



**Sustainable Energy Watch
2005/2006**

Energy and Sustainable Development in the European Union



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Summary of Report

When looking at the policies and measures that have been developed to promote sustainable energy use, results show that the EU still has a long way to go. While there are plenty of action plans and directives that set the way forward they lack the legally binding targets or commitments, primarily because member states want to keep control over their national energy policies. However with the sharp increase in oil and gas prices and with the distribution difficulties in Russia and Ukraine, discussions on an EU-wide energy policy have re-emerged.

Preface

This report looks at the European Union's energy policy by analysing the initiatives and the legislative work done by the EU institutions (Commission, Council, Parliament, etc.) in the field of energy.

A repeating element that runs through much of the EU energy policy discussion is the lack of competence: the EU and its institutions can only play a coordinating role as the competence and authority in this field remains at the member state level.

Only five out of the eight SEW indicators could be calculated as much of the data are not available at the European level.

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Executive Summary

When looking at the policies and measures set up over the past years to ensure a sustainable energy use in the European Union (EU) results show that there is still a long way to go. The main problem is the limited competence of EU institutions in this field. While there are plenty of action plans and directives that set the way forward they lack the legally binding targets or commitments. Member states maintain that the issue of targets and commitments is too sensitive for Brussels (the seat of the EU) to coordinate and lead on. Instead member states want to keep control over their national energy policies. Still, with the recent troubles in the energy market that has led to the soaring of high oil and gas prices and with the distribution difficulties in Russia and Ukraine, discussions on an EU wide energy policy have re-emerged.

Overall there is some progress and the situation hasn't worsened, but action needs to be stepped up. The EU is not delivering on sustainable energy use as it is supposed to, especially within the context of the Lisbon objectives which aim to make the EU to the most competitive region in the world.

Table 1: Indicators of Energy Sustainability for the European Union (EU 15)

Indicator	1990		2002 – 2003		% change	
	Metric	Vector	Metric	Vector	Metric	Vector
1. Carbon emissions (kg C per capita)	2345	2.536	2294	2.471	- 2.18	- 2.56
2. Local pollutants: PM (kg per capita)	69	1	40	0.531	- 27.54	- 46.9
3. Energy spending	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
4. Clean energy investment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
5. Resilience: Energy trade (% imports)	50.5 %	0.505	55.9 %	0.559	+ 5.4	+ 10.69
6. Government investment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
7. Energy productivity (MJ/€ GDP PPP)	10.06	0.939	6.63	0.581	- 34.09	- 38.13
8. Renewable energy (% of total energy production)	3.3 %	1.062	4.6 %	1.047	+ 1.3	- 1.41

Policy Overview

Introduction

This report discusses energy discussions, evolutions and developments at the European Union (EU) level. The central question of this work is whether the EU is able to provide energy needs in a sustainable way.

The EU Commission launched the Lisbon agenda with the aim of putting itself in the lead with regards to sustainable development. In principle this process needs to balance economical, environmental and social aspects of development. Currently economical development is being favoured over the other two aspects of sustainable development.

Regarding EU energy policy, it is important to realise that the success or failure of a policy is dependent on member state commitment and competency: each member state is individually responsible for its energy policy. The EU Commission can only provide guidance or move on issue where there is a clear consensus. In the discussion on EU energy legislation this is apparent by the number of voluntary targets that are used for renewable energy, energy efficiency etc.

The energy discussion is of course strongly linked to an environmental discourse. Where the EU has committed itself firmly to reducing the impacts of climate change it also means the EU will need to cut its greenhouse gas emissions – CO₂ being the most important one. It has to look to strategies to deliver on this while not losing its global economic position.

Some elements are constantly present: security of supply, pricing and the associated environmental and health impacts, e.g. where does the energy come from and what broader societal impacts does it have. Together with recent developments, the energy discussion has moved back to the top of the EU agenda.

General Discussion

The EU recently expanded to include ten new member states, moving it from a coalition of 15 countries to one of 25. Like the old members, these new member states are fully accountable to EU legislation and are an integral part of the Union. For this reason, this report looks as much as possible at the EU 25, especially when discussing EU legislative and policy efforts in the field of energy. However when calculating the SEW indicators it was not always possible to find data on EU 25. Where possible both figures for EU 15 and 25 are provided.

Economic Activity

With the introduction of the single currency (Euro, €) and the recent enlargement to 25 member states the EU economy has gone through major changes. Compared to the late nineties and 2000, growth rates have decreased slightly over the past couple of years. With a peak growth of 3.9% in 2000, 2001 only saw a growth of 1.9% and it took until 2004 for growth to rise over 2% (2.4%), representing a GDP of 10.3 trillion €. Forecasts for 2005 are not particularly optimistic (1.5%) but growth is anticipated to increase from 2006 onwards.

