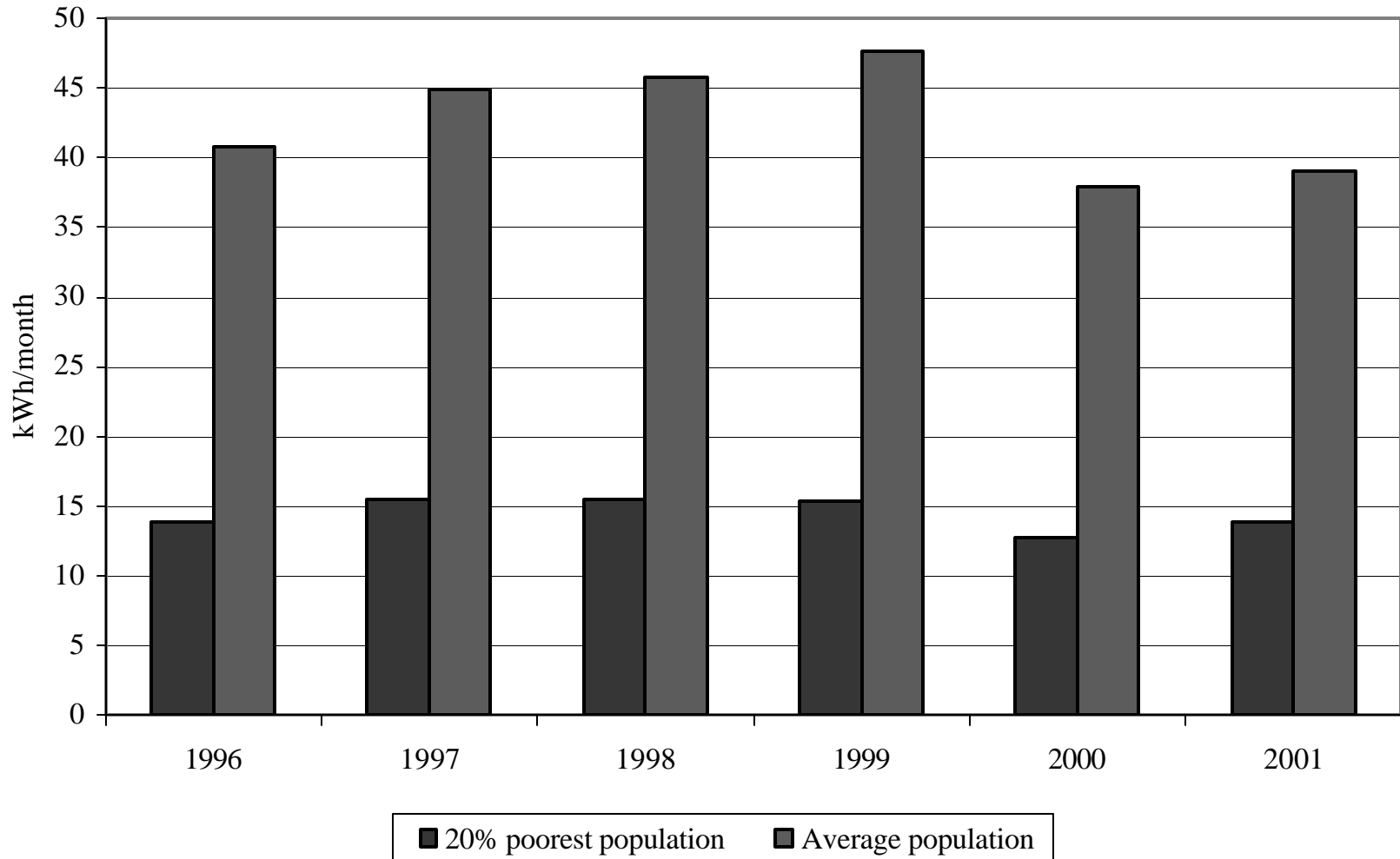
Social indicators

- *Indirect driving force*: the ratio of disposable income or private consumption in terms of individual available to the groups of poorest 20% and richest 20% of the population (Indicator #19);
- *Indirect driving force within energy sector*: the ratio of daily disposable income per capita of 20% poorest population to the prices of electricity and major household fuels (Indicator # 20);
- *Direct driving force*: the fraction of disposable income/private consumption spent on fuel and electricity per capita by average population and by group of 20% poorest population (indicator #21)

