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Development/improvement of an energy statistics reporting system and user-friendly tools

Kiev, 7-9 October 2014

BUILDING PARTNERSHIPS FOR ENERGY SECURITY

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Outline



- Demands to a modern energy statistics
- Data collection
- Data, compilation and methods
- The transformation sector
- Final energy consumption – In general
- Final energy consumption – Households
- Energy efficiency indicators
- Publication and dissemination of energy statistics
- Recommendations

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Demands to a modern energy statistics



Demands to a modern statistics system



- In accordance with national and international standards and regulations
- Match between organisation and responsibility
- One national energy statistics – and data sharing
- Well functioning national and international networks
- Good co-operation with reporting companies
- Consistent and coherent – no redundant information
- Contain the data needed for monitoring national energy policies and for international reporting
- High degree of flexibility
- Timeliness
- Monthly and annual statistics at the web





Key figures and energy efficiency indicators should be an integrated part of the energy statistics



Pure energy statistics cannot stand alone

Important supplements:

- Climate adjusted statistics to reveal the trends
- Key figures
- Factors and human activity behind the energy consumption
- Energy efficiency indicators
- International comparisons / Benchmarking
- CO₂ emissions



Data collection



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Available methodologies applied applied in the process of collecting, elaborating and processing energy statistics data: Draft Plan for 2013 (Ukrainian ESAP 3.4)

The draft Plan of the State Statistics Observation for 2013 envisages the following actions for the compilation of monthly and annual energy statistics:

- Statistics on production of industrial products by type
- Statistics on production of electricity, heat, gas and energy capacities
- Statistics on consumption of fuel, heat and electricity
- Statistics on imports and exports
- Energy balance of Ukraine



Annual energy statistics



Questionnaires, reporting instructions and links

- **Eurostat: Questionnaires and instruction**
<http://epp.eurostat.ec.europa.eu/portal/page/portal/energy/questionnaires>
- **IEA: Annual questionnaires 2013 and documentations**
<http://www.iea.org/statistics/resources/questionnaires/annual/>
- **IEA: Manual on energy and several topics**
<http://www.iea.org/statistics/>
- **IEA: Glossary - Balance definitions**
<http://www.iea.org/statistics/resources/balancedefinitions/>
- **IEA: InterEnerStat (international energy stat. Cooperation: Definition on flows and products)**
http://www.iea.org/interenerstat_v2/index.asp



Data, compilation and methods



Topics for particular attention



- Climate adjustment needed – Important to define a meaningful reference year
- CHP at autoproducers: Split between transformation sector and final energy
- Good statistics on biomass, especially firewood
- Other renewable sources. Small now but high politically attention (**Many sources and complex organisation**)
- Waste: Renewable and non renewable
- The split between energy consumption in the service sector and in households
- Quality checks: Time series and indicators are helpful
- Revisions are inevitable

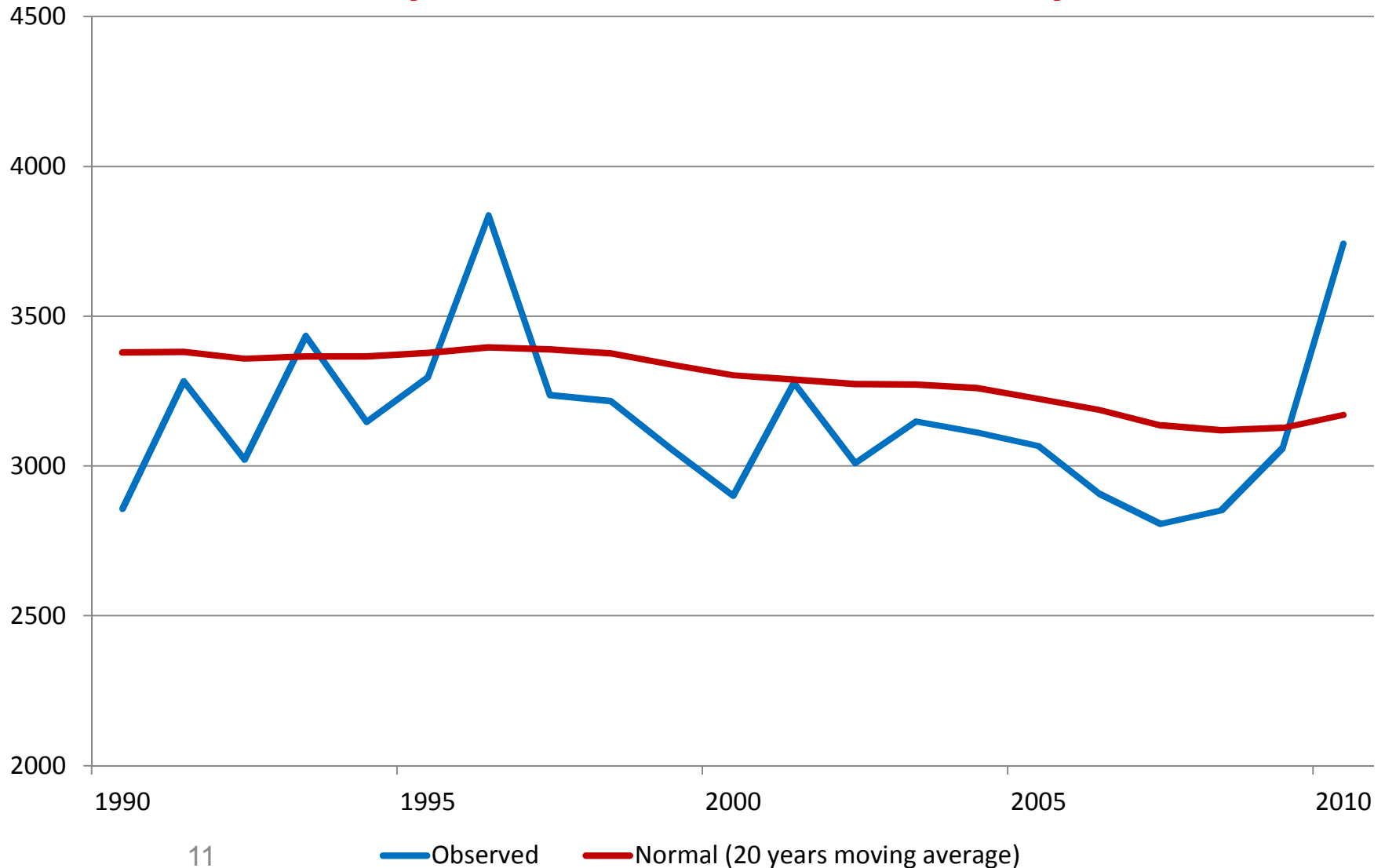


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Climate adjustment is needed

