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Sustainable Energy Watch
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Energy and Sustainable Development in the European Union

A report produced by
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Executive Summary

The 2002 report for Sustainable Energy Watch (SEW) on recent developments in the European Union comes to a mixed set of conclusions. While there is good progress on some issues, and a positive trend in others, change is slow and EU energy markets remain heavily dominated by fossil and nuclear fuels.

A number of EU level policies, recently implemented and in preparation, could improve the situation in favour of sustainable energy technologies, especially those aimed at reducing the emissions of greenhouse gases, under the EU strategy to implement its Kyoto Protocol commitments. Member State policies show a similar push, although developments over the last decade have a mixed balance. At the same time however, many member states and the EU itself continue to apply policies which are likely to make emissions rise further. This contradiction is likely to persist.

The SEW indicators for the EU [1] show good progress in the reduction of energy-related local pollutants and increases in energy productivity. Per capita carbon dioxide emissions from fossil fuel combustion have declined slowly, but are still at highly unsustainable levels. Dependency on fossil fuel imports has risen despite increases in domestic production and a significant rise in the deployment of renewable energy sources. These still amount to only a very small share of primary energy consumption.

The EU energy system is still very unsustainable. Greater efforts will be needed in the future to improve the situation towards an environmentally-friendly energy supply.

Summary table : Indicators of Energy Sustainability for the European Union

Year / Indicator	1990		1998/1999		% change	
	Metric value	Vector value	Metric	Vector	Metric	Vector
1. Carbon emissions	2,344.6 kg C per capita	2.53	2,241.5 kg C per capita	2.41	-4.6	**-5.1**
2. Local pollutants: particulates	69.21 kg per capita	1	47.91 kg per capita (1998)	0.66	-30.8	**-34.2**
3. Household electrification	n.a.	close to 0	n.a.	close to 0	n.a.	n.a.
4. Clean energy investment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
5. Resilience: energy trade	50.5 % imports	0.51	52.4 % imports (1998)	0.52	+3.7	**+3.7**
6. Gov'nt investment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
7. Energy productivity	9.34 MJ/$ GDP PPP	0.86	6.93 MJ/$ GDP PPP	0.61	-25.9	**-29.2**
8. Renewable energy	3.30 % of PE	1.06	4.08 % of PE (1998)	1.05	+23.6	**-0.9**

[1] Out of the eight indicators measured under the SEW reporting requirements, only five could be fully evaluated. However, indicator 3 on electrification of rural households is less relevant in the highly industrialised EU countries. It is assumed to be close to 0 (meaning 100% electrification), although no proper data was available for confirmation.

Introduction

This is the first Sustainable Energy Watch report for the European Union as a distinct regional group. It was prepared in a collaborative effort between HELIO International and Climate Action Network (CAN) Europe, a Brussels based non-profit organisation that works on European and international climate politics, with a focus on sustainable energy issues.

The main parts of the report were produced by Matthias Duwe, policy researcher with CAN Europe. Specific input on EU energy policy and general feedback was provided by other CAN Europe staff, notably energy specialists Jason Anderson and Rob Bradley. The section on specific developments in EU Member States was based on three national SEW reports (France, Germany and Portugal) and targeted input from CAN Europe member organisations from Belgium, Ireland and the UK. Vital support was also received from Anke Herold at the Berlin section of the German Eco-Institute and Benoit Lebot at the International Energy Agency. Naturally, the production of this report would not have taken place without the determination and support of Helene Connor at HELIO International in Paris.

Due to the constraints regarding time and finances under which this report was produced, not the full set of SEW indicators could be evaluated. Data on energy investment was not available in time, preventing the calculation of indicators 4 and 6. For indicator 3 on the access of households to electricity no separate statistics could be found. It is generally assumed that close to all households in the EU have access to electricity and the lack of statistics seems to support this assumption. It is no longer regarded as a relevant issue for EU countries. Due to the time it takes until concise and updated annual data collection are published, most of the indicators refer to 1999 data as the most current value, two indicators refer to 1998. Where available, more up-to-date information was inserted to comment on possible developments within the last two or three years.

Despite these limitations, the results have proven to CAN Europe and HELIO International that the first SEW regional report on the European Union was a worthwhile exercise, which should be repeated in the future.

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Part I: Policy Overview

►Introduction

Although the European Union (EU) is not a geographically distinct region, it deserves special attention from an energy policy perspective, because it includes a governing component that does not exist in most other world regions.

The EU is an expanding political and economic alliance of countries that includes most of Western Europe and seeks to embrace further members in the near future. It has supranational legislative and executive powers, a unique arrangement. EU level law supersedes national law, although there are different degrees of constraint. However, the general principle of subsidiarity applies, which stipulates that all matters should be settled at the level where regulation is most effective, meaning, at the lowest administrative level. Accordingly, this report gives the reader an overview of the most important recent EU level policies and discussions relevant to energy

Naturally, reporting developments and trends on a regional level will necessarily hide the national particularities, trends and policies. In order not to completely smooth over the different national circumstances in the fifteen EU Member States, this report also looks at some of the specific events and decisions at country level in a separate section in order to highlight some of these singularities which would otherwise go missing.

▸General Discussion

The European Union is a political entity that brings together fifteen countries of different size, geography, economic structure and language. These are (in alphabetical order): Austria, Belgium, Denmark, Germany, Greece, Finland, France, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.[2]

These countries together cover a land area of 3.24 million square kilometres (9 times as big as Japan, but only a good third of the size of the United States)[3]. It ranges from the snow-rich Scandinavian North to the sunny Mediterranean coast. Its 375 million inhabitants represent just around six percent of world population, but nearly a fifth of world economic activity measured in GDP PPP[4]. Every European citizen emits more than twice the amount of carbon dioxide, the most important greenhouse gas, than the world average.

Economic activity

The economies of all fifteen Member States together grew by around 40% between 1990 and 2000. While annual growth was between 1 and 2 % in the first half of the decade, it picked up pace in the second half[5] and saw increases of over 2% from 1997 onwards, topping 3.4% in 2000.

In terms of employment, the 1990s saw a continuing trend of sectoral shift away from agriculture and industry to services. The European economy is now based strongly on the provision of services. In 1999, two-thirds of employment was in this sector. The other major share is industry with just under 30%. Agriculture gives employment to less than 5% of people. Unemployment decreased by a fourth between 1997 and 2000, as levels fell in the latter half of the 1990s from over 10.6 to 8.3% on average.

In 1992 the European Internal Market was created, which lifted a number of trade barriers that still existed between EU countries. This has intensified economic exchange between them. A good sixty percent of all imports and exports of these countries takes place among the 15 Member States, a further 10% with other Western European countries under the European Free Trade Agreement (EFTA) and around 6% with the Central and Eastern European countries that are preparing to join the EU in the near future, leaving just a quarter of total trade with the rest of the world.