The economic growth in 2004 was mainly due to a generally favourable international environment: a growth in exports but also a faster expansion in internal demand, together with a healthy macroeconomic environment, tempered somewhat by rising commodity prices.

The enlargement of the Union by ten new member states also marked an important step in the process of economic integration as the new member states had to be fully integrated in the economic coordination mechanisms within the EU.

After gathering momentum in the first half of 2004, economic activity in the EU25 decelerated in the second half of the year, reflecting in part the impact of the sharp rise in oil prices and the strength of the Euro.

Employment growth in the EU was limited at 0.6% in 2004, slightly higher than the previous year's level of 0.3%, making overall growth for the past three years to be low. As a result the average employment rate for the EU increased by 0.4 of a percentage point to reach a level of 63.3%, an improvement over 2002 and 2003 when total employment rates barely rose. The rise in the total employment rate was again driven by the on-going rise in the employment rate for women (+0.7 of a percentage point on average in the EU). It also reflects the continued strong rise for older people (aged 55-64) for whom the employment rate rose by 0.8 of a percentage point. Unemployment remained unchanged compared to 2003, although the long-term unemployment rate increased slightly from 4.0% in 2003 to 4.1%.

Between 2003 and 2004 employment growth in the EU was stimulated by the continued expansion of employment in the services sector. Over 2004 growth in this sector remained stable at just above the 1% level, an improvement on the rates of the previous year. In contrast, employment in both the agriculture and industry sectors continued to contract in 2004, although the recent trend suggests that the contraction in the industry sector may be coming to an end, at least temporarily.

In order to boost the EU economy the Commission launched the Lisbon process. In a recent review of the renewed process, the Commission has concluded that it is "Time to move up a gear". The strategy is focused on

creating more growth and consequent jobs and also dedicates a separate section on EU energy policy.

This section identifies the main challenges of energy supply but looks mainly at internal markets and calls for the availability of energy at competitive prices. It calls on enterprises to shift towards energy efficiency and gives special attention to renewable energy. Although wanting market forces to dictate these shifts the Commission is also calling for energy production and consumption to take full account of environmental considerations.

Energy Production and Consumption

The idea of a single EU energy market is not yet reality. The EU Commission has launched a number of initiatives to liberalise the electricity and gas markets however integration is far from complete. Certain black-outs across the EU over the past couple of years have demonstrated a poor performing infrastructure.

Energy market structures still differ from one member state to another. Overall, the energy is provided through a mix of oil, coal, gas, nuclear energy and a small proportion of renewable energy such as biomass, wind, solar, geothermal or hydro power.

In total the EU consumed 1,724,580 mtoe in 2003 (Gross Inland Consumption), indicating a 4.26 % increase compared to 2000. As production has remained more or less stable since 2000 the major part of this growth has occurred through increased imports. This means that the EU is becoming more and more dependent on external energy supplies. Under a business as usual scenario, by 2030 almost 70% of the energy the EU uses will be imported; energy demand will rise 1 to 2% per year and the share of fossil fuels in the energy supply could rise to almost 90%, substantially increasing greenhouse gas emissions.

With recent events, EU energy policy could go through some changes over the up-coming years. With high oil prices not predicted to drop any time soon and with the recent gas disturbances in Russia talks have picked up on an enhanced EU Energy Policy. Ideally these talks should investigate alternatives and enhanced efficiency but refrain from ideas of re-strengthening the nuclear capacity as France did in January 2006. The UK presidency re-launched the need for an improved internal energy market; the Austrian presidency is looking to deploying biomass as an alternative source; Denmark and Ireland are in favour of wind energy. Clearly, member states are still far from agreeing on a single EU energy policy.

The most recent Eurobarometer poll (focusing especially on energy) shows that there is a clear demand for action at all levels; action at the EU level is perceived by 1 out of 2 respondents as the most appropriate; Europeans also

clearly support the enhanced use of renewable energies; they also indicate that they lack information regarding practical issues such as how to save energy and the use of new forms of energy at home.

EU Policies & Legislation

EU energy policy focuses on two related issues: supplying people with energy and ensuring that the energy keeps flowing, i.e. security of supply. If this is managed without compromising the environment or social structures then this is defined as sustainable energy. The question is whether current policies are sufficient enough to provide people with a continuous flow of sustainable energy, a flow that answers to the needs of people and industry while at the same time ensuring the future need for energy and safeguarding the environment.

With EU commitment in various international agreements, such as the UNFCCC and the Kyoto Protocol, there is a lot of attention on energy policy. CO₂ emissions – the most important GHG – are linked to energy consumption. In order to comply with the Kyoto Protocol it is necessary to reduce these emissions. Currently, energy consumption accounts for nearly 80% of man-made CO₂ emissions. This means cutting energy use and finding ways to get more energy from the same carbon output, i.e. energy efficiency or shifting to other means of energy such as renewable energy. The solution is a combination of the three. To be able to talk about a sustainable energy system, there has to be a commitment to shift from a fossil-based, energy production system to one based on renewable energy while simultaneously introducing increased energy efficiency and energy demand in general.