Degree days in Denmark

1990 very warm – 1996 and 2010 very cold



The climate adjustment factor used (DEA)

The climatic adjusted energy consumption for a year (B_n) is calculated as the product of the observed consumption in the the year (B) multiplied by a degree day factor (F_g), using the formula:

$$B_n = B \cdot F_g$$

where

$$F_g = 1/[1 - r \cdot a \cdot (1 - G/G_n)]$$

The adjustment factor depends on the four parameters:

- r** the share of fuel consumption used for heating purposes
- a** the share of heating which depends on degree days
- G** the number of degree days
- G_n** the number of degree days in the chosen reference year



If the energy statistics are to be reliable revisions are needed



- Revised national account statistics (ISIC-NACE)
- Changes in calorific values etc.
- Improved statistics on renewable energy
- Re-consideration of the transformation sector
- Change in definitions of final energy consumption
- Re-estimation of components in final energy consumption
- Introduction of new surveys

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Improvement of productivity

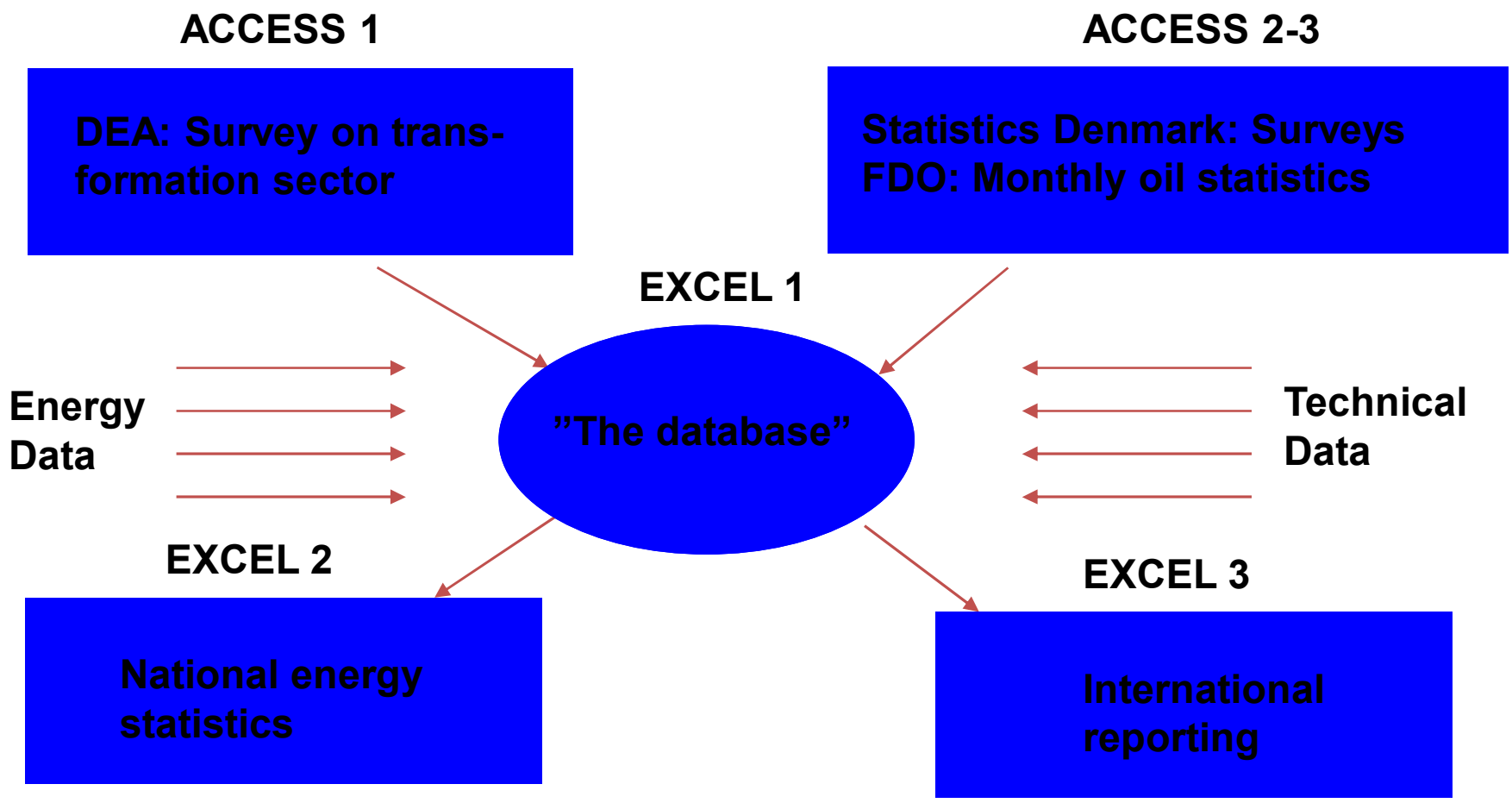


- The software used should not be too advanced
- Intensive use of internal and external networks
- Analytical skill and uses of modelling
- Estimation used when necessary
- Small errors/differences must not steal your time
- Quality control to avoid critical errors (Helpful to organize data and statistics in time series)
- Simultaneous national statistics and international reporting