Energy production and consumption

The fifteen EU member countries have very different energy market structures. While France, for example, derives over three-quarters of its electricity from nuclear power (and exports some of it), this energy form is banned in Denmark and Italy, and being phased-out in Germany, Sweden and Belgium. Austria on the other hand has a considerable share of hydro power to supply the country's electricity, Denmark is a pioneer in wind energy, and Germany now sports the world's largest amount of installed wind power capacity.

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[2] Austria, Finland and Sweden joined in 1995. All EU level figures prior to this date which are used in this report include all fifteen Member States.

[3] Figures in this introductory chapter are from the EU Commission's 'EU energy and transport in figures 2001', unless otherwise indicated.

[4] GDP= gross domestic product , PPP= purchasing power parity

[5] Economic data 1990-1998 from Annual Energy Review 2000

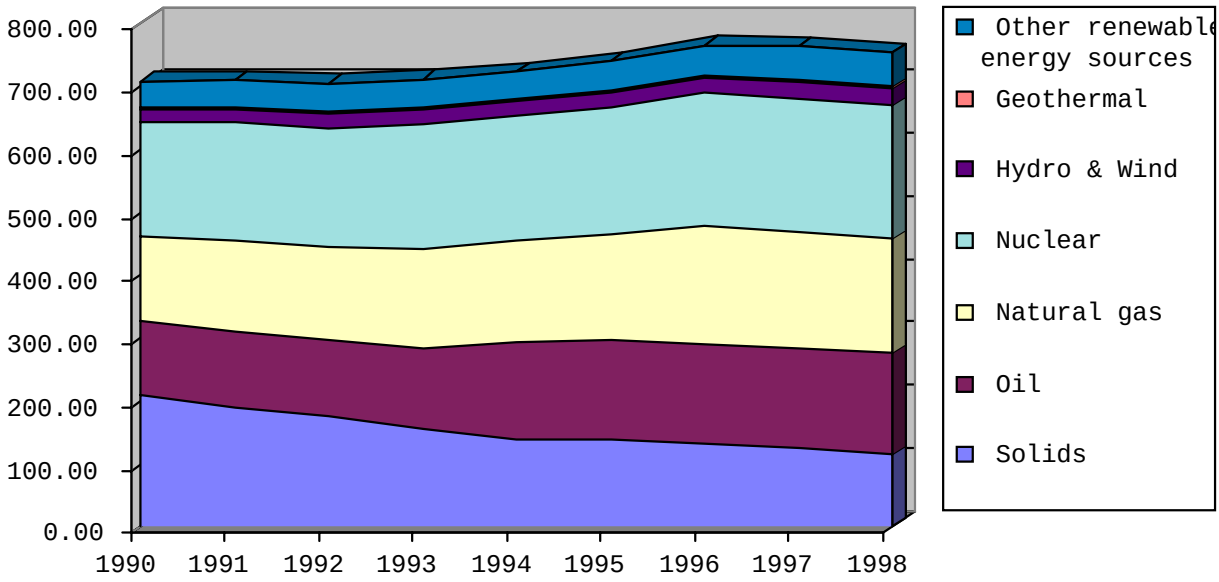
Nevertheless, fossil fuels such as coal, oil and natural gas continue to dominate the EU's energy supply. Despite considerable domestic production, an increasing majority of these have to be imported and the EU's energy import dependency is growing. This is mainly due to an increase in overall consumption beyond the growth in domestic production and changes in the fuel mix (see Figures 1 and 2 below).

Between 1990 and 1999, primary energy consumption rose by over 9%, while domestic production increased only by 7%, after a downward trend in the late 1980s. Coal production in particular is on the decline, in line with overall consumption of coal. The resulting gap was filled by increased use of oil and natural gas in particular. Consumption of these fuels rose by 1.2% (oil) and 4.5% (gas), respectively, each year between 1990 and 1998. The level of electricity generated from nuclear power plants also increased by over 2% annually during the same period (mostly from existing reactors), making up for over one third of the overall increase of 15% in electricity consumption- twice the increase in electricity from hydro and wind power. At present, only one additional nuclear plant is under construction (in France), although Finland is considering giving a license for a fifth reactor.

Wind power is not only the fastest growing source of energy world-wide, but it is reaching new record levels particularly due to its dynamic growth in Europe. In 2001, generating capacity reached 17,300 MW, an increase of 35% in one year.

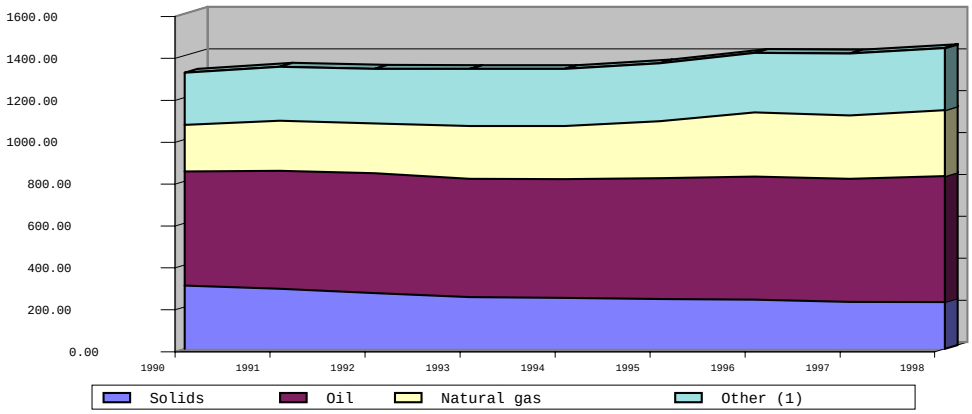
- see graphs next page -

Figure 1: Primary Energy Production in the EU 1990-1998



Source: Annual Energy Review 2000

Figure 2: Gross Inland Consumption (GIC) in the EU 1990-1998



(1) Other includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

Source: Annual Energy Review 2000

▸Other Energy-Related Developments

This section presents the important energy-related policies in the region, with an emphasis on EU-level developments, and brief reports on particular events/ policies in some of the fifteen Member States.

EU Policies

EU level policies have a bearing on the energy markets in Europe in many respects. In fact, a common energy policy was one of the founding pillars of what is now the European Union. Two out of the three European communities that were founded in the 1950s had a strong energy aspect; the European Community of Coal and Steel (ECCS, 1951) and Euratom (1957).