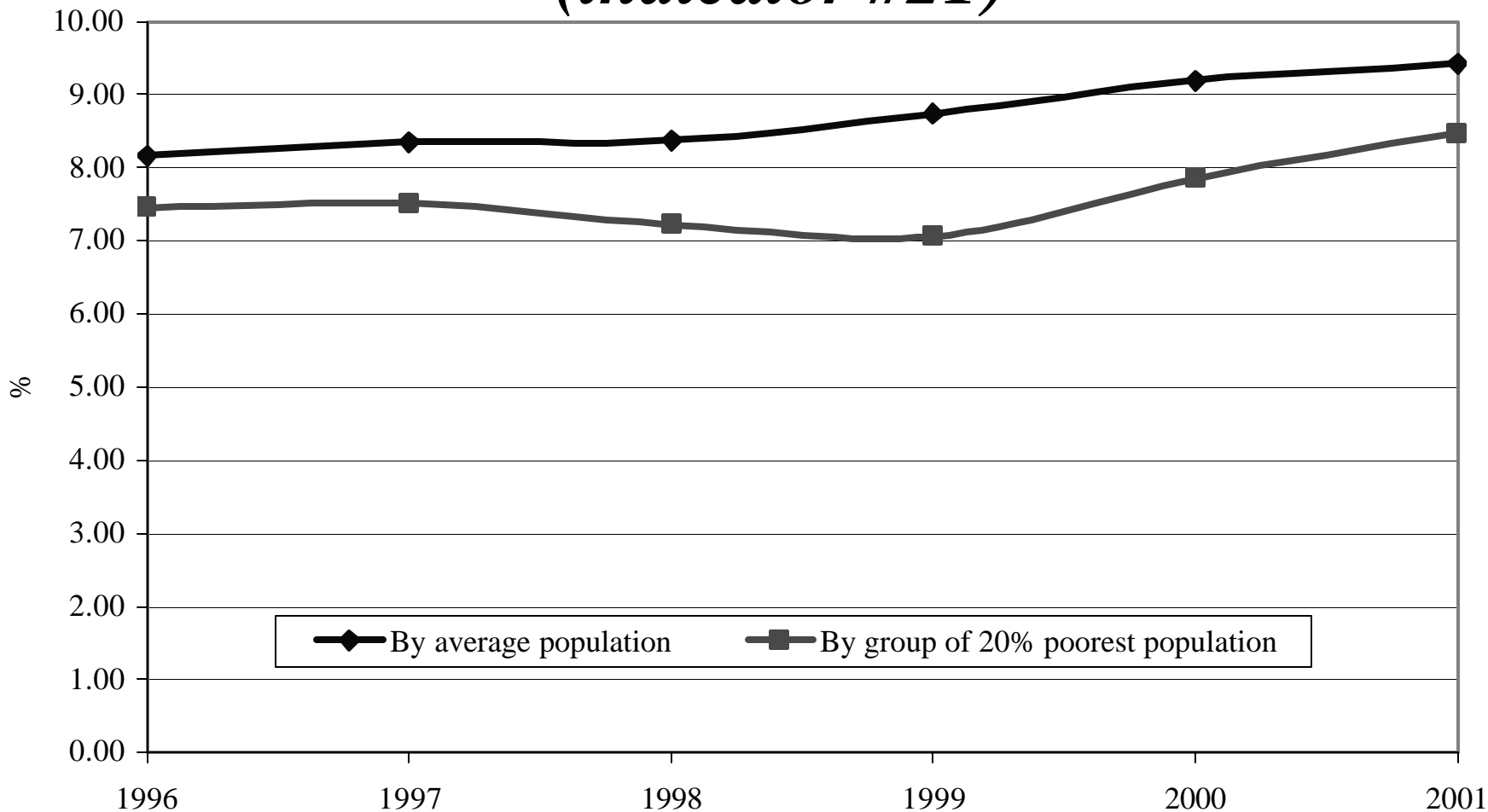
The ratio of disposable income or private consumption in terms of individual available to the groups of poorest 20% and richest 20% of the population (Indicator #19)