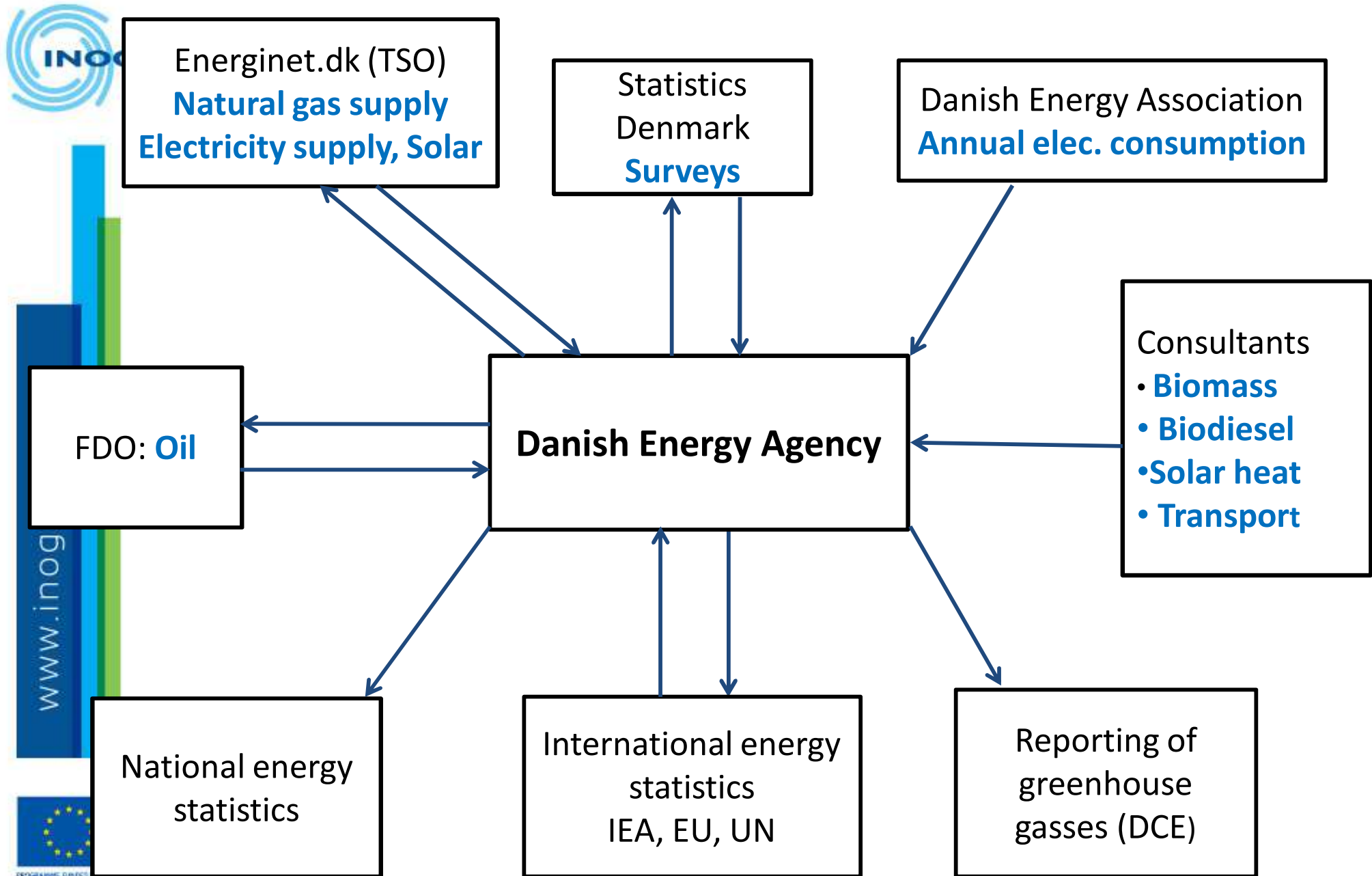


The Danish energy statistics system

All data arranged in time series (useful for quality control)



Organisation of the Danish energy statistics



Organisation and sources of the Danish energy statistics on renewables



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Energinet.dk
Wind, Solar

Energinet.dk
Hydro

Statistics Denmark
Renewables in industry
Foreign trade statistics

FDO(Oil companies)
Biofuels

DEA: Statistics on renewables

Consultants
• Biomass
• Solar heat
• Biodiesel

DEA
Geothermal
Biogas

DEA
Electricity and heat survey
Biomass, biogas, waste etc.

DEA
Register of wind turbines

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Manpower resources for the Danish energy statistics in 2013



	Man-years
Danish Energy Agency (DEA)	
The energy statistics team	4.5
Specialists in DEA	0.5
External consultants	0.5
The Danish Central Oil Stockholding Entity (FDO)	2
Statistics Denmark	1
Danish Energy association	1
Energinet.dk (TSO)	1
Danish Competition Council (prices)	0.5
Total	11



The transformation sector



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Challenges in the transformation sector



- Need for a new questionnaire?
- CHP: Fuel split between electricity and heat
- CHP: How to treat autoproducers
- Renewable energy, incl. wind, solar etc.
- Introduction of new key figures

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Electricity and heat questionnaire (DEA)

Survey of EI and DH-producing unit for the year 2000 30. Januar 2001

Plant-Data (applies for all units on the plant)		Internal code: [2-1-3]	
Plant-name	Assels Fjernvarme	Number of units at the plant	3
Address	Støjbjergvej 4	Company no.	
Zip	5610 Assels	CVR-nr	61-87-72-15
Municipality	421 Assels Kommune	PHR	_____?