In recent years, climate change has been one of the major factors, though far from the only one, in debates on future energy policy. Energy consumption is the source for most of the emissions of greenhouse gases that are responsible for global warming. The European Union has taken on a leadership role among developed countries with regard to this global problem. Under the Kyoto Protocol, which could enter into force in 2002, the EU as a whole has pledged to cut its emissions of a basket of six such gases by eight percent during the period 2008-2012 from their levels in the base year 1990, which is also the base year for the SEW indicators evaluated in this report.

The provisions of the Kyoto treaty allow the EU countries to achieve their commitments jointly. In effect, this implies a reallocation of the reduction effort among the fifteen Member States, based vaguely on their economic capability and their consumption levels. The arrangement is know n as the "burden-sharing agreement", and it includes a range of targets, from –28% for Luxembourg to +27% for Portugal[6].

The European Community (as the European Union was known prior to the Amsterdam Treaty) as a legal entity is also Party to the treaty and responsible for complying with it. Common and Coordinated Policies and Measures (CCPM) are, therefore, key to EU Member States and thus the EU as a whole achieving the targets they agreed to under the Kyoto Protocol. Achieving these targets will arguably be one of the most important factors for the region's future energy situation.

Accordingly, the following policy round-up focuses on the EU climate change strategy and some of the policies it incorporates, including an overview on the most important debates relevant for the energy sector.

Although we concentrate on climate change issues here it is important to recall that this is not the most important driver in EU energy policy. Although no policy proposal fails to mention climate, recent policies have been influenced more by security of supply concerns and the drive to liberalise the electricity and gas markets.

The European Climate Change Programme (ECCP)

The European Climate Change Programme (ECCP) is the official implementation strategy of the European Union for compliance with its Kyoto target of an eight percent reduction in greenhouse gas emissions. The process was initiated in March 2000 with the release of a Commission communication entitled "Towards a European Climate Change Programme"[7]. It established a twelve-month stakeholder consultation process, whose

[6] The EU burden-sharing agreement (in % of 1990 levels): Austria –13, Belgium -7.5, Denmark –21, Finland 0, France 0, Germany -21 ,Greece 25, Ireland 13, Italy -6.5, Luxembourg -28, Netherlands -6, Portugal 27, Spain 15, Sweden 4, UK -12.5 => EU -8. Agreement also known as "the bubble".

[7] Document index: COM (2000) 88.

goal it was to identify and develop all the necessary elements of an EU strategy to implement the Protocol. Six working groups were initially set up.

- Working Group 1 Flexible mechanisms
- Working Group 2 Energy supply
- Working Group 3 Energy consumption
- Working Group 4 Transport
- Working Group 5 Industry
- Working Group 6 Research

These were then in some instances divided into more specific subgroups. WG 5 established a sub-group on Fluorinated Gases and one on Voluntary Agreements. WG1's main group discussed an EU-wide Emissions Trading Scheme, and a smaller group debated the use of the project-based mechanisms of the Kyoto Protocol, Joint Implementation and the Clean Development Mechanism. An additional group on agriculture was also set up in 2001. The reports from these working groups were synthesised into a final document and published in June 2001. In late October 2001, the Commission then presented a communication outlining the results and listing twelve priority measures, which should be put in place during the coming two years. The list excludes measures which were already well advanced or adopted at the time of its publication, such as the directives on Emissions Trading and the promotion of renewable energy sources.[8]

Emissions trading

Given the failure to implement energy taxation at the European level, the Commission proposed an emissions trading scheme for large point sources of CO2 emissions in the EU. This proposal was presented along-side the ECCP communication in October 2001 and is now being considered by the European Parliament and Council. It would set an overall emissions cap for all large installations in a small range of sectors, including cement, refineries, pulp and paper, ceramics and power generation plants over 20 MW. Allowances under this cap, each worth one tonne of CO2, could then be traded among the installations subject to this cap (there are roughly 4,000-5,000 such sites in the EU) and thus make emissions cuts where they are most cost-effective. Any company failing to obtain enough allowances to cover its emissions would be liable for a penalty payment of €100 per tonne as well as having to make up the emissions cuts in the following year. The crucial details of the level of the overall target and the way to allocate allowances to companies before the trading system starts are left to the member states, subject to Commission review.

At the time of writing it is unclear what the finished article will look like – whether it will remain mandatory or become (for some time) voluntary; whether allowances will be exchangeable for Kyoto mechanism units; or whether there will be a "pilot phase" during 2005-7, for instance.

Directive on Combined Heat and Power (CHP)

A Directive on the promotion of Combined Heat and Power, or cogeneration, is being prepared within the European Commission's department for energy and transport (DG TREN). In the first half of 2002, its progress was delayed because of concerns from Commissioner de Palacio (head of DG TREN). Even if and when it emerges, it seems likely to be very weak: no targets are included, and issues such as grid access for CHP are restatements of the hopes of the liberalisation directives.

[8] The final reports from these groups and the official report are available from the ECCP web page of the European Commission's General Directorate (DG) on Environment <http://europa.eu.int/comm/environment/climat/eccp.htm>

The CHP Directive is among the twelve priority measures listed in the ECCP communication.

Renewable Energy Directive

This Directive was approved in September 2001 and must be implemented by the member states by October 2003. It sets indicative targets for the consumption of electricity from renewable sources in the EU by 2010, totalling 22.1% of EU electricity consumption in that year. The means to meet those targets are left to member states. Renewable energy sources in this Directive include both large scale hydroelectricity and the biodegradable fraction of incinerated municipal waste. This Directive is set in the framework of an EU aim to supply 12% of primary energy demand from renewables by 2010. Current levels are at around 6% under this definition of renewable energy. The SEW indicator follows a definition by the International Energy Agency (IEA), which divides hydro power plants into large and small facilities, using a threshold of 10 MW generating capacity.

Energy efficiency

The EU has a long-standing Action Plan on energy efficiency which has as its target an additional 1% per annum improvement in energy intensity (energy per unit of GDP) above business as usual (business as usual is not defined.) This includes a wide range of proposals for Commission initiatives, including:

- Updating of the "SAVE" Directive 1996/73
- Voluntary agreements on appliance standards and industry efficiency
- Proposals for promoting boiler efficiency
- Proposal for a CHP Directive (see above)

The most significant current energy efficiency initiative is the proposal for a Directive on energy efficiency in buildings. This is currently being revised by the Parliament and Council. It mandates energy audits for most classes of building at the time of sale and otherwise at regular intervals (exactly how often is still being debated – every 10 years looks likely). Large buildings visited by the public would have to display energy consumption data prominently.

The Commission is expected during 2002 to start drafting a proposal for a Directive on energy services for demand side management, but at time of writing no progress has been seen on this initiative. This Directive is part of the ECCP priority list.

