Key Messages

This publication aims at evaluating trends in energy efficiency and discussing the pattern and the impact of policy measures in the New EU Member Countries (NMC) and the EU-27. To do so, it relies on the following two tools:

- ✓ The **ODYSSEE** database on energy efficiency indicators (www.odyssee-indicators.org), which has since become a reference for the evaluation and monitoring of annual energy efficiency performances and energy-related CO_2 emissions for the EU as a whole, and for all member countries and Norway[1].

- ✓ The **MURE** tool (www.mure2.com), which combines a database on important energy efficiency measures implemented in the EU-15 countries and at the EU level with a simulation tool to evaluate the impact of RUE measures.

Both tools have been used by the Commission to prepare Directives (MURE for example provided important input to the Directive on the energy performance of buildings) and the Energy Efficiency Action Plan or are expected to contribute to the monitoring of recent Directives such as the Energy Service Directive.

Trends in energy efficiency in the New EU Member Countries (NMC) and the EU-25

Overall trends

- The energy efficiency of final consumers improved by 14 % on average in the EU-25 between 1990 and 2004. This resulted in energy savings of about 150 Mtoe in 2004.

- Over the period 1998-2004, the rate of energy efficiency improvement (or rate of energy savings) is around or above 2 %/year in six new EU countries. In 3 other countries and as in the EU-25, it is below 1%/year, which corresponds to the annual target of ESD target for many countries; however, the definitions of energy savings are not directly comparable.

- In most countries the greatest achievements come from the industry sector.

- The rapid economic growth in EU new members was possible with almost no growth in energy consumption, which shows a total decoupling between energy use and GDP.

[1] This methodology has already been presented in a previous book entitled "Energy efficiency indicators: the European experience".

- Primary intensities measured at purchasing power parities are on average 50% higher in EU-10 countries than in the EU -25.

- After correction for national characteristics (in terms of climate, industrial and economic specialisation and primary fuel mix) and adjustment to the EU -25 situation, the difference in intensities drops to 25%.

- CO_2 emissions in the EU-25 are in 2004 5 % below their 1990 level: they have increased almost six times less rapidly than the GDP. Slightly less than half of this reduction (42%) is due to fuel substitutes with lower emission factors.

Industry

- Energy efficiency in the manufacturing industry improved on average by 5 % per year in new EU countries since 1998. As a result, energy efficiency improvements were large in the EU-25 (20 % between 1990 and 2004), than in EU-15 countries (12%).

- The energy productivity of manufacturing industry increased by 8%/year on average over the period 1996-2004 for the EU-10 as a whole. This improvement was even greater in five countries (Lithuania, Hungary, Bulgaria, Poland and Estonia). In general, the energy productivity progress slowed down after 2000 (twice slower on average for EU-10).

- Structural changes in industry only made a minor contribution towards the reduction in the energy intensity of industry on average in EU-10 countries. In some countries, however, a shift towards less energy-intensive branches contributed greatly to decreasing the energy intensity of manufacturing (especially in Hungary, Cyprus, Latvia, Poland, Estonia and the Czech Republic).

- Comparing the energy intensity of manufacturing industry within the EU-25 is more relevant if intensities are measured at purchasing power parities and adjusted to the EU-25 average value added structure; the range between the 2 extremes is reduced from a factor of 5.5 to a factor of 2.

- CO_2 emissions of EU-25 were 15 % below their 1990 level in 2004 despite a 23 % growth in industrial production over the period because of large CO_2 savings. Energy intensity reduction accounted for most of the total savings (72 %).

Transport

- The transport sector demand has grown very rapidly in all new EU member countries, in particular in comparison to EU-15 countries. One factor behind

this rapid growth is the modal shift to road transport both for passenger and goods.

- The transport sector was 12 % more energy efficient in 2004 than in 1990 in the EU-25. Most of the gains come from cars. There has been no efficiency improvement for road freight transport since 2001, a mode with a very rapid growth in energy consumption.

- Data limitations do not allow to monitor energy efficiency trends for cars in New Member Countries.

- The transport sector is the only sector where CO_2 emissions continue to increase: emissions in 2004 were 25 % above their 1990 level in this sector in the EU-25.

Households

- Between 1996 and 2004, the energy efficiency progress in households was assessed as 0.4 %/year in the EU-25 (3.4 % over the period). This is partly the result of the policy measures implemented (EU directives and national measures such as building standards and financial incentives), which have raised the energy performance of new buildings and electrical appliances.

- Large dispersion in the electricity consumption per household in New Member Countries: a factor 3 between the countries with the lowest level (Latvia and Lithuania) and countries with the highest profile. The average consumption in New Member Countries is still 40% lower than in the EU-25 average.

- Electricity use per household is following very different trends. There is as very rapid progression in Baltic and Mediterranean New Member Countries due to a catching up in equipment ownership in Baltic countries and the rapid diffusion of air conditioning in Mediterranean countries. In some countries, there is an absolute reduction. For the EU-25 average, the progression is below 1%/year.

- Between 1996 and 2004, CO_2 emissions of households were reduced by 8% in the EU-25: most of these CO_2 savings (about ¾) were due to fuel switching.