Energy is clearly an important issue for the EU both for the European and worldwide economy. While most of the local environmental problems linked to energy production and use are dealt with in a European context, there still remains the global challenge of climate change.

This report first focuses on pending and existing EU legislation, policies and initiatives concerning the different aspects of energy production, and energy use and its impact on environment and society.

The Directive on Emission Trading, the first legislative initiative that clearly links CO₂ emissions and energy use, is discussed followed by a discussion on the outcome of the first European Climate Change Programme (ECCP)¹ and the potential impact of the second phase of the ECCP that was launched at the end of 2005. A final section looks at energy use in transport; the use of transport and its subsequent carbon emissions keeps growing thus if the goal

¹ The ECCP is a programme that guides EU climate policy and was developed to deliver on domestic GHG reductions. The second phase of the programme could significantly impact on EU energy policy.

is a sustainable energy system, the use of energy by transport will also need to be tackled.

The EU Commission aims to respond to these challenges by:

- making energy efficiency a central issue;
- increasing the share of renewable energy;
- limiting the rise of import dependency; and,
- making the use of fossil fuels more clean and efficient.

In transport the commission aims on a modal shift, enhanced efficiency and technological innovations.

Renewable Energy

The basis for the present EU renewable energy policy can be found in the 1997 White Paper on the "*Energy for the Future: Renewables Sources of Energy*". This White Paper sets as a clear goal to attain, by 2010, a minimum penetration of 12% of renewable energy sources in the EU. It also identifies the need for member states to act on this goal. Therefore, the EU Commission has been proposing a number of legislative acts – some of which have already been transposed into a Directive.

At the end of 2001 the *Directive on the Promotion of the Electricity Produced from Renewable Energy* was adopted. In accordance with the White Paper, the overall indicative target of this directive is to increase, by 2010, the share of renewable energy production to 12% of total energy use and of renewable electricity production to 22% of total electricity consumption. To reach this goal the directive sets indicative targets for the share of renewable electricity production per EU Member State.

Today, EU renewable energy sources represent 4 % of total energy production.

A second *Directive on Renewable Transport Fuels* was adopted in 2003 to substantially increase the use of bio-fuels in transport, and in particular for road transport. The directive sets individual targets for each member state, aiming at a EU-wide target of replacing 5.75% of all transport fossil fuels with bio-fuels by 2010.

In addition to the renewable energy directives the Commission has recently adopted the *Biomass Action Plan*. This plan is to deal with the current use and future potential of bio-fuels, the land availability – comparing food to industrial needs – and the total socio-economic impacts of bio-fuels in the

EU. It is also tasked with ensuring the functioning of an EU bio-fuels market in an international context.

It is important that the current initiatives are continued and further strengthened. At the recent Beijing International Renewable Energy Conference (BIREC - November 2005) EU Environment Commissioner Dimas supported the European Parliament's objective of a 25% share for renewables. However at the same meeting, the Commissioner also pointed to the most urgent problem: much needs to be done in terms of Member States' support, public awareness and research in innovative technologies. The promotion of renewables is not consistent across the Member States.

On renewable energy there is still a lot of work to do: with renewable energy making up only 4% of the energy mix, it will require substantive action to reach the target of 25% by 2010. The target will likely be met on bio-fuels - if not through domestic production, than by imports - but the implications of the increased use of bio-fuels on other areas such as agriculture or dependence of imports is not yet clear.

As with many elements of energy policy national implementation is a problem. While some member states are committed to renewable energy, others lag behind and are not actively creating the infrastructure for renewables.

Energy Efficiency

As a result of the Action Plan on Energy Efficiency, which has the objective of an additional 1% per annum improvement in energy intensity above business as usual, the Commission has launched a number of new initiatives in the field of energy efficiency.

This has, among others things, resulted in the *2002 Directive on the Energy Performance of Buildings* that calls upon member states to apply a methodology, at the national or regional level, to calculate the energy performance of buildings on the basis of a general framework, provided in the Directive.

The purpose of the *Directive on Cogeneration of Heat and Power* is to increase energy efficiency and improve security of supply by creating a framework for promotion and development of high efficiency cogeneration of heat and power based on useful heat demand and primary energy savings in the internal energy market and by taking into account the specific national circumstances especially concerning climatic and economic conditions. Again, the determination of criteria and the implementation rests with the member states.

The *Directive for Eco-design Requirements* for energy-using products is the only framework directive without any minimum standards and which will need further elaboration on specific targets and implementation measures.