Liberalisation of the gas and electricity markets

Liberalisation of electricity markets in Europe is breaking down non-innovative state monopolies and opening the system to green power producers. On the other hand, competition on price and volume could induce higher consumption. As a result the process has been closely followed for its environmental implications. Individual national initiatives in the UK and the Nordic region began the liberalisation trend in the early 1990s, and a 1996 EU directive mandated a target of 33% market opening for the whole Union by 2003.

At the behest of the Council, the European Commission has proposed to speed up the process so that 100% of all customers, from industry to households, could choose their supplier by 2005. Objections by the French lead to a compromise at a heads of state meeting in Barcelona in March 2002, whereby only the industrial and commercial sectors will be opened; it may be that following French elections their resistance to household level competitions softens. The meeting also called for investment in high-voltage interconnections to maintain at least 10% exchange capacity between markets, ensuring

liquidity; environmental NGOs in particular have emphasised distributed generation as an alternative.

In its first reading of the Commission proposal, the European Parliament added measures to promote distributed energy, strengthened provisions on labelling the source of and environmental damage resulting from electricity delivered to customers, and called for separate management of nuclear decommissioning funds to avoid them being used for corporate takeovers in the sector.

Security of Supply

In October of 2000 the European Commission released a green paper on security of energy supply for a year-long consultation period. Citing the EU's increasing reliance on foreign fuel sources, particularly petroleum, it called for measures to reduce risks to that supply and to increase domestic flexibility. Controversially, it mentioned nuclear energy as a necessity if Kyoto goals and security of supply considerations were to be reconciled. A European Parliamentary opinion was similarly controversial in its apparent support for nuclear energy.

The support for nuclear has overshadowed discussion of efficiency and demand-side management, despite the rhetorical importance placed by the EU institutions on the latter. The Green Paper will be followed by a directive, scheduled for late 2002. Environmental NGOs have emphasised the importance of efficiency, renewable energy and distributed generation as means of both diversifying and localising production, while reducing the overall need for energy and the vulnerability to changes in external supply.

Member States

In order to complement the policy round-up for the EU region, this section depicts noteworthy national policies. Three national SEW reports for the EU region were prepared in 2002: France, Germany and Portugal. For three of the other Member States, specific policies are briefly presented.

a) National Reports Synthesis

France

Status: France has a better balance regarding most of the SEW indicators than the EU average, because of its use of nuclear power plants for electricity production. This makes the economy less carbon intensive and reduces import dependency, at least as calculated under SEW indicator 5. However, since uranium is all imported, this indicator may be misleading. France also has a slightly higher deployment of renewable energy than the EU average and the other two countries for which a SEW report was prepared. Yet, levels are still small, produced by large hydroelectric dams, and, therefore, highly unsustainable.

Trend: The development between 1990 and 1999 shows only very slow improvement. Primary energy consumption rose by 14% in the 1990s. Electricity consumption soared even higher, climbing more than one fifth of 1990 levels, an expansion driven nearly exclusively by the use of nuclear power. This rise accounts for more than half the additional nuclear electricity used in the EU between 1990-1999. A larger share of French electricity (net 12%) is now being exported.

Energy productivity, as measured in SEW indicator number 7, was better than the EU average in 1990. However, it has not improved since then but remained stable over the decade. Its indicator value is now below the EU average. Dependency on energy imports has also remained stable and high.

The share of energy-related investment for renewable sources remains minimal and little input was received from the government. However in April 2002, the French government announced plans "to invest 10 billion euros ($8.81 billion) to build 10,000 megawatts of wind generating capacity by 2010" (Reuters, 3rd April 2002).

Germany

Status: Germany is the largest economy in the EU and also by far the biggest emitter of greenhouse gases (in absolute terms). Per capita levels are also above the EU average. One of the reasons is that Germany's energy supply still includes a considerable share of coal and lignite, parts of it from domestic sources.

Trend: Germany has shown mixed progress. Its per capita carbon dioxide emissions are still over 20% higher than the EU average, despite a reduction in per capita levels by a fifth since 1990. Germany has done particularly well in improving its energy productivity indicator and cutting its emissions of air pollutants. This is in large part due to the modernisation and restructuring of the former East Germany and improvements in coal power generation.

Energy import dependency has risen, for some part because of lower coal production. The share of investment for clean energy remains very small (due to still high levels of coal subsidies) and so does its deployment. However, figures up until 1999 do not yet take into account the effect of policies such as the eco-tax or the Renewable Energy Sources Act, which extends the successful feed-in tariff, that guarantees a premium of up to 50 Euro cents (for photovoltaic) for electricity from renewable sources. Due to this law in particular, installed wind power capacity nearly tripled within three years, amounting

to 8750 MW in 2001 (generated by over eleven thousand rotors). That is half of all installed capacity in Europe and the largest amount in any single country world-wide.

Other recent policy initiatives to support renewable energy sources include a negotiated agreement with industry on the promotion of Combined Heat and Power (CHP), as well as legislation for the promotion of biomass.

One other noteworthy policy decision is the phase-out of nuclear power in Germany. The government was elected on an anti-nuclear platform in 1998 and has followed suit. A negotiated agreement with industry foresees a flexible maximum running time system, in which each utility can choose how long to run individual plants, provided that they do not exceed their overall number of allowable years for all the plants it operates. Critics of the phase-out deal have calculated that the agreed times allow for business-as-usual end of life-time shut-downs for all nuclear plants. However, it is possible that this as well as other policies could be altered or even reversed in the case autumn elections hand the office to a different government coalition.

Portugal

Status: Portugal is one of Europe's smallest economies and under the EU's regional policy it qualifies for extra financial support. It has much lower levels of carbon emissions than the EU average and the same goes for other pollutants. However, Portugal is nearly exclusively dependent on imports for its energy supply. And its economy was much less energy intensive per unit of GDP than the EU average in 1990.

Trend: Due to the comparably low (but already unsustainable) starting levels, emissions of carbon dioxide and local air pollutants have been rising, as opposed to the reductions seen in the EU as a whole. Renewable energy did not increase significantly, but a recent raise in the feed-in premium for green electricity has resulted in a small boom in wind power and small hydro during the last two years. Economic expansion over the 1990s caused an even stronger surge in energy consumption that has led to a worsening of energy productivity. Import dependency on the other hand improved a little, but a further shift towards gas may prove to be a disincentive to exploring endogenous energy sources. However, in early 2002, a new major hydro power project was initiated.

b) Other Member State Issues

Belgium

Climate Plan and Nuclear Phase-out (Stephan Vis - IEW)

In terms of sustainable energy, Belgium is far from being the best student of Europe. Some facts: Per capita emissions of carbon dioxide are among the highest in Europe (12 tCO2/year; only Luxemburg is worse), despite large use of nuclear energy to generate electricity. 57% of all electricity comes from nuclear power, making Belgium the 3rd most "atomic" country in the world behind France and Lithuania. Electricity intensity per unit of GDP is the highest of all 15 EU Member States (27% more than the Netherlands). Energy and environment taxes are among the lowest in the EU. The share of renewable energies is the weakest (1,1% in 1997). While the European target is 22% of electricity consumption by 2010, the Belgian target under the Renewable Energy Directive is only 6%. Energy subsidies are proportional to existing market share for each energy source: While fossil fuels receive 9 million of Euros per year (money transfers and tax relief), nuclear get more than 40 and renewable energy 5 million.