The ratio of daily disposable income per capita of 20% poorest population to the prices of electricity (Indicator # 20)



The fraction of disposable income spent on electricity per capita by average population and by group of 20% poorest population (indicator #21)

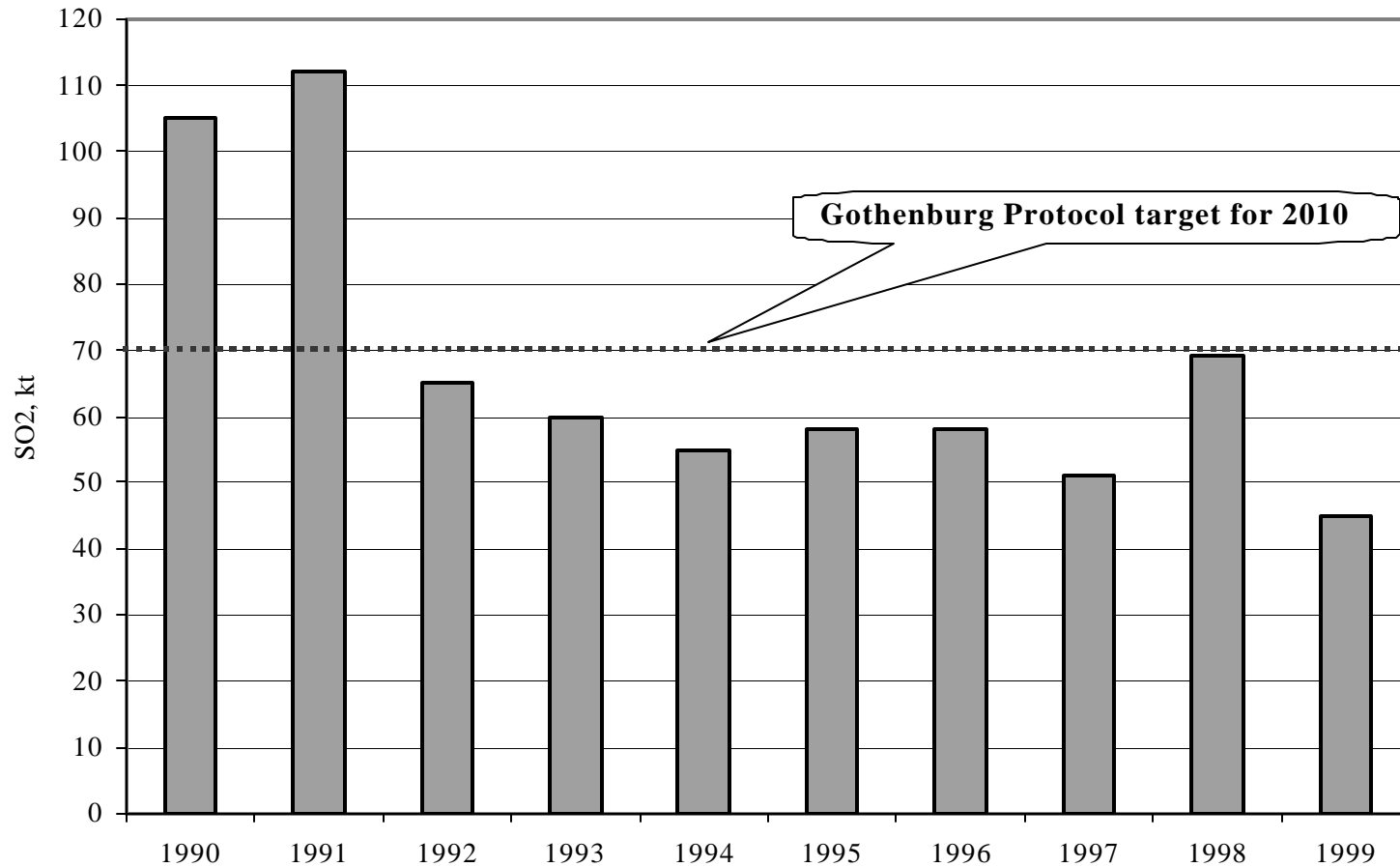


Environmental direct driving force indicators

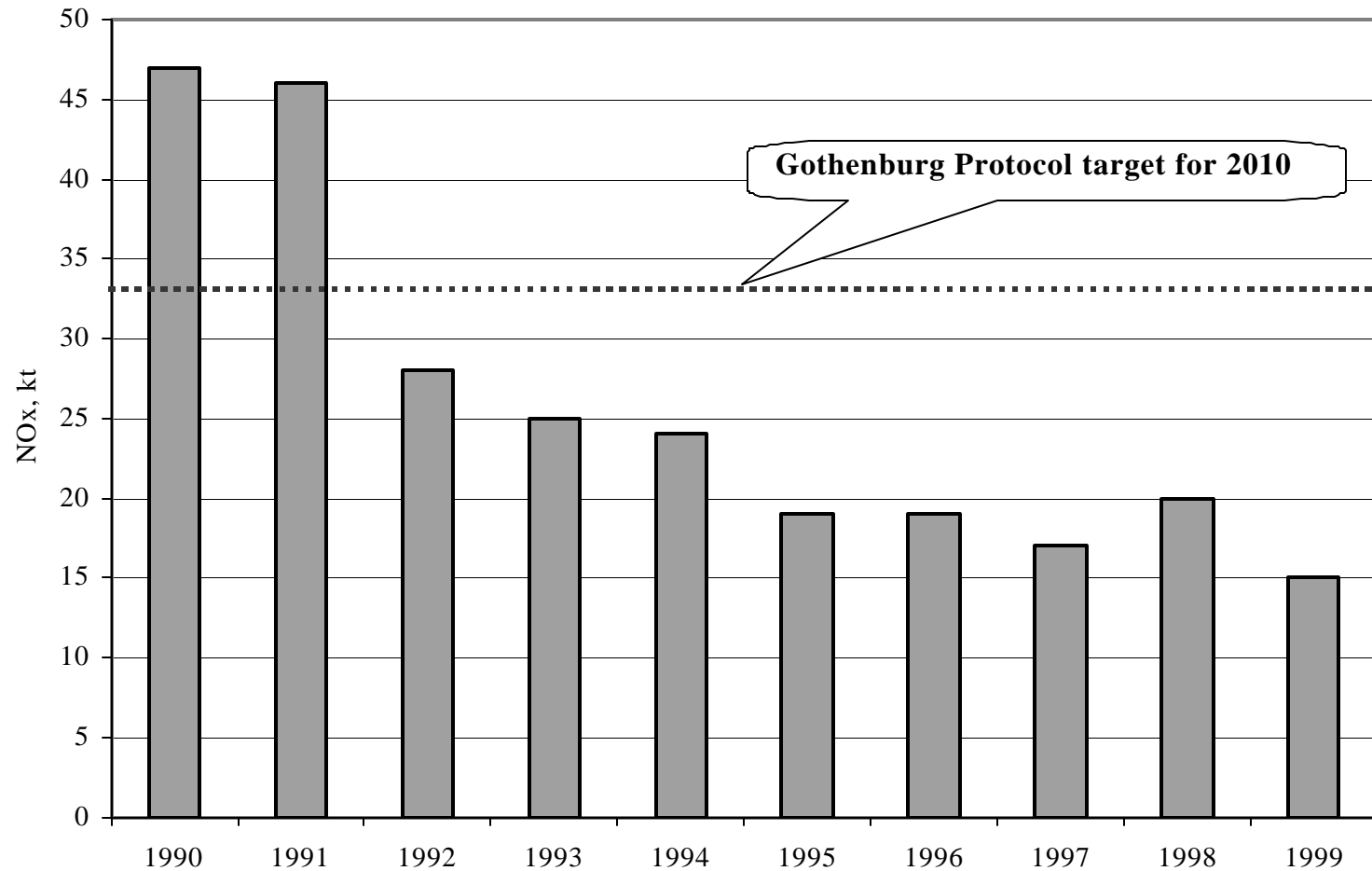
- *Quantities of SO_2 and NO_x emissions (Indicator #23);*
- *Quantities of CO_2 emissions (Indicator #26).*