In respect to all these initiatives, the Commission launched the *Green Paper on Energy Efficiency* (Doing more with less) in June 2005. The main thrust of the paper is that there is still considerable potential for energy savings in Europe which the initiatives so far have not delivered.

A final initiative that is in the pipeline is the *Directive on the Promotion of End-use Efficiency and Energy Services*. Although this proposal has been pending since 2003, it is supposed to, by 2006, enhance the cost-effective and efficient end-use of energy in member states. As with other initiatives in this field it lacks mandatory or specific targets.

The problem with EU initiatives in the field of energy efficiency is the lack of targets. As the Commission does not have legal competency in this field, the result is always dependent on the limits set by and negotiated amongst member states. Industry traditionally argues that mandatory targets will create more administration and limit economic growth. Ironically industry has failed to deliver on the voluntary targets of 1% savings per year, where in fact there is the potential of saving at least 2.5% annually. Energy efficiency should be seen as a win-win situation: it provides the opportunity to reduce dependency, can guarantee the security of supply and can help significantly in the reduction of greenhouse gas emissions.

Meanwhile, the European Parliament launched an 'Energy Efficiency Watch', set up to monitor EU and national performances. EU Commissioner for Energy is also very much committed to efficiency. In June 2005, he launched an ambitious plan of cutting - by 2020 - 20% of the EU's energy consumption - half of which could be achieved by merely implementing existing (voluntary) legislation.

Security of Supply

Security of supply is a cross-cutting issue as it relates in one way or another to every aspect of the energy discussion. Developing more renewable sources of energy will enhance the supply of energy, reducing the need for fossil fuel imports; a higher efficiency ensures that you produce more for the same net consumption.

With the big power cuts that hit the EU over the past couple of years, more attention has been paid to the issue of supply and security and with the recent high oil prices the discussion continues about how best to secure the supply of energy.

In 2000, the Commission launched a *Green Paper on Security of Supply*. This paper proposed nuclear energy as a solution to reconcile the Kyoto

commitments with the issues of securing supply. In 2003, the Commission also launched a proposal for a directive. While the directive was never finished, the Commission recently launched a report on the initiatives under the Green Paper.

Simultaneously, the Commission has been focusing on Trans-European Energy Networks. In this scheme, a lot of money is being invested into the infrastructure to allow energy to freely move across Europe. The scheme extends to the closest neighbours of the Union and attempts to former Soviet states in the East. The hope is that these networks and infrastructure should make it easier for a liberalised market to operate.

With recent events influencing the supply of gas, high oil prices and the rising demand for energy especially in China and India the best option is for the EU to work towards an integrated supply approach. This approach should also address the demand side as a reduced demand for energy will result in reduced imports. These issues are discussed further in this report.

Liberalisation of the Energy Market

From the view of sustainability liberalising the energy market can go in any direction. Breaking down state monopolies makes it easier for green energy to enter the market. Conversely, liberalised energy markets can generate a downward pressure on the market leading to lower the prices, in turn increasing consumption and associated environmental impacts.

In 2003, the EU adopted the gas and electricity directive and established a European Regulators Group for Electricity and Gas. The idea was to fully open the market while maintaining high standards of public service. Initially this has allowed industry operators to freely choose their energy supplier. One of the biggest problems remains the limited national implementation and the fear of competition by big energy producers in their respective countries which has blocked the liberalisation.

Simultaneously, market conditions do not seem to favour renewable energy markets and instead favour the consolidation of traditional big producers. The problem is that prior to this most energy producers were controlled one way or another by governments with public funds being used to invest in production and distribution. With the liberalisation of the energy markets, the monopolies have disappeared and have for the most part been replaced by "oligopolies"; a situation where the same actors remain dominant in the market and the economic effects of lowering prices through enhanced competition have not really worked.

Another consequence of this is that new entrants – typically private operators – that try to sell renewable energy have to take full costs into account and charge the customers accordingly. Renewables are thus obliged to take full

external cost into account and have to compete with an existing infrastructure that does not face the same costs pressures.

Emission Trading

After lengthy discussions, the EU decided to go forward with a European Emission Trading Scheme and launched the first phase on 1 January 2005. After the Emission Trading Directive was adopted, it was soon amended by the Linking Directive, allowing operators in the ETS to use credits from the Kyoto Protocol mechanisms (Joint Implementation (JI) and the Clean Development Mechanism (CDM)) to meet their targets.

The ETS is one of the EUs most important instruments for meeting its Kyoto commitments. It puts a cap and trade system in place covering CO₂ emissions from the large industrial sources. It covers only CO₂ and only from specific (heavy) industry branches such as power generation and oil refinery. Every member state has to develop a National Allocation Plan (NAP), setting the cap and the allowances for every installation under the system. This appears to be the weak link in the system. While it is probably still too early to draw any conclusions, the Commission tried during the summer of 2005 to conduct a preliminary assessment about the system. The Directive set a formal procedure of review and the option for allowing amendments, including the inclusion of possible new gases and or sectors such as fluorinated gases and covering aviation under the ETS.