Unfortunately, the institutional complexity in Belgium makes it difficult to implement a proactive policy. That does not mean there are no attempts to do so. In March 2002, the Belgian government decided to initiate a phase-out of nuclear fuel, demanding a shut-down of the 7 Belgian nuclear reactors after 40 years of use (between 2014 and 2025). However, implementation of the phase-out is strongly questioned in Belgium's regional parliaments.

Hopefully, this decision will oblige Belgium to act on the real cause of climate change, the excess of consumption. Belgium has ratified the Kyoto Protocol and introduced green certificates to promote green electricity. That won't be sufficient. Will it do more by imposing public service obligations on suppliers, introducing disclosure on bills, and tackling the transport problem ? It remains to be seen whether Belgium can leave its unsustainable path towards a more efficient and environmentally friendly future.

Ireland

offshore wind and peat combustion (Pat Finnegan, Grian)

Two recent developments in Ireland—one positive and one negative—illustrate perfectly the divided loyalties present in Ireland as it, in common with other industrialised countries, attempts to face up to climate change. Essentially, the challenge is the choice between the environmentally-destructive technologies in use in the last century, and those more appropriate to the new one. Briefly this amounts to Business as Usual (BAU) versus fuels for the future.

Firstly, the good news: Ireland approved in January 2002 a 640 million euros plan to build the world's largest offshore wind farm, capable of generating 520 megawatts of electricity. Authorities say the project would be three times the size of all existing offshore wind farms in the world put together. The facility could end up supplying 10% of national electricity.

The farm is going to be built on Arklow sandbank, a location about four miles offshore at the point closest to the coast, and would be made up of up to 200 giant turbines, according to current plans. If realized, the wind farm could reduce Ireland's emissions of harmful carbon dioxide gas by 1.1 million tonnes a year. Irish private company Eirtricity, which is building the facility, could begin construction work in early 2002, with the first phase of the project, generating 60 megawatts, going into operation in Autumn. [9]

[9] Some information available at Eirtricity website: http://www.eirtricity.ie/news-11-01-2002.htm

Unfortunately, however, this positive news has to be offset against simultaneous Irish government action in favour of local political interests, protection of business as usual (BAU), and continued use of fossil fuels. This is represented by the Irish government's successful negotiations with the European Commission of a PSO (Public Service Obligation) under security of supply headings to allow the State-owned Electricity Supply Board construct two brand new high-carbon-intensity peat-fired generating stations.

Local NGO's campaigned vigorously and vociferously against this action, citing amongst other things, the EU Habitats Directive, the Convention on Biodiversity, the Kyoto Protocol protection of sinks provisions - bogs are important sinks and biodiversity havens - and the Irish government's own National Climate Change Strategy, all of which are fundamentally breached by this proposal. This campaign is still continuing, and is currently in the Irish courts.

United Kingdom

Renewables Obligation (John Lanchbery, RSPB)

On 1 April 2002, under the provisions of the Utilities Act 2000, the UK Government placed a legal obligation on electricity suppliers to supply 3% of all electricity from renewable sources by 2002/3 (1999 renewable generation was about 2.8%). Increasing obligations will thereafter be placed at yearly intervals rising to 10.4% in 2010/11. The government say that the obligation will then remain in force at a minimum of 10.4% until at least 2027. It may increase.

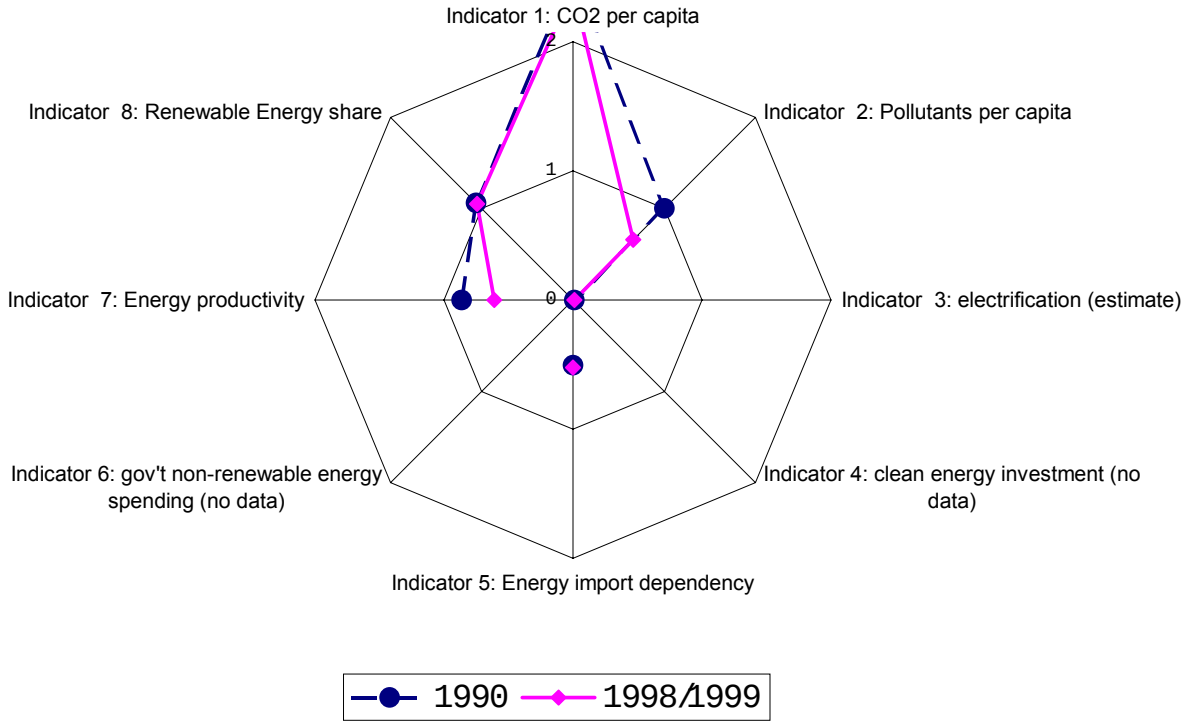
Supplier's compliance with the Obligation will be established by the surrender of Renewable Obligation Certificates (ROCs) equivalent to their Obligations. (ROCs will originate with generators.) Suppliers that do not meet their annual Obligation have two options for coming into compliance. They can either buy ROCs from others (i.e. trade) or they can buy themselves out of the Obligation at a rate of 3 pence per kWh, which is currently more than double the normal price of electricity. This rate may be raised over time but will not fall. Issuance, trading and surrendering of ROCs will be supervised by the Gas and Electricity Regulator (OFGEM).