Unit-Data			
Unit name	Blok 1	Unit established date	(1) 01.02.84
Type of unit	Fedel	El-capacity	MW
Heat capacity	18,9 MW/s		
Only operated as a backup-unit [] Yes [] No			

Fuel-consumption on the unit 2000					
Fuel type	Consumption	Unit		Calorific value	
		Standard	Other unit	Standard	Actual
Coal	_____	GJ	[]	25,0	_____ GJ/ton
Gas-oil	_____	m ³	[]	42,7	_____ GJ/ton
Fuel-oil	_____	GJ	[]	40,7	_____ GJ/ton
Waste-oil	_____	GJ	[]	41,9	_____ GJ/ton
Natural gas	_____	Mm ³	[]		_____ GJ/1000 Mm ³
Bio-gas	_____	m ³	[]	24,0	_____ GJ/1000m ³
Straw	_____	GJ	[]	14,5	_____ GJ/ton
Wood-chips	_____	GJ	[]	9,3	_____ GJ/ton
Wood-pellets	_____	GJ	[]	17,5	_____ GJ/ton
Wood-waste	_____	GJ	[]	14,7	_____ GJ/ton
Municipal waste	_____	GJ	[]	10,4	_____ GJ/ton
Other	_____	GJ	[]		_____ GJ/ton
Unit-receiving heat from other plant/company (please write amount): _____ TJ					
Name of company _____					

Energy production on the unit 2000				
Type of energy	Production	Standard	Other	Unit
Heat production ⁽²⁾	_____	TJ	[]	Alternative units
delivered to net	_____	TJ	[]	-> MWh, GJ, Gcal
Electricity product.	_____	MWh	[]	-> MWh, GJ, Gcal
				-> GWh, kWh, GJ

Unit data reported in 1999					
Unit fuel-consumption 1999		Unit energy-production 1999		Efficiency 1999	
Wood waste	30 822 GJ	Heat-production	GJ	El-production	MWh
Wood-pile	59 143 GJ	- delivered to net:	GJ	- delivered to net	MWh
					95 %

Company	3	Assels Fjernvarme A.m.b.a.	Phone.	6471 1024
Contact person	Johannes Jesen		(Signature)	

Comments to be stated on the backpage (1),(2),(3) ref. guidelines backpage

INGATE
Name etc.


Fuel consumption, calorific values etc.

Unit data from previous year

Unit data

Energy production

Signature



Annual survey on electricity and heat production (DEA)

- Comprehensive survey covering all thermal electricity and heat delivered to a public net
- Production as well as fuel consumption
- Electricity and heat capacities
- Supplemented by statistics on wind power, hydro power, solar and geothermal energy



Eurostat / IEA requirements for statistics in the transformation sector



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	Electricity only	CHP	Heat only
Public Production			
Autoproducer		The subject here	



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CHP by autoproducers: An example



Fuel use: 100 TJ natural gas in a CHP-producing industry company

Production: 40 TJ electricity
40 TJ heat, of which 20 TJ is sold for district heating

Loss: 20 TJ

Proportionally fuel split (Eurostat/IEA):

Natural gas used for electricity production: 50 TJ

Natural gas used for heat production: 50 TJ

Used for district heat production: 25 TJ

Used in the company: 25 TJ (final consumption)

200% heat-efficiency (DEA):

Natural gas used for electricity production: 80 TJ

Natural gas used for heat production: 20 TJ

Used for district heat production: 10 TJ

Used in the company: 10 TJ (final consumption)

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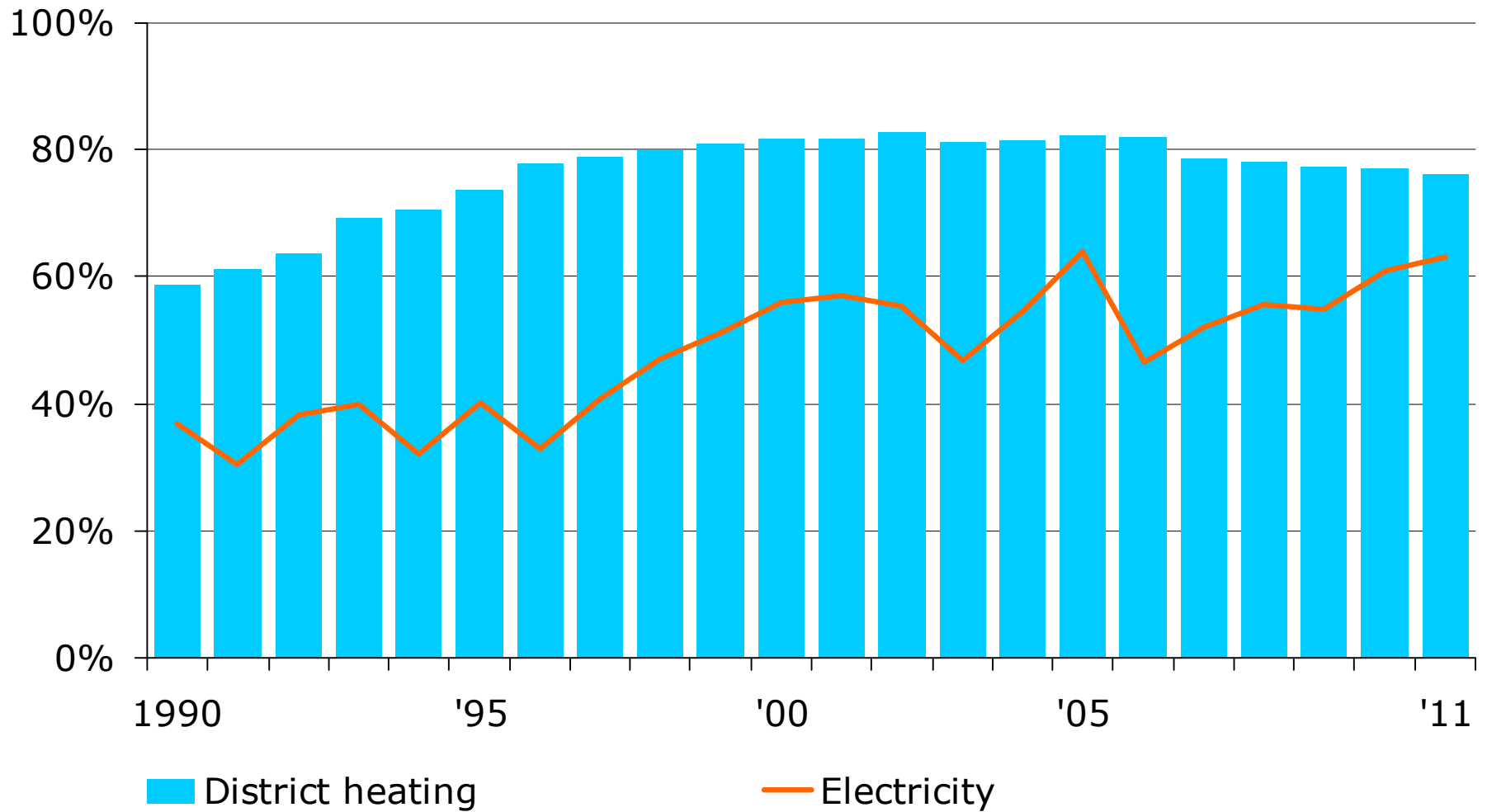
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Conclusion on autoproducers' CHP