- The data available by end-use are still limited and do not permit a good assessment of energy efficiency trends by end-use.

Services

- Since 2001, the energy consumption increases as the valued added in the EU-25, whereas its progression was much slower before. The energy consumption per employee follows a similar trend: it increases since 2000, although it decreased before.

- Electricity intensity in the service sector is increasing since 2000 in the EU-25, after an average decrease of 0.7%/year from 1996 to 2000. In several New Member Countries and in the EU-10, a reverse trend is taking place, with an electricity consumption growth slower that the valued added: this reflects a decoupling between the electricity consumption and the valued added.

- Direct emissions are 8 % below their 1996 level despite a 31 % increase in the economic activity: CO_2 savings have completely offset the effect of economic growth. About 40% of these savings are coming from an increasing use of electricity and fuel switches to gas.

- The data situation is still fairly poor in the service sector, in particular concerning floor area and detailed data by sub sectors: they will have to be improved because of the expected energy demand growth in this sector.

Energy efficiency policies and impacts

Patterns and dynamics of energy efficiency measures in NMCs as compared to EU-15

- EU related measures have a stronger importance in the NMCs in the national measure mix of the NMCs as in the EU-15.

- While the measures of the EU-15 have been built up continuously over the period, most of the measures in the NMCs are originating after 2000 as a consequence of the accession process. However, in all sectors, except for the transport sector, the NMCs have now reached an activity level comparable to the EU-15.

- Quantitative impact evaluations: Roughly only 8-15% of the measures have quantitative evaluations as compared to 25-35% in the EU-15. To better appreciate this gap it is important to keep in mind the very recent measure dynamics in the NMCs (see below). But this fact makes monitoring in the frame of the Energy Service Directive (ESD) more difficult (in particular also for the evaluation of Early Action).

- Semi-quantitative impact evaluations: The share of measures with unknown impacts is typically 30 to nearly 50% in the NMCs. Only the industrial sector is characterized by a larger number of high impact measures. Especially in transport lower impact measures or measures with unknown impact (which is often also a sign of low impacts) are prevailing even more than in the EU-15. Based on the semiquantitative methodology used here, this implies that it will be more difficult for the NMCs to achieve their target under the ESD.

- Consistent packages of measures are still lacking in the NMCs, although similar combinations can be observed as in the EU-15 such as energy audits and subsidies for buildings or industrial energy saving measures.

- The following points are the main observations by sector with respect to differences in measure types:
    - *Residential:* Similar to the EU15 legislative/normative, legislative/informative and financial measures prevailing. Stronger importance of legislative measures (due to stronger role of EU legislation). No cooperative measures for the sector.
    - *Transport:* Legislative normative measures more important (due in particular to late introduction of technical inspection schemes). Financial measures comparatively more important (clean cars). Absence of cooperative measures.
    - *Industry:* Comparatively stronger accent on new market-based instruments. Absence of cooperative measures. More importance of information/education/training measures.

- *Tertiary:* Similar to the EU15 legislative/normative, financial measures and information/education/training prevailing. Absence of cooperative measures.
- *Cross-cutting:* New instruments such as Tradable White Certificate schemes for energy efficiency are currently not experimented in the NMC.

Industry

- There are large variations in industrial measure types by country in the New Member States but cooperative measures are largely absent (due to both differences in the approach to energy in the former centrally planned economies and due to fact that cooperative instruments have shown their limits in a variety of configurations). In addition, new measures such as the emission trading scheme have further weakened the importance of cooperative measures.

- New market-based instruments such as emission trading are increasingly also complementing the measure "tool box" in NMCs like in the EU-15 countries. They constitute the strongest link between national measures and EU-policy for energy efficiency in the industrial sector, although the impact on energy efficiency was limited in the first phase of the emission trading scheme.

- This is why in some NMCs mandatory audits up to the introduction of mandatory standards (especially for industrial cross-cutting technologies such as electric motors, compressed air systems etc.) are investigated.

- Other innovative measures next to mandatory audits and the emission trading scheme are the inclusion of energy efficiency criteria in environmental permits, the use of EU Structural Funds to steer environmental and energy-related issues, energy efficiency funds and Energy Service Companies ESCOs.

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Households

- There was an important dynamics in recent years in the NMCs with the update of the building regulations. A variety of them have achieved standards which are 4-5 times lower than in the eighties as shown by the example of Lithuania.

- Nevertheless, this process has not yet been fully used to introduce tight regulations for new buildings (and larger additions to existing buildings). This could be an issue for consideration in further revisions of the legislation in order to take benefit from the substantial improvements which are still possible with buildings.

- Measures for existing buildings, which generally represent 95% of energy consumption for heating, are still largely absent in the mix of high-impact measures, although a variety of subsidy programmes do exist in the NMCs for the energetic improvement of these buildings.

- Interesting innovative measures in the residential sector concern building tax exemptions, the limitation of internal temperatures for rooms (which might indicate the revival of policies dealing with behavioural aspects under the combined pressure of high energy prices and climate change impacts.

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