In 2006, the member states will need to produce their second NAPs. While the first NAPs can be seen as a trial phase and an experiment, member states will need to carefully consider their second NAPs as these will cover the first commitment period under the Kyoto Protocol and they will have to deliver on emission reductions. As a result, countries will not be in the position of distributing emission allowances as liberally as was previously their want. They will need to show their commitment and set strict caps in order to meet their objectives.

European Climate Change Programme ECCP

The European Climate Change Programme was initiated in 2000 to provide a coherent and interactive framework for deciding on a range of policies that would enable the necessary emission reductions as agreed under the Kyoto Protocol. At the end of 2005, the European Commission initiated a second phase of the ECCP. While it is initially set up to deliver on Kyoto targets, it has a strong energy component.

In the first phase (from 2000 until 2003) a number of working groups were set up to focus on energy, transport, industry, research and agriculture. The

most important document issuing from this process was a report identifying cost-effective options (<20€/t CO₂eq) totalling 664-765 Mt CO₂eq.

Compared to European Environment Agency estimates that to reach the -8% Kyoto target the EU would only need 336 Mt CO₂eq, the ECCP report points out that the technical potential is twice the size of the required reduction.

The second phase was launched at the end of October 2005 and is to deliver before summer of 2006 on most of the issues. In addition to new issues such as Carbon Capture and Storage, Aviation, Cars and CO₂ and impacts and adaptation there is also a review workshop to analyse the implementation of the options identified in the 2001 report. The Commission hopes, via a process of stakeholder consultation, to have a review of existing initiatives as well as to develop new initiatives on the basis of the working group discussions and outcomes.

Transport

Transport is a significant consumer of energy. In 2003 its total share of EU energy use was 34% and it is still rising. Transportation has not received a lot of attention over the past couple of years. However its impacts are predicted to grow if nothing changes.

Directly linked with the energy debate, and especially in the context of the Kyoto commitments, there is a lot of discussion about the potential of changing transport use. One element is the *Directive on Renewable Transport Fuels* or the *Bio-fuels Directive* (this directive has been discussed earlier in this report). It is still not clear what the indirect effects of this Directive will be. It sets reference targets of 2% of bio-fuel blending by the end of 2005 and a target of 5.75% by end of 2010. It also asks member states to ensure a minimum proportion of bio-fuels through national targets.

The overall transport policy is directed by the White paper: "*European Transport Policy for 2010 – Time to Decide*". This paper talks about modal shift, efficiency, sustainable transport. One of the big challenges will be to break the link between constant transport growth and economic growth as currently transport is growing the fastest and is a large energy consumer. Therefore, the European commission is aiming on a modal shift, enhanced efficiency and technological innovations. Still, it is in the end the member states that need to implement their national transport policies.

Regarding road transport, most of the work of the Commission is done by setting technical standards for emissions, the so called EURO norms. These norms are gradually being lowered and are set separately for cars and trucks, however they do not regulate for CO₂ emissions. Other norms, such as CO₂ emissions, are being developed together with the industry (ACEA) and are implemented on the basis of voluntary targets. A 1996 commitment

was set to lower the km emission to 120g CO₂ by 2010. This target will not be reached; currently the EU is at 160 g/km. Targets therefore need to be stringent and mandatory.

Regarding energy itself, the biggest challenge will be the introduction of bio-fuels. Ideally there should be a shift from transporting goods via road to water because of the lower emissions per ton km (emissions for transporting one ton of freight over one kilometre).

Maritime and aviation affairs are mostly dealt with at the international level, either through the International Maritime Organisation (IMO) or the International Civil Aviation Organisation (ICAO). These organisations are working on integrating international bunker emissions (emissions from international shipping or aviation) into the international system such as the UNFCCC and regulating, in particular, CO₂, SO₂ and NO_x. As these emissions are linked to the use of fuel and the production of energy, they should be addressed. However as these international organisations are known for their bureaucracy and complex negotiations it is not certain that they will have much influence on existing issues. Concerning aviation, the Commission is considering the option of including aviation into the European Emission Trading Scheme. This is also being discussed within the ECCP.

In general the EU does not have a lot of responsibility concerning the energy side of transport. It is trying to regulate the transport market within the functioning of the internal market by protecting consumer rights and road and traffic safety. Still, within the Commission there is an expert group that is looking at the links between transport and environment and sustainable transport is part of the 6th Environmental Action Programme.

The growth in transport needs to be decoupled from an increase in energy use. The issue of transport needs to be reassessed and restructured to provide the same service but more efficiently. Unfortunately, the scope of this report does not allow for a separate discussion on national transport policies.