- The assumption how to treat fuel consumption in CHP units may differ from country to country
- Regarding autoproducers: Eurostat and IEA has no knowledge about the split between the transformation sector and final energy consumption
- The Danish assumption means more fuel consumption in the transformation sector and less fuel consumption in final energy (which has an effect on energy efficiency in final energy)

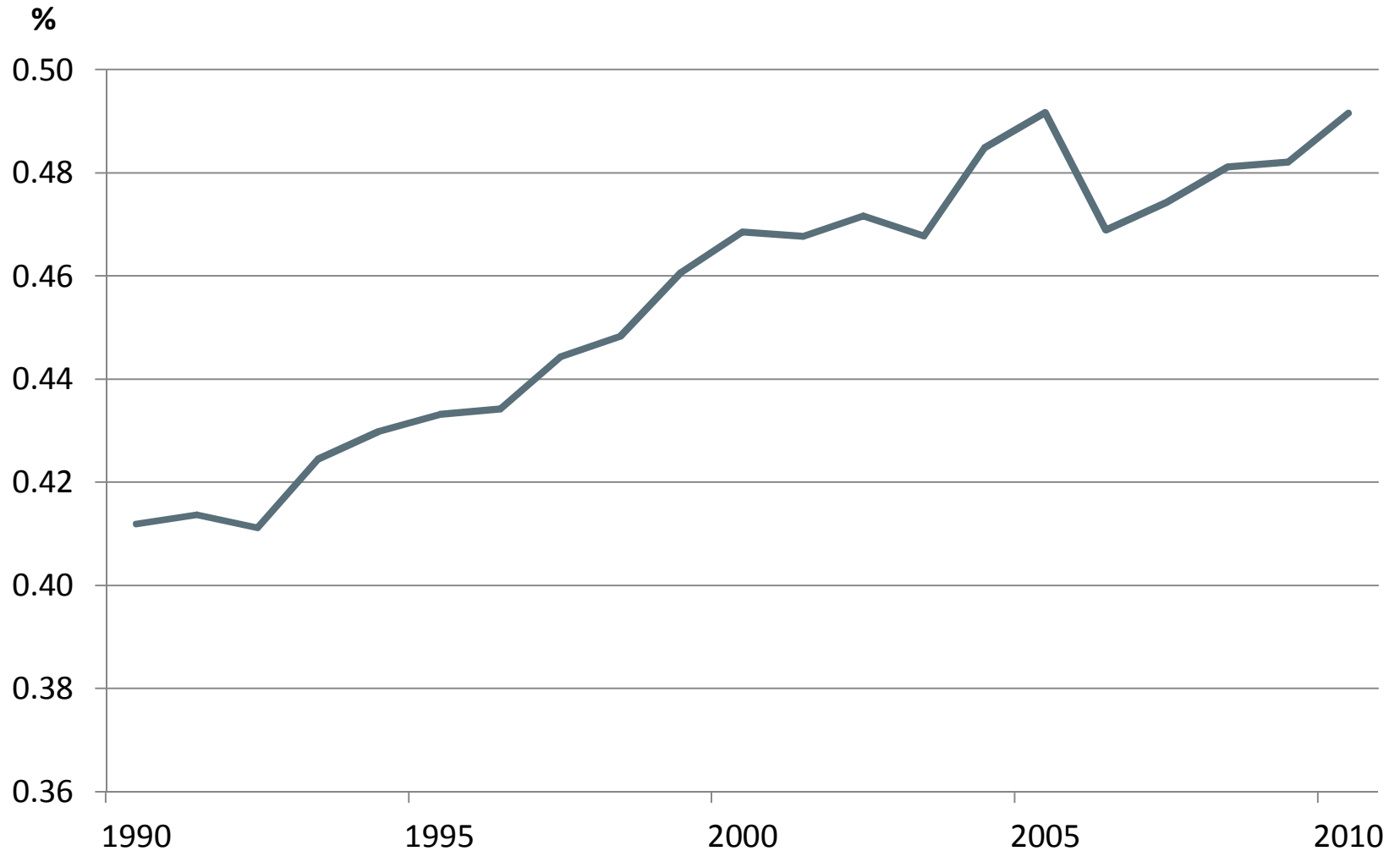
New key figures

CHP share of thermal power and district heating production in Denmark



Efficiency in gross electricity production (DK)

First CHP and later wind turbines



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Final energy consumption In general