UK legislation requires electricity generation, distribution and supply to be accounted for separately, in spite of companies "vertically integrating" to include all three. Hence an obligation on suppliers ensures that the renewable energy is actually used (and is of benefit to the climate) whereas an obligation on generators might mean that plants were built but not used. The current aim of government is to include in the Obligation only those renewables that are not commercially competitive. The long term idea is thus to keep the level of the Obligation at 10.4% after 2011 but drop out those renewables that are competitive thereby, in effect, raising the Obligation.

Eligibility for the Obligation. The list of eligible renewables is complex but basically it includes all of the unambiguously renewable technologies: wind, solar, small hydro (<20MW), tidal, wave, photovoltaics and energy crops. It also includes landfill gas and sewage gas. It includes large hydro built after 1 April 2002 and the electricity accruing from both large and small hydro refurbishments after 1990. Mixed waste burning is not eligible but non-fossil derived waste can be counted under specified circumstances. The biomass component of co-fired will count, up to a limit, but will be ineligible after 2011.

Part II: The Eight Indicators

▶The Star: General Discussion



The SEW "star" was designed to visualise the developments on the set of eight indicators assessed as part of the SEW reports. The indicators are grouped as pairs to measure developments in four categories: environmental, societal, economic and technological sustainability.

Each indicator operates on a scale between one and zero, thus integrating different units and measures. However, the scales are not identical; some indicators have vector values greater than one, others do not. In general, the centre of the circle (zero) refers to the sustainability goal for the indicator. The closer an indicator's value is to zero, the more sustainable it is. Indicators number 1, 7, and 8 measure each country's progress relative to 1990 global averages, whereas the other indicators are relative to the country's/region's performance in 1990.

For the SEW EU report 2002, five out of the eight indicators were evaluated. While there was no data for investment-related indicators 4 and 6, an estimate for indicator 3 was used instead of official figures.

In terms of environmental sustainability, the EU scores mixed results. While indicator 1 '*carbon emissions per capita*' improves by 5% between 1990 and 1999, it still remains at a highly unsustainable level, which is off the mark in the star above. Indicator 2 '*local pollutant per capita*' is reduced by over a third in the same period, and has progressed towards the sustainability goal. Nevertheless, current levels are still too high.

As regards societal sustainability, the lack of data does not allow for thorough analysis. In terms of '*access to electricity for all households'*, the sustainability goal has been achieved. However, as the other indicators show, at the expense of other aspects of sustainability.

SEW EU report 2002 – indicators value table

Sustainability	**Environmental**		**Societal**		**Economic**		**Technological**	
year\indicator	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1990	2.53	1	0.01	no data	0.51	no data	0.86	1.06
1998/1999	2.41	0.66	0.01	no data	0.52	no data	0.61	1.05
change in %	-5.1	-34.2	0	x	+3.7	x	-29.2	-0.9

In the economic sustainability category, only indicator 5 '*import share of non-renewable energy*' could be evaluated. It shows a modest increase from an already unsustainably high level of import dependency.

More progress was made in terms of technological sustainability, at least in terms of the energy intensity of the economy. Indicator 7 '*energy productivity*', already better than world average in 1990, has improved considerably between 1990 and 1999. However, there is still some way to go towards a truly sustainable path. Indicator 8, which measures '*renewable energy deployment*', has seen progress from its 1990 levels. By 1999, the renewable share of primary energy consumption (excl. large hydro power) had risen by over 30%. Certainly, the boom in wind power in particular over recent years has led to even steeper increases thereafter. However, the actual share of renewables remains negligible, which is expressed in the high indicator value (> 1). Even in 1999, the EU still lacked behind the 1995 world average in using renewable energy, and the fuel mix remains highly unsustainable.

▸Environmental indicators

1. Per capita energy sector carbon dioxide emissions

Metric (actual data) for 1990 = 854,611,349.6 Metric Tonnes of Carbon (MTC) / 364.5 million people and 1999 = 842,565,219.7 MTC / 375.9 million people.
Indicator values for 1990 = 2344.612756 kg carbon per capita and 1999 = 2241.461079 kg carbon per capita

Vector values for 1990 = 2.535540779 and 1999 = 2.405134107

Change in percent for the indicator = -4.6 and for the vector = -5.14

Discussion

The vector measures the distance from the 1990 world average level of carbon any earth citizen emitted (1) and aims at 30% of that level as a sustainability goal. The EU values for 1990 and 1999 are high above the world average (ca. 1.5 times) despite a small decrease of 5%. This change towards the better stems from only a minor reduction in carbon dioxide emissions from fossil fuel combustion (- 1.41%), accompanied by population growth of 3.13%.

At present it is not clear whether this represents a downward trend that will continue in the future. Despite the EU's Kyoto commitment and the policies that have been implemented to achieve it, anecdotal reports from some Member States indicate that the trend could come to a halt. In the UK for example, emissions have been on the rise in both 2000 and 2001. In Spain, emission growth above its target was reported, and first calculations from data on Germany's primary energy consumption in 2001 indicate a rise of 1.5 % in Europe's largest greenhouse gas emitting nation[10].

It should be noted, however, that emissions of all greenhouse gases counted under the Kyoto Protocol fell more strongly than CO2 alone. They decreased by 4% between 1990 and 1999, which in fact marks half the cut the EU has pledged to achieve under the climate treaty.

References

CO2 emissions from fossil fuel combustion only (excluding e.g. fugitive emissions) are taken from EEA Technical Report No. 60/2001. This report contains the official figures submitted to the secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) in 2001, as part of the EU's annual reporting obligations. It is available from the EEA website (http://www.eea.eu.int).

Population data is from Eurostat, extracted from 'EU energy and transport in figures 2001'. The figures represent the average value over the year.