Quantities of SO_2 and NO_x emissions

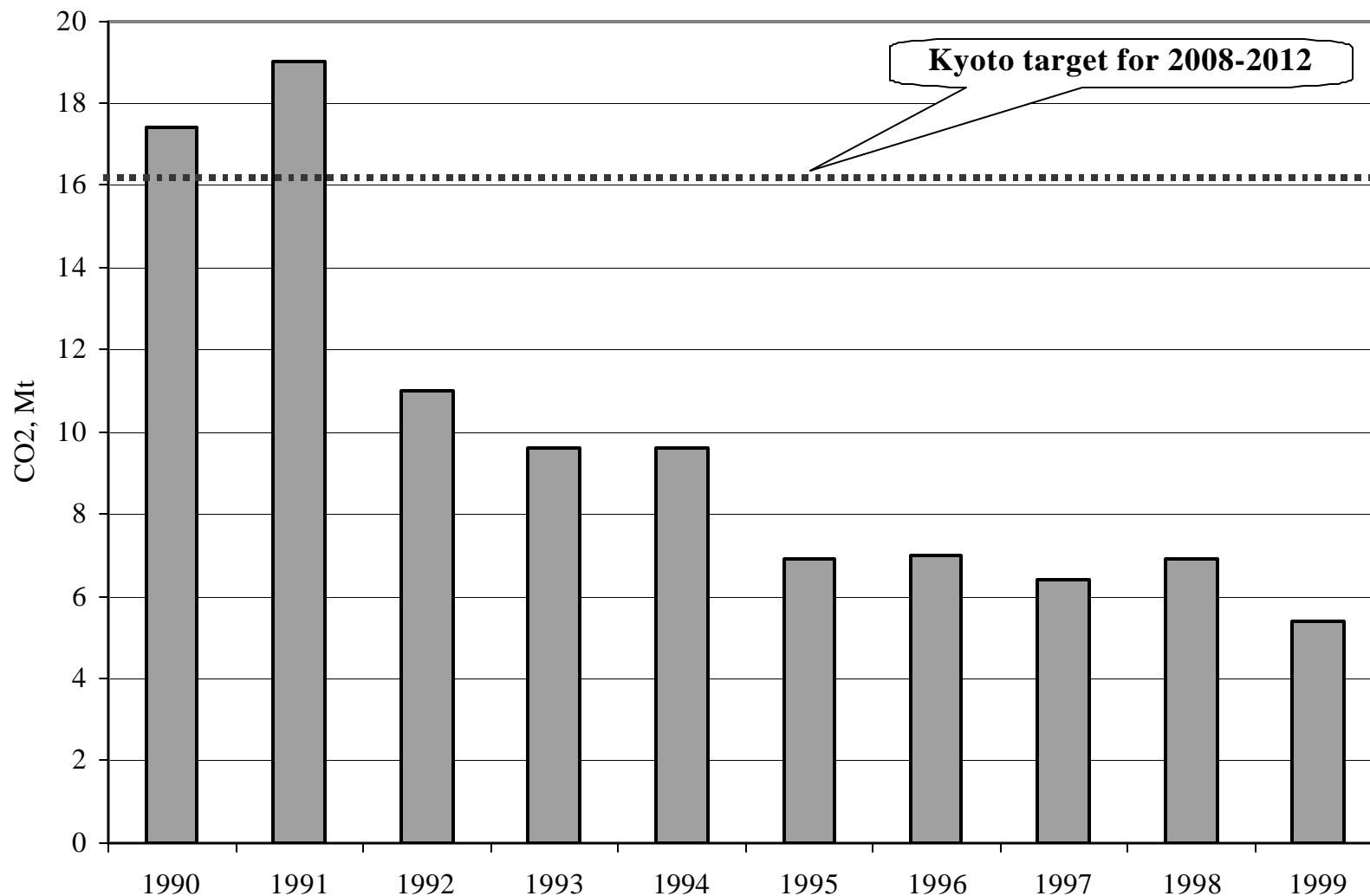
(Indicator #23)



