



# Renewable Energy Policy Review

## Luxembourg

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## LUXEMBOURG

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### 1. General information

#### Population and geography

Luxembourg is situated in the heart of the European Union, sharing borders with Belgium, France and Germany. With 2,586 km<sup>2</sup>, Luxembourg is the smallest country of the EU and is populated with 441,300 inhabitants. In term of landscapes, the country is divided into two distinct regions. Luxembourg is divided into 3 districts (Luxembourg, Diekirch and Grevenmacher), 12 « cantons », 118 local communities and 4 electoral territories.

The Luxembourg State is a representative democracy, in the form of a constitutional monarchy. Luxembourg joins the European Union in 1957. The separation of power is shared between the legislative power and the executive power; only the judicial power remains completely independent. The legislative power rests on the joint action of the Council and, Government House of Commons of State. The Government has a right to take initiatives out of legislative matter called "governmental initiative", which enables him to present "bills". After consultation of the Council of State, the bills are subjected to the House of Commons, within whom the government has a majority normally. After the vote of the Parliament, the Large-Duke exerts his rights of sanction and promulgation.

Lacklustre economic performance from 1950 to 1970 seemed to be related to the economic structure at the time, which was dominated by the iron and steel industry until the first oil crisis and the simultaneous world crisis in the market for steel. Iron and steel was without doubt the driving force of the Luxembourg economy: in the early 1970s it was responsible for 30 % of the total value added. Meanwhile, this industrial sector was subject to significant fluctuations in demand and prices. Its overall growth performance, bearing its cyclical nature in mind, does not seem to have been sufficient to enable the Luxembourg economy to keep pace with the rate of growth in neighbouring countries. This led to the implementation of an eminently successful [industrial diversification](#) policy from the end of the 1950s.

However, the early 1970s was the first period during which the average growth of the Luxembourg economy exceeded that of neighbouring countries. This period was marked by the particularly favourable economic climate for steel. The first oil crisis, followed by the structural crisis in the iron and steel industry and coupled with excess capacity at global level, was to bring the curtain down suddenly on this favourable situation. Since the end of the 1970s, on the other hand, the rapid development of financial services began to stimulate growth in Luxembourg. Details on the development of this sector can be found in [section 2.2.2.1](#).

The economic cycle in Luxembourg tends to mirror what happens in other European countries. However, the extent of variations in GDP is more marked, which is characteristic of a small-scale economy that is very open to the exterior and, therefore, more vulnerable to external crises. Consideration of GDP aggregates makes it easier to understand the reasons underlying the exceptional growth of GDP in Luxembourg from the early 1980s.

Over recent years, Luxembourg has been marked by slightly higher consumer price and wage inflation than its principal trading partners (Belgium, France, Germany), apart from the Netherlands. This differential may be due to the swifter transmission of external crises because of the automatic indexing system, a mechanism which ensures that pay is automatically adjusted to the cost of living index.

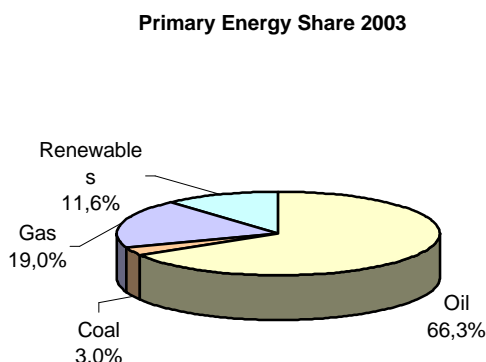
(source Static, Luxembourg 2004 [http://www.portrait.public.lu/en/economic\\_development/growth/index.html](http://www.portrait.public.lu/en/economic_development/growth/index.html))

## 2. Renewable Energy Policy

Energy and Renewable energy country profile

### Country Profile

		Thousan	
<b>Population</b>	442,972	ds	
<b>Area</b>	2,586	km <sup>2</sup>	
<b>Total Primary Energy Supply</b>	4.03	Mtoe	
<b>Electricity Production</b>	1.242	TWh	
<b>Electricity Prod. by source</b>			
Fossil Fuel	22.54	%	
Hydro	70.61	%	
Nuclear	0.00	%	
Other	6.84	%	



Source: EUROSTAT 2003

Luxembourg is a unique country with respect to energy in Europe. It is completely landlocked, it has few indigenous energy resources, and it is almost entirely dependent on imports of both fossil fuels and electricity to meet its energy needs. Luxembourg is the EU's smallest member state and is hugely dependent on imported power, 92 percent of the electricity is produced in Belgium and Germany.