[10] Calculations for 2001 emissions in Germany from GERMANWATCH (http://www.germanwatch.org). Other emission and climate change related news are available from Climate Ark News Service (http://www.climateark.org)

2. Most significant energy-related local pollutant(s)

Metric (actual data) for 1990 = primary particulates (PM10) and precursors 25,229 kt / population 364.5 million and 1998 = 17,961 kt / population 374.9 million

Indicator values for 1990 = 69.21536351 kg per capita and 1998 = 47.90877567 kg per capita

Vector values for 1990 = 1 and 1998 = 0.65796657569

*Change in percent for the indicator = -30.8 and for the vector = -34.*2

Discussion

This indicator measures the evolution of emissions per capita of local pollutants since 1990. The sustainability goal lies at a reduction by 90% from 1990 levels. It is up to the SEW reporter to decide which pollutant to evaluate. For the SEW 2002 report on the EU, 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.

The indicator measures a set of four particulates, following a classification developed by the European Environmental Agency (EEA) "Primary (PM10) and secondary fine particulates are summed in this indicator, by using aerosol formation factors (…): SO2 0.54; NOx 0.88 and NH3 0.64." (source: EEA Indicator fact sheet 'Environmental Signals 2001: Chapter air pollution - Emissions of primary particulates and secondary particulate precursors').

The indicator values show a considerable improvement in air quality between 1990 and 1998. The level of per capita emissions of the indicator declined by over 30%. This corresponds to an improvement of the vector value by over a third. Considerable progress towards the sustainability target has been made.

This is due primarily to emissions reductions for sulphur dioxide (SO2), nitrous oxide (NOx), and primary particulates (PM 10) from the energy industry. SO2 emissions alone have been cut in half since 1990, due to "a switch from high sulphur solid and liquid fuels to natural gas in the energy industries, industry and domestic sectors, the construction of new power plants, and the use of low sulphur coal and flue gas desulphurisation." (EEA Indicator Fact Sheet Signals 2001– Chapter Air Pollution/ Emissions of SO2)

References

Particulates data taken from EEA fact sheet, available from the EEA website (http://www.eea.eu.int)

Population data same source as indicator 1.

▸Societal indicators

3. Households with access to electricity

Vector value for 1990 and 1999 = 0.01 (estimate)

Discussion

No actual data was available for this indicator.

The indicator is used to measure the availability of energy services to all parts of society.

Conversations with a number of EU energy experts revealed that it is widely assumed that grid connection is close to being total. This indicator is not regarded as particularly relevant for a strongly industrialised region as Western Europe. Some countries prepared their SEW using the weight of energy in the family budget instead.

Nevertheless, socially marginalized groups without permanent housing may be excluded from access to electricity, of course. Rural areas, however, are well-connected.

References

Pedro Barata, Euronatura, Portugal

Gunnar Boye-Olesen, INFORSE, Denmark

Rob Bradley, CAN Europe, Belgium

4. Investment in clean energy

Discussion

No data on EU level was available.

This indicator measures the share of total investment in energy that goes into renewable energy technology. Clean energy has a higher potential for job creation, seen as a social good, than centralised conventional power plants.

▸Economic indicators

5. Energy resilience: energy trade

Metric (actual data) for 1990 = non-renewable share of Gross Inland Consumption (GIC) 1,274.6 Mtoe/ net-imports of non-renewable energy 643.73 Mtoe and 1998 = 1,379.9 Mtoe / 722.93 Mtoe

Indicator values for 1990 = 50.50% and for 1998 = 52.39%

Vector values for 1990 = 0.505044719 and 1998 = 0.523900281

Change in percent for the indicator = +3.7 and for the vector = +3.7

Additional metric values: Gross Inland Consumption total in 1990 1,318.087 Mtoe, in 1998 1,435.6 Mtoe. Imports of renewable energy is assumed to be zero.

Discussion

This indicator measures the degree to which a country/ region relies on importing non-renewable fuels for their domestic energy supply. Indicator values are arrived at by dividing net-non-renewable imports by non-renewable primary energy consumption. This does not measure the country's overall reliance on non-renewable fuels. This is done via Indicator 8, which measures the share of renewable energy sources.

In statistical terms, net-non-renewable energy imports in the EU equal total net-energy imports, because renewable energy imports are not accounted for separately in the official statistics at the moment. According to information from EEA's Ian Smith, "renewable imports / exports are (almost) zero and renewable electricity (even hydro) is assumed to be zero for imports and exports. However this methodology may change."

The results for this indicator show that the EU's dependence on foreign non-renewable fuels is increasing, as primary energy consumption soars. Gross inland consumption (GIC) rose by nearly 9% between 1990 and 1998, and imports of non-renewable sources increased by 12.3%. Apparently, the additional energy demand is being filled to an increasing extent by external sources. Accordingly, import dependency increased by nearly 4%.

This development has a number of reasons. Firstly, there is a shift in the EU's energy production mix (discussed in Part I of this report) away from coal towards natural gas. In 1990, coal made up nearly 30% of domestic energy production. Between 1990 and 1998, production of coal was nearly halved. The resulting gap, worsened by a rise in overall consumption levels, could not be filled by the significant increases in the production of other fuels, such as oil or natural gas. Imports had to make up for two thirds of the additional energy needed.

Secondly, there is a sectorally specific growth in energy consumption, which changes the structure of fuel demand. The increase of nearly 9% between 1990 and 1998 was caused primarily by the tertiary sector and transport in particular. While industry reduced its energy use in times of overall rising consumption, fuel demand in transport grew by over 17% or 45 Mtoe. This increase amounts to over one third of the overall rise in energy consumption in the EU.

This development is of crucial importance regarding the future development of energy consumption in the EU and also that of carbon dioxide and other emissions. The high growth in the transport sector and increases in the services sector are the main drivers behind the overall growth (or only moderate reductions in emissions) observed in recent years. More policies targeting these sectors need to be developed and implemented if current trends are to be stopped and reversed.

This development also refutes an argument frequently made by the nuclear industry in particular, that for the sake of energy security, import dependency should be mitigated

by expanding the use of nuclear power. As long as the transport sector runs primarily on petrol, energy imports cannot be substituted by electricity. And for those that can, sustainable and low-risk alternatives are available.

References

Energy trade and consumption data from Annual Energy Review 2000.

Information on methodology for energy imports and exports from Ian Smith, Energy & Environment Data, European Environment Agency, Denmark (Ian.Smith@eea.eu.int) - personal communication.

6. Burden of energy investments

Discussion

No data on EU level was available

This indicator measures the GDP share of government investment for non-renewable energy.

▸Technological indicators

7. Energy productivity

Metric (actual data) for 1990 = GIC 1,318.087 Mtoe/ GDP 5315 billion Euros (1990)/ PPP proxy: 0.9 and 1999 = GIC 1,442.4 Mtoe/ GDP 8004 billion Euros (1999)/ PPP factor 1999: 0.918

Indicator values for 1990 = 9.3447036434 MJ/$GDP and 1999 = 6.9263355994 MJ/$GDP

Vector values for 1990 = 0.86473513402 and 1999 = 0.61219043436

Change in percent for the indicator = -25.88 and for the vector = -29.20

Discussion

This indicator measures the amount of energy used per unit of economic output. This is done by dividing primary energy consumption and gross domestic product (GDP). The indicator measures a country or region's energy productivity against the world average in 1990, which was 10.64 MJ per $ GDP. The sustainability target lies at a reduction of energy input per dollar to a tenth of this value.