Quantities of NO_x emissions (Indicator #23)



Quantities of CO₂ emissions (Indicator #26)



Overview of current policies in priority areas

- **Decrease of energy intensities;**
- **Get energy prices right;**
- **Increase of security of energy supply by promoting renewables;**
- **Reduction of atmospheric emissions.**

Decrease of energy intensities

The efficient use of energy resources and energy conservation is being guaranteed in Lithuania by implementation by National Energy Efficiency Programme

The effect of this policy tool can be assessed in terms of decrease of energy intensities in all branches of economy and GHG emission reduction in Mt of CO₂ equivalent:

Branches	2005	2010	2015	2020
Transport	0,44	0,44	0,41	0,41
Industry	0,51	0,48	0,44	0,42
Households	0,12	0,12	0,12	0,12
Total	1,07	1,04	0,97	0,95

Get energy prices right

- Since 1997 energy prices were increased in Lithuania to cover long range marginal supply costs.
- Only for 27 thousand household consumers living in the area around the Ignalina NPP the alleviated electricity tariff (reduced by 50%) is applied.
- For all households lower VAT rates (reduced by 50%) were applied for district heating since 2000.
- The effect of energy price increase and removal of subsidies had positive impact on efficient use of energy resources but on the other had caused an energy affordability problems because support for low income population was not effective.

Increase the security of energy supply

- Since 1 January 2003 on denaturated dehydrated ethyl alcohol and methyl and ethyl ester will be exempted from VAT.
- Legal and natural persons using biofuels are exempted from the tax for pollution from mobile pollution which is based on the fuel consumption and is levied per tone of fuel consumed.
- Feed in prices for electricity produced from renewables applied since 11 February, 2002:
 - 5.8 EURct/kWh for hydro PP
 - 6.4 EURct/kWh for wind PP
 - 5.8 EURct/kWh for power plants using biomass
- Effect of support measures can be assessed in GHG emission reductions.