Eight SEW Indicators

Introduction

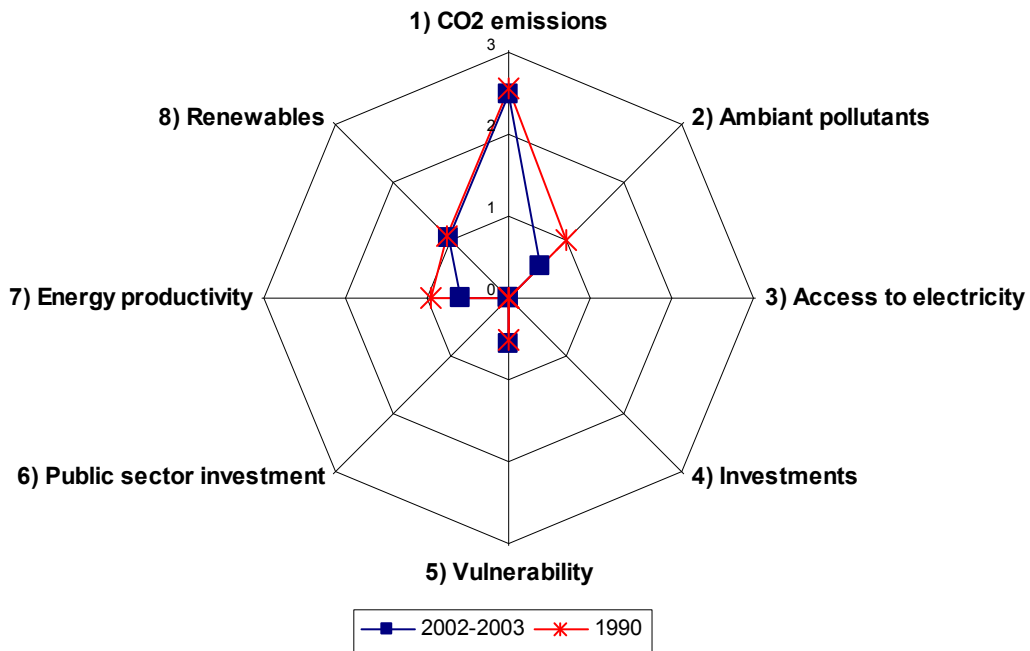
The indicators are calculated on the basis of EU 15 figures. This will permit readers to see the evolution of the indicators from the last report² that was finished before the enlargement of the EU to 25 member states.

² See www.helio-international.org for previous EU report

The indicators illustrate that the EU has had difficulties in reaching targets set in the field of renewable energy or energy efficiency, especially when compared to world averages or targets estimated to fit with sustainable development aims. The vector values of the different indicators represent the closeness to a defined target; the closer to zero, the closer to the target of sustainability. No data was available for indicators 3, 4 and 6.

EU Star

Eight Sustainability Indicators



Environmental Sustainability

Indicator 1: Per Capita Energy Sector Carbon Dioxide Emissions (EU15)

Objective

Global environmental impact is measured by carbon dioxide (CO₂) emissions per capita (actual carbon in the CO₂). Each nation's per capita emissions are compared to the 1990 global average. Climate experts estimate that the stabilisation of the climate may require a 60-80% reduction in CO₂ emissions

1990

854,611,349.6 metric tonnes of carbon (MTC) / 364.5 million people =
2344.61 kg C / capita
Vector value: 2.532

1999

2241.46 kg C / capita
Vector value: 2.405

2002

871,777,214.4 MTC / 380 million people = 2293.91 kg C / capita
Vector value: 2.471

Discussion

Since the last report, the values have barely changed. Compared to 1990, there has been a minor decline in CO₂-emissions. Unfortunately, CO₂-emissions have actually risen slightly compared to 1999. The downward trend of the last report is not acknowledged in these figures.

When comparing the EU carbon-emission to the world average the same conclusion still stands: EU values remain higher than the world average (approx. 1.5 times higher). The ultimate goal has been set at 30 % of the world average. There is therefore a lot of effort still required from the EU to attain sustainable levels of CO₂-emissions.

Indicator 2: Most Significant Energy-related Local Pollutant(s) (EU15)

Objective:

The most significant energy-related pollutant that strongly impacts local human or environmental health is chosen. Such pollution sources are frequently related to industry, mining, fuel refineries, manufacturing, or electric power plants. The most common energy-related pollutants are sulphur dioxide, nitrogen oxide and ozone. Factor 10 is used as a goal.

1990

25040.1 kt (PM10) / 364.5 million people = 69.21 kg / capita

Vector value: 1

1998

47.91 kg / capita

Vector value: 0.6579

2002

15209.1 kt (PM10) / 380 million people = 40.02 kg / cap

Vector value: 0.531

Discussion

The vector results give an idea of the evolution of emissions per capita of local pollutants since 1990. The sustainability goal lies at a reduction by 90% from 1990 levels. Primary and secondary fine particulates were chosen as the local pollutants to be measured. These particulates are responsible for a number of respiratory problems, especially for people in urban areas, where exposure levels are highest.