The data on energy consumption had to be converted from Mtoe into megajoules for the calculation of the indicator. To account for regional differences in the actual value of the goods produced, the GDP figures are adjusted for purchasing power parity (PPP). For the EU, PPP factors for the conversion of Euros into US dollars were obtained from the Organisation for Economic Co-operation and Development (OECD).

However, EU level values were only available for the years 1997 to 2001. As these values (0.911-0.925) were constantly increasing over this five year period, the 1990 value was assumed to be below 1997 level. As the period covered by the OECD values was a high growth period, a 1990 value of 0.9 was used, just slightly below the 1997 figure. This arbitrary choice was necessary to make all figures compatible. As real 1990 PPP figures become available, the indicator should be recalculated.

According to the SEW indicator, energy productivity in the EU improved considerably between 1990 and 1998. While the EU economy already used over 10% less energy per output unit than the world average in 1990, this level was further improved by over a quarter. In 1999, the economies of the European Union were on average much more energy-efficient than at the start of the decade. Apparently, the EU has realised some of the potential for so-called 'no-regret' energy cuts through efficiency gains. Despite the fact that this development has still led to an increase in energy consumption, it is a promising trend, which has taken the EU a good step towards a more sustainable economy.

References

1990 values for GIC and GDP from Annual Energy Review 2000.

1999 values for GIC and GDP from 'EU energy and transport in figures 2001'.

PPP factors were obtained from the official statistics of the OECD (http://www.oecd.org).

8. Renewable energy deployment

Metric (actual data) for 1990 = renewable energy 43.530 Mtoe/ GIC 1318.087 Mtoe and 1998 = 58.554 / 1435.638

Indicator values for 1990 = 3.30% and 1998 = 4.08%

Vector values for 1990 = 1.0618 and 1999 = 1.0528

Change in percent for the indicator = +23.6 and for the vector = -0.85

Discussion

This indicator measures the share of renewable energy sources as a share of overall primary energy consumption. The values for the country/ region are compared with the 1995 world average value, which was 8.64% as a reference (vector value = 1). The sustainability target is a 95% share of renewable energy sources in primary energy consumption (and not just in electricity). The SEW reports follow an EIA classification of renewable energy, which excludes large hydro power (everything above 10 MW of generating capacity), but includes biomass fuels such as wood, charcoal, animal and vegetal wastes as well as energy from modern bio-fuels and waste-to-energy as well as PV, wind power, solar thermal electric, tidal, and geothermal power plants.

It should be noted that renewable energy and the respective shares of its various sources is significantly different in electricity production. Overall, renewable energy sources provide a good four percent of Europe's electricity at present. Wind, small hydro and biomass account for a good 1 % each.

For the EU share of renewable energy, all energy from hydro power was excluded, because no clear distinction between power from small and large facilities and their respective development could be made. All data from conventional sources combines all hydro power as one category, despite the potentially significant differences in the environmental and social impact of various dam sizes. According to an IEA study on 'The Evolving Renewable Energy Market', "in 1996, small hydro plants (less than 10 MW) in the European Union accounted for about 10 percent of installed hydro capacity. Small hydro capacity in 1996 was 9,643 MW, having expanded by 709 MW since 1993." Despite this indication for the share of small facilities of all hydro power in the Union, proper data for real change in growth over the observation period for the indicator was not available, therefore preventing its inclusion.

Hydro power as such accounts for the second largest single share of non-fossil, non-nuclear energy after biomass. Capacity for electricity from hydro increased between 1990 and 1998 by 17%, slower than non-hydro renewable energies.

Renewable energy as defined above, grew considerably over the same period. In absolute terms, its level was increased by over one third, from around 43 Mtoe to over 58 Mtoe. This increase corresponds to a growth in the share of renewables in overall primary energy consumption of nearly a quarter (the absolute growth level slightly lessened by higher energy consumption).

Biomass continues to hold the lion's share, although its importance decreased slightly. Biomass accounted for over 94 percent of non-hydro renewable energy in 1990, and 92% in 1999. Still, its growth accounted for most of the growth in renewables in absolute terms.

Non-biomass non-hydro renewable energy grew by nearly four-fifths (79%) between 1990 and 1998, starting from negligible levels. The available data does not reveal which particular energy source was responsible for most of this increase, but current trends lead one to attribute it to the surge in wind energy. After 1998, wind power rose even more strongly. In 2001 alone, installed capacity in wind power was increased by over one third compared to the previous year, and in 2001 stood at nearly 18,000 MW.

Nevertheless, the overall share of renewable energy in the fuel mix of primary energy consumed in the EU remains very low and at a highly unsustainable level. The vector value for 1990 and 1998 is above the 1995 world average. Renewable energy still plays only a very minor role in providing the EU with its primary energy.

References

All EU energy figures from Annual Energy Review 2000.

Wind power figures from "Wind Directions", volume April 2002 (available from the European Wind Energy Association (EWEA) (http://www.ewea.org).

References and Other Sources

Annual Energy Review 2000
http://europa.eu.int/comm/energy/en/etf_1_en.html

EU energy and transport in figureshttp://europa.eu.int/comm/energy_transport/etif/index.html

Eurostat
http://www.europa.eu.int/comm/eurostat/

General facts and figures on energy from the European Comission
http://europa.eu.int/comm/energy_transport/en/etf_en.html

HELIO International
http://www.helio-international.org

IEA study "The Evolving Renewable Energy Market"
http://www.iea.org/pubs/studies/files/evoree99/index.htm

"Wind Directions", volume April 2002 , from the European Wind Energy Association
http://www.ewea.org

More information on European Union legislation mentioned in this report:
-European Climate Change Program
http://europa.eu.int/comm/environment/climat/eccp.htm
-Emissions Trading:
http://europa.eu.int/comm/environment/climat/emission.htm
-Energy Efficiency:
http://europa.eu.int/comm/energy/en/fa_2_en.html
-Liberalisation of the Energy market:
http://europa.eu.int/comm/energy/en/internal-market/int-market.html
-Security of Supply :
http://europa.eu.int/comm/energy_transport/en/lpi_lv_en1.html

See also CAN Europe website at
http://www.climnet.org/resources/resources.htm#euenergy - or
http://www.climnet.org/ => Information => EU Climate Policy Issues