Challenges in final energy consumption

- Wood consumption (especially in household) can be difficult to measure
- Households and trade and services have to be split properly
- More detailed data needed for energy efficiency indicators
- EU-decision: More detailed data in households
- Need for new questionnaires?
- Introduction of new key figures (e.g. shares of renewable)

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New surveys are needed



- To address the challenges new surveys have to be added
- A comprehensive survey on energy consumption in household could be very useful (high priority in more Partner Countries) but
- Comprehensive surveys are very costly and can only be prepared every 3 to 5 years
- Transport: More data are needed – but a new survey?
- For firewood consumption in households two other possibilities exist:
 - Inserting a question in an existing questionnaire (e.g. as in Belarus, *the Living Standard Measurement Survey*)
 - A separate survey on firewood

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An alternative approach



To meet the challenges an alternative approach can be considered:

Electricity and natural gas supply companies can be given an obligation to deliver annual consumption data for all companies according to the NACE code

This approach will provide very disaggregated data on an annual basis

There will be starting costs - in money terms and data treatment – but subsequent it will be cheaper and easier

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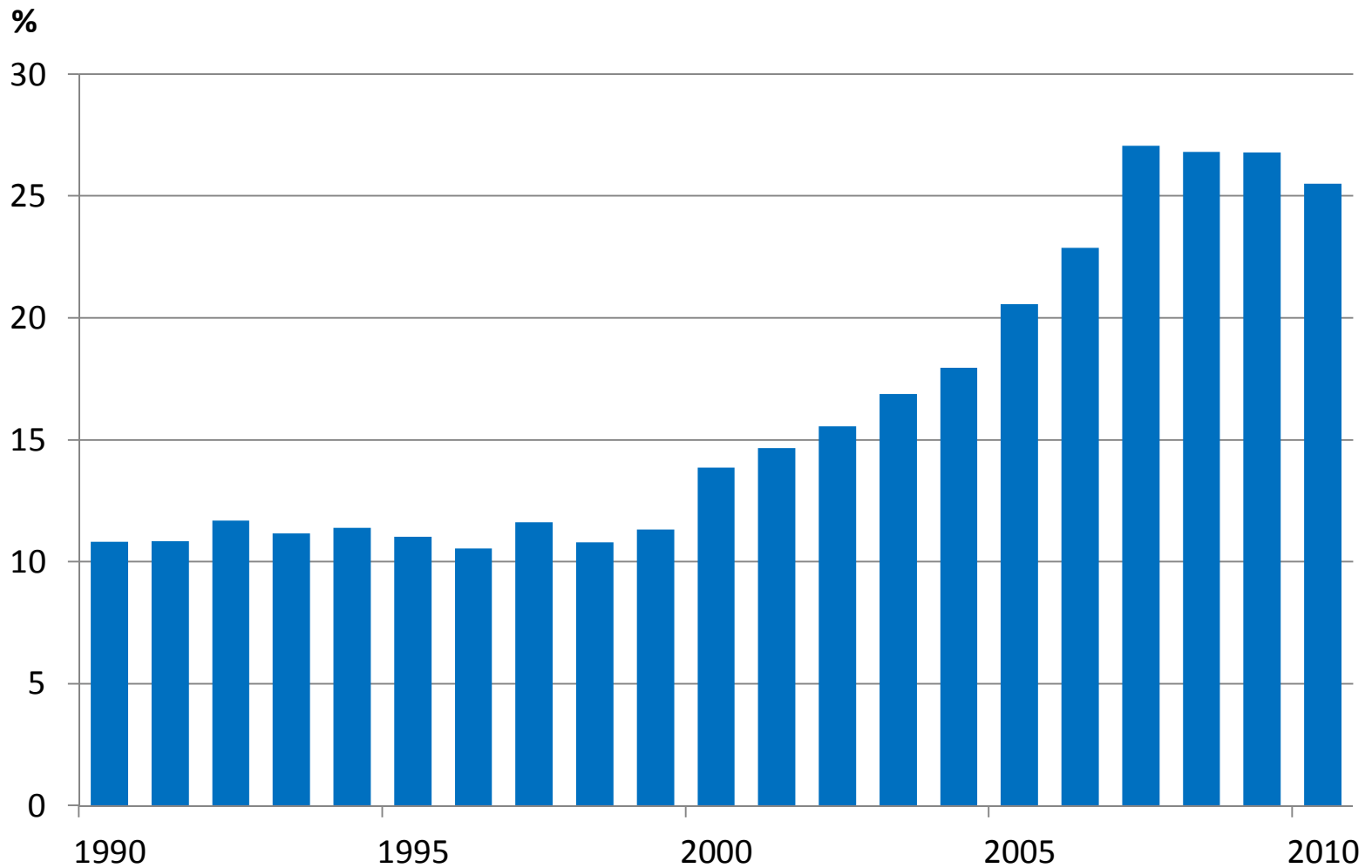
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Final energy consumption Households