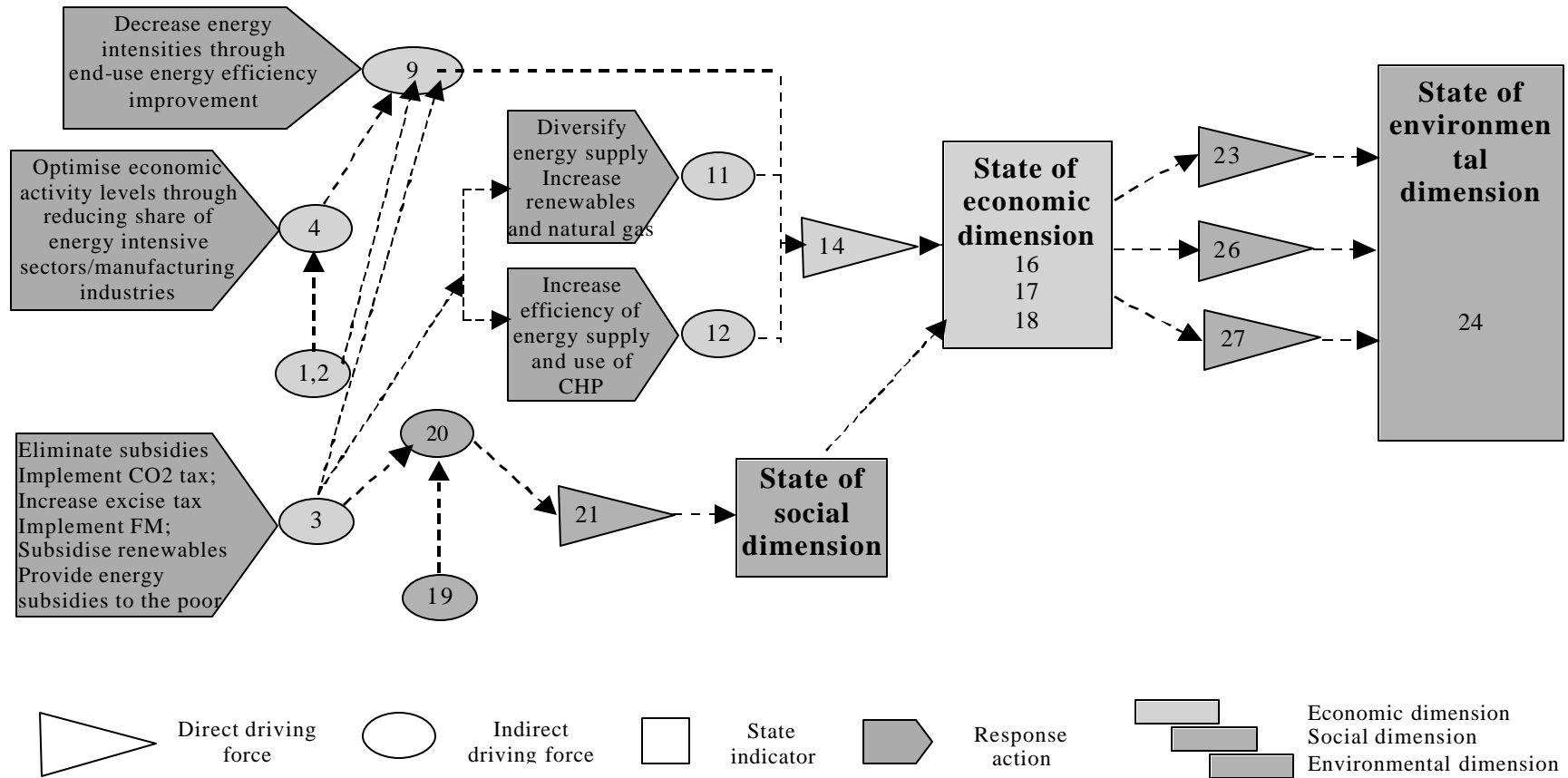
Policies impact on GHG emission reduction in Lithuania, Mt of CO₂e

Policies	2005	2010	2015	2020
Total in energy generation	3.306	3.846	4.279	4.734
Implementation of RES-E directive 2001/77/EC by guaranteed purchase and feed-in prices	0.322	0.302	0.376	0.451
Implementation of White paper on RES strategy by VAT, Excise tax exemptions for biofuels, Feed-in prices	2.77	3.20	3.50	3.80
Implementation of CHP directive 2004/8/EC	0.304	0.344	0.403	0.483
Total in transport	0.52	0.697	0.723	0.8
Implementation of energy efficiency programme	0.442	0.442	0.41	0.41
Implementation of biofuels directive 2003/30/EC by VAT, excise and pollution tax exemptions for biofuels	0.078	0.255	0.313	0.39
Total in industry	0.51	0.48	0.44	0.42
Implementation of energy efficiency programme	0.51	0.48	0.44	0.42
Total in households	0.12	0.12	0.12	0.12
Implementation of energy efficiency programme	0.12	0.12	0.12	0.12
Total impact	4.456	5.143	5.562	6.074