With figures for 2002 the initial trend observed in the first report is confirmed: 2002 figures show a 39% decline of small particulates. However in comparison with the goal of 90% decrease, the EU still has a long way to go. Considering that by 1998 there was already a decline of 31% it appears that progress is slowing and there needs to be extra attention paid to managing sustainable progress in this area. Between 1990 and 1999 there was an annual decrease of 3.44%, while in recent years, this decline has slowed to only 2.67%.

Social Sustainability

Indicator 3: Households with Access to Electricity – Proportion of Energy Spending in Household Budget

Objective

Access to electricity is considered a social good—it helps spread literacy and education, it contributes to improved health through refrigerated storage of food, medicines, and increased levels of communication and awareness. The task is to find the number of households with access to reliable and affordable electric power, either through the transmission grid or by stand-alone systems

Countries with 100 % access look at the percentage of household income spent on energy

1999

On average, European households spent 4.1% of their total expenditure on energy in 1999.

Discussion

Aside from a few exceptions, the majority of households in the EU are connected to the grid. Thus this indicator looks at the proportion of energy spending in the total household budget, allowing to analyse the importance and impact of the energy prices on households.

Unfortunately, no reliable historic data is available. As recent price increases will most likely make the proportion of energy spending increase, the EU commission and various member states are promoting renovations to increase insulation and efficiency standards for houses. The policy is aimed at reducing the share of household consumption that - in 2003 - was 26% (EU15) and 27% (EU25) of the total final energy consumption (EU15: 1003.5 Mtoe; EU25: 1131.5 Mtoe).

Efficiency standards for houses are an issue that deserves proper attention. On average, houses are only renovated every 20 to 30 years. With households showing growth figures for energy consumption close to 11% (between 1995 and 2003) it is important to build decent and proper insulated new houses and to make sure that every house that is renovated is brought up to standard. Every missed opportunity in this field means a delay of another 20 years. Often it is said that more insulation makes building more expensive, but numerous studies have shown that the pay-back time of the investment is short enough to have a return on the investment as well as save on future costs.

Indicator 4: Investment in Clean Energy (RES)

Objective

Investments in clean energy create more jobs and faster growth than comparable investment in conventional energy. Detailed data on employment gains are not available in most countries. A substitute indicator has been selected for which data are generally available: investment in renewable energy and energy efficiency

This indicator thus measures the share of total investment in energy that goes into renewable energy technology.

Discussion

Even when only considering renewable energy as being clean energy and leaving out data on investment in energy efficiency (because the data are too fragmented) it is not possible to estimate or calculate the specific investment in renewable energy.

A number of member states have pledged to develop renewable energy and have agreed on voluntary targets. Although some countries such as Germany, Denmark, the Netherlands and Spain – all well known for their use of wind energy – have made significant investments, there are many member states that have not committed to developing clean energy. Because of the varied energy mix of the different member states it is also not possible to extrapolate figures from one specific or group of countries.

However, the European renewable energy industry is convinced that renewable energy has a higher potential for job creation and that it will generate faster growth. Investments need to be made in different forms of technologies and modes of renewable energy to ensure a continuous energy supply. Investment in renewables would also reduce import dependency by producing (which in turn would require imports).

Economic Sustainability

Indicator 5: Energy Resilience: energy trade

Objective

Many countries are highly dependent on imported fuels and the threat of supply interruption is real. A more universal threat is the price and exchange rate fluctuations that can destabilize both importing and exporting nations.

In order to provide a sustainability incentive for net energy importers without discouraging imports of renewable energy, imports of non-renewable energy are measured as a fraction of non-renewable energy consumption. Importing countries can improve sustainability by reducing either imports or consumption of non-renewables or increasing imports or consumption of renewable energy

For the EU the indicator measures the share of net-imports of non-renewable energy on the total non-renewable share of Gross Inland Consumption.

1990

643.73 Mtoe / 1274.6 Mtoe = 0.5050 (50.50%)

Vector value: 0.5050

1998

52.39%

Vector value: 0.5239

2003

807.364 Mtoe / 1445.6 Mtoe = 0,5585 (55.85%)

Vector value: 0.5585

Discussion

Sine 1990, the share of imports is increasing. This illustrates how slow the EU and its member states are to adapting to changing conditions. It also demonstrates that, even with promotional campaigns, there is a delay in policies delivering targets and objectives. The recent rise of energy prices and supply difficulties should alert policy makers to the fact that more attention needs to be paid to the diversification of the energy supply and to the deployment of renewable energy (produced in the EU or from domestic energy sources). The European economy, households and transport also need to be made much more efficient and less energy demanding.