Energy consumption in households for space heating: Share of renewables in DK

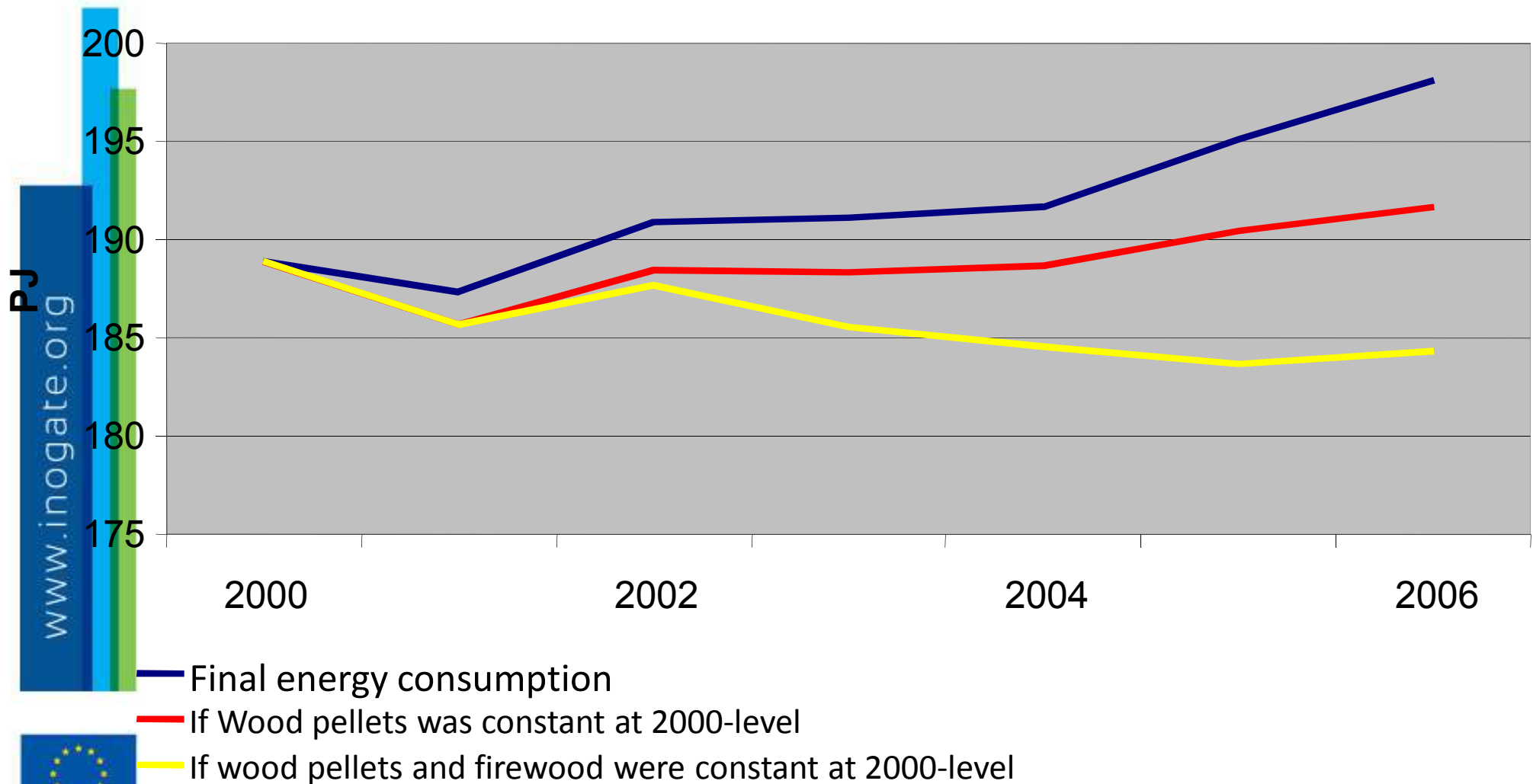


Energy consumption in households

Good statistics on wood consumption is very important



Climate adjusted



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Consumption of wood in households

Impact on total consumption and efficiency



- The energy statistics will give a false picture of the development of energy consumption - **and energy efficiency** - if wood pellets and firewood are not treated correctly. This is especially important for households.
- Without surveys on wood pellets and firewood the Danish consumption of biomass in households had been seriously underestimated.
- The energy consumption in households has increased 2000-2008. Instead of reductions in the energy consumption we have seen fuel shifts.
- A shift towards wood has a negative impact on the unit consumption in households.