Reduction of atmospheric emissions

- In 1996 the new 1,5 stricter normative values for emissions from steam and water heating boilers were introduced. The new, 7 times stringer standards for large combustion power plants will be implemented since 2008.
- New improved system of pollution charges was adopted on the 13 of April 1999. The increased rates of taxes were applied for SO₂, NO_x, V₂O₅ and Dust. The tariffs are established in order to achieve determined pollution reduction aims.
- Excise taxes for fuels also were continuously being increased seeking to achieve EU level. Since May 2004 excise taxes were harmonised with EU.
- This environmental policy had positive impact on emission reduction. Atmospheric pollution from stationary pollution sources has declined more than 4 times comparing with the year 1990 level though energy consumption decreased twice.

Linkages between indicators and policy actions



Formulation of new policies

- **The structure of economy** : optimise the structure of economy by reducing the share of energy intensive sectors/manufacturing industries in GDP
- **End-use energy intensities**: increase of end-use energy efficiencies by implementing new resource saving technologies etc;
- **Energy prices**: eliminate remaining subsidies, implement green certificates and support for renewables, increase emission taxes, introduce GHG emission trading, implement CO₂ tax in sectors not covered, introduce Flexible mechanisms, improve support system for low-income population
- **Security of energy supply**: diversify energy supply, increase the share of renewables, increase efficiency of energy supply and the share of CHP.

Environmental situation improvements

- GHG mitigation options in electricity and heat sector can be supply or consumer side oriented. Supply side oriented GHG mitigation options in power sector can be: improvement of combustion efficiency and switch to a fuel with lower carbon content. The second option of GHG mitigation option is power system expansion with new cleaner generating technologies.
- Implementation of both consumer and supply side options is influenced by already described energy price policies;
- Implementation of new standards imposed by EU environmental directives will also have a positive impact on atmospheric emission reduction.

Conclusions con't

- In Lithuania TPES/GDP, GHG/GDP are 2 times higher but TPES/capita, GHG/capita are 2 times and GDP per capita more than 3 times lower than in EU;
- High TPES/GDP indicates energy intensive structure of economy;
- With increase of GDP/capita energy intensity is decreasing.
- On average, a 1% decrease in the *per capita* income gap between developed and transition economies leads to a decrease in the energy intensity growth rate of a transition country by 0.7%.
- Analysis showed that, over the period to 2020, energy intensities of Lithuania and most new EU member states will converge to EU levels.

Conclusions con't

- The primary decoupling has started from the beginning of transition process when use of energy resources decreased more rapidly than GDP;
- The secondary decoupling than pollution decreased much rapidly than energy consumption has started since 1999
- Restructuring of Lithuanian economy: shift from energy and resource intensive industries to less intensive branches of economy stipulated by liberalization of energy prices and removal of cross-subsidies;
- Reduction of end-use energy intensities was achieved by implementation of measures foreseen in Energy efficiency programme stipulated by energy price increase (since 1997 all energy prices covers long-run marginal energy supply costs).
- Emission reduction were stipulated by implementation of new pollution tax system and harmonization of environmental policy with EU policy.

Conclusions con't

- Positive trends in terms of SD can be noticed in Lithuanian energy sector. Although some issues in comp with EU-15 situation (energy intensity, energy efficiency, RES utilisation and energy affordability) requires attention.
- New policies to address these problems should be implemented (new support schemes for low income population to increase energy affordability, new measures to enhance renewable energy sources utilisation, reduction of energy transformation losses in the system, local and international climate change mitigation measures).
- Though energy statistics capability was adequate to conduct energy policy analysis some information on environmental issues related to energy sector is lacking (wastewater discharges, land area taken by energy facilities, intensity of use of forest resources etc.).