Indicator 6: Burden of Energy Investment

Objective

This indicator compares government investment in non-renewable energy supply to total GDP as a measure of the burden of energy development on the economy. The primary purpose of this indicator is to get public funds out of the energy supply sector and to promote investment in cost-effective renewable energy supplies and end-use efficiency.

For the EU this indicator measures the GDP share of government investment for non-renewable energy.

Discussion

No data at the EU level is available. Although the role of government is central to the discussion on better integrating renewable energy into the overall energy market, few governments make any direct investments.

The situation of energy markets has changed drastically. Previously most energy companies were managed under government control and the government was responsible for the production and distribution infrastructure. This is no longer the case. With the liberalisation and the end of government control, operators have now become independent.

Technically the GDP share of government investment for non-renewable energy is close to 100%, meaning that the government is barely or not investing at all in renewable energy. However, governments (whether they are at regional or local levels) are often providing subsidies for green renovations i.e., investments in energy efficiency or local renewable energy production. Currently obtaining information on these numbers at the EU-level is very difficult.

Technological Sustainability

Indicator 7: Energy Productivity / Energy Intensity (EU15)

Objective

This indicator measures each nation's progress in terms of obtaining more economic activity per unit of energy consumed. While this indicator is not perfect, it can be used as a proxy for overall progress in improving energy efficiency and restructuring away from energy-intensive practices.

For the EU this indicator measures the amount of energy used per unit of economic output.

Eurostat uses the term energy intensity instead of productivity and measures toe per million € (at 95 prices). (Where Eurostat expresses this in toe/M€, the conversion to MJ/€ is done.)

1990

55,185.6665 PJ / 5,485.8 billion € = 10.0597 106 J/€
Vector value: 0.939

1999

60,390.4032 PJ / 8,131.0 billion € = 7.4272 106 J/€
Vector value: 0.664

2002

61,772.0472 PJ / 9,315.7 billion € = 6.6310 106 J/€
Vector value: 0.581

Discussion

Although energy intensity per unit of economic output is decreasing, the EU still has a long way to go to be sustainable in this area. This can be explained by:

- the already high efficiency standards in European industrial installations;
- the high productivity of the labour force; and,
- the fact that there is only a limited margin for progress.

Conversely, there are a number of action plans and voluntary targets on energy efficiency that can contribute to a lower intensity. The challenge is therefore to introduce more energy efficient techniques than can enhance current practices while at the same time counterbalance further economic expansion. Another option is to reduce demand for energy intensive products and services.

Indicator 8: Renewable Energy Deployment

Objective

Availability of multiple forms of renewable energy is the best form of supply security. Global use of renewable energy is growing faster than the use of fossil fuels and electricity. Fossil fuels and nuclear power —heavily subsidised and politically favoured for decades— still generate a large fraction (approximately 4/5) of the world's electricity. Yet the market is changing, as is both political and popular support. Renewable costs are falling rapidly and therefore competitive without counting the multiple benefits of clean, environmentally advantageous energy supply and improved energy services to many disadvantaged regions of the world.

This indicator measures the share of renewable energy sources in the EU as a share of overall primary energy consumption. Because available figures do not distinguish between the size of hydro generation, all hydro is excluded. (Based on guidelines from the World Commission on Dams, the limit for sustainable or renewable hydro energy is 10 MW.)

1990

43.530 Mtoe / 1318.087 Mtoe = 0,033 (3.3 %)

Vector value: 1.0618

1998

58.554 Mtoe / 1435.638 Mtoe = 0,0408 (4.08%)

Vector value:1.0528

2002

67.305 Mtoe / 1475.4 Mtoe = 0,0456 (4.56%)

Vector value: 1.047

Discussion

Values are compared with the 1995 world average value: 8.64% as a reference (vector value = 1).The sustainability target is 95% share of renewable energy sources in primary energy consumption.

To define renewable energy, large hydro power (above 10 MW of generating capacity) is excluded, but biomass fuels such as wood, charcoal, animal and vegetal wastes as well as energy from modern bio-fuels and waste-to-energy, photovoltaic, solar thermal electric, tidal and geothermal energy are included. All hydro energy is excluded as noted above.

Looking at the figures, there is a modest growth in the share of renewable energy. Over the last couple of years there has been an annual increase of 0.09 %; very slow progress towards the final goal of reaching 95%. Even when compared to the EU target of 10% by 2010, this low percentage

indicates that EU member states will have to seriously focus on renewable energy deployment if they are to reach the 10% target. Currently a target for 2020 is being elaborated; it is anticipated that this target could be close to 20%.

Renewable energy still plays a very minor role in providing the EU with primary energy. Despite current policy there is not significant enough to meet the set targets.

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