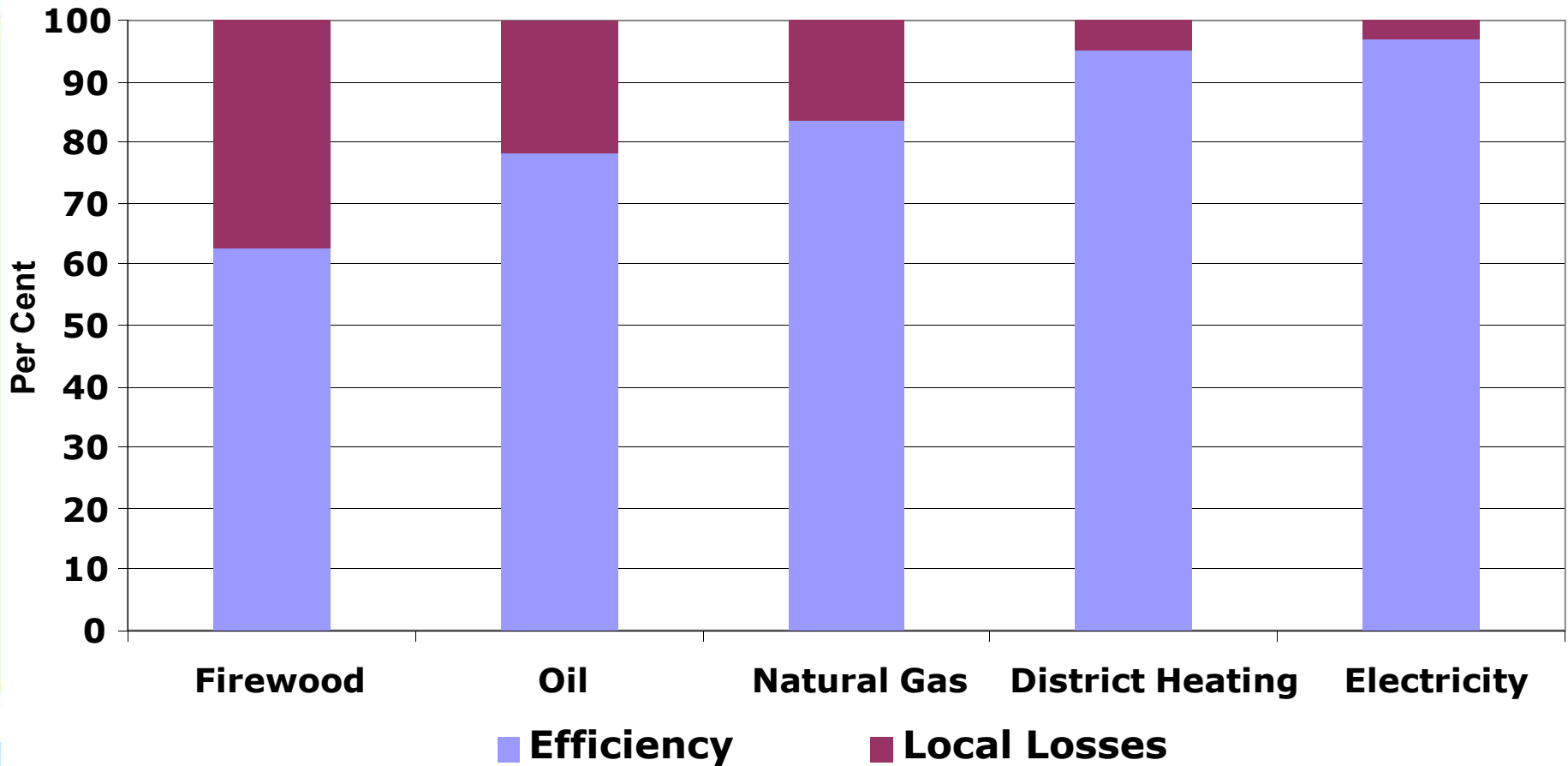


Efficiency of heating devices in households



Shifts from oil to district heating means lower final energy consumption

Shifts from natural gas to firewood means higher final energy consumption



Decision in Eurostat: Disaggregated reporting of energy consumption in households



Energy consumption in households by end use for main fuels:

- Space heating
- Space cooling
- Water heating
- Cooking
- Electricity only: other electrical appliances

This need was laid down in EC Regulation no. 1099/2008

To support member countries: Establishment of MESH



Manual for energy consumption in households “the MESH project” initiated by Eurostat

The project was launched on January 2012 and finished end of 2013 - main result is the manual:
“Manual for statistics on energy consumption in households”

http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-GQ-13-003/EN/KS-GQ-13-003-EN.PDF

Objectives:

- Definitions
- Description of methods
- Practical examples of methods
- Country case studies
- Other issues



Energy efficiency indicators: Need for more data





Energy efficiency indicators:

More detailed energy statistics is needed



Only a few examples:

- For households energy consumption for **space heating, space cooling, water heating, cooking and appliances** has to be separated
- Introduction of **net energy consumption** in household
- Statistics for households on **electrical appliances** equipment and specific consumption
- Energy consumption to transport has to be split between **passenger transport and freight transport** and **by cars and trucks**
- **Market diffusion:** Data on the diffusion of energy efficiency technologies and practices (Odyssee)

Energy efficiency indicators: Odyssee

Get inspired: Important information on political use of energy statistics and indicators in member countries

Odyssee home page

- <http://www.odyssee-indicators.org/>

National reports, 2012

- http://www.odyssee-indicators.org/publications/national_reports.php

Country profiles, 2012

- http://www.odyssee-indicators.org/publications/country_profiles.php



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Publication and dissemination of energy statistics



Topics of special attention



- Policy for publication and dissemination of energy statistics
- Key figures and energy efficiency indicators should be an integrated part of the energy statistics
- Energy statistics has to be politically useful
- Mass media and the public are interested in political oriented statistics
- Monthly and annual statistics at the web
- Links to IEA and other <http://www.iea.org/countries/non-membercountries/ukraine/>



Energy statistics has to be politically useful



- Energy is an important sector of the national economy (energy supply, employment etc.)
- Monitoring of energy policies: Self-sufficiency, renewable energy, energy efficiency and emissions
- Financial aspects in the annual international reporting because of UN commitments (CO₂)
- Inclusion of energy statistics in political and economic reports
- Mass media and the public are interested in political oriented statistics

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DK: Press release 24 September, 2012



Renewables now cover more than 40% of electricity consumption

Large decrease in observed energy consumption and in greenhouse gas emissions in 2011, and consumption of renewable energy continues to grow.

The February 2008 energy agreement included the goal that renewable energy was to cover at least 20% of adjusted gross energy consumption by 2011. This goal was met in that the percentage of renewable energy was actually 21.8% in 2011.

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Do we use too many units in energy statistics?



- **It is not easy to have a good general view of energy statistics. The diversity of units used do not make it easier**
- Eurostat: Joule >< IEA: toe
- Electricity statistics: GWh
- Oil production: m³ >< metric tons >< barrel/day

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Recommendations



Recommendations (1)

- The statistics should be in accordance with national and international standards and regulations ... and contain the data needed for monitoring national energy policies and international reporting
- System design: Use a rather simple model for data collection and preparing of the energy balance.
- Highest priority: Final energy consumption by sectors - improvements and organisation and of surveys
- Review of the present set of questionnaires and – if needed - addition of new questionnaires
- More disaggregated statistics on final energy consumption in households needed, cf. EU decision.



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Recommendations (2)

- Consider alternative approaches to surveys:

Electricity and natural gas supply companies can be given an obligation to deliver annual consumption data for all companies according to the NACE code.

Enhancement of analytical skill and more/better uses of modelling

- Improved statistics for renewable energy, especially wood
- Need for climate adjusted time series
- More detailed data needed for energy efficiency indicators (both for the nominator and the denominator)
- Revisions to the energy statistics is inevitable



Recommendations (3)

- Formulation of a policy for publication and dissemination of energy statistics
- Key figures and energy efficiency indicators should be an integrated part of the energy statistics
- Energy statistics has to be politically useful
- Mass media and the public are interested in political oriented statistics
- Monthly and annual statistics at the web



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Thank you for attention!

Peter Dal

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**INOGATE Technical Secretariat and Integrated Programme
in support of the Baku Initiative and the Eastern
Partnership energy objectives**

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