Domestic energy production in Luxembourg accounted for **just over 2% in 2001** of total energy supplies. Currently oil, which is 100% imported, is the largest source of primary energy in Luxembourg, representing nearly **64%** of primary energy consumption. Gas, which supplies **18%** of primary energy demands, is also 100% imported

Luxembourg has a national target of reducing carbon dioxide emissions by 20 per cent by 2005, compared with their 1990 levels. In the context of the EU's burden sharing arrangements, Luxembourg has committed itself to reducing its average emissions of greenhouse gases by 28 per cent between 2008 and 2012 compared with their 1990 levels. This is the highest level in the EU

### Renewable Energy Sources

Renewable energy country profile

Renewable energy technology in 2003 in capacity

Luxembourg	
Population	441,300
SPV (MWc)	
Grid connected	3.50
Off grid	0.00
STH (square meter installed)	
Average surface for 1000	
SHP (2001 figure)	<b>40 MW</b>
Biogaz (Mtep)	<b>2</b>
Wood (Mtep)	<b>0.01</b>
(2002 figure)	
Wind (MW)	<b>22</b>

Source Eurobserv'ER 2003/Sun in Action 2/EWEA/ESHA

Renewable energy contributed 1.8% of Luxembourg's total energy supply and 44% of total electricity supply in 2001 compared to EU averages of 5.8% and 15.5% respectively. (IEA Renewables Information 2003)

The share of TPES from renewable energy sources has remained more or less static for the last 10 years. Wood and wastes, mainly used for electricity generation, provide the vast majority of Luxembourg's renewable energy supply, although small amounts of solar heat are also used. In addition, small-scale hydropower generated 60 GWh in 1996 (12% of domestic electricity generation). In 1996, municipal waste accounted for 46% of total renewable TPES and hydropower 13%, providing 39% and 55% of renewable electricity generation respectively. Luxembourg has few indigenous energy resources, making it almost entirely dependent on imports of both fossil fuels and electricity. Using renewable energy sources contributes to diversification and thus helps to increase security of energy supply. The share of renewable energy sources in gross inland energy consumption is very small. Renewable energy sources account for about 16 % of gross electricity production.

### **Hydro**

There are no large hydro resources in Luxembourg, and the limited resources on the Moselle river have largely been exploited. Small hydro generation varies widely year by year, and stood at 60 GWh in 1996. (figure for 2001) SHP installed capacity has increased by 43% over the period 1990 to 2001 from 28 MW to 40 MW. SHP contribution to the electrical installed capacity of the country represents one of the highest in the EU-15, around 3% over the period. Nevertheless, this relevance at national level diminishes when comparing at EU level. In 2001, only 0.4% of the EU-15 SHP capacity was installed in Luxembourg.. SHP electricity generation in Luxembourg doubled from 67 GWh in 1990 to 133 GWh in 2001. This increase is quite remarkable considering that the total electricity generation in the country has decreased by 10% in that time. Hydropower represented 71% of the country's electricity generation in 2001. SHP contributed to 15% to the total Hydropower and 11% of the total electricity generation in Luxembourg in 2001.(source Report on Small Hydropower Statistics: General Overview of the last decade 1990-2001 ESHA)Around 5-10% was produced from installed hydro autoproduction. The main renewable source for electricity production is small hydropower, which provides 9.3% of total gross electricity production in Luxembourg. These plants are located on the Moselle River. However, the limited resources on this river have largely been exploited now.

### **Biomass**

Small amounts (15 ktoe) of wood are reported as being used in the residential sector, and 1 GWh was also generated in 1996 from biogas. This will increase as 4 new biogas installations are under construction. Biomass is the second most important renewable source with a share of 5.0% of total gross electricity production (in 1999). Wood and municipal wastes are the most important biomass resources in Luxembourg. Small amounts of wood are used in the residential sector to provide heating and in 1999, primary heat production from wood (wastes) amounted to 644 TJ. Wastes, including animal products and gases from biomass, are important for the production of both electricity and heat

### **Wind**

Work has been carried out on the potential for wind power in Luxembourg, and although no generation was reported to 1996, the government estimate that 2.7 GWh were generated from 2 MW in 1997. The government estimate wind potential at 1% of electricity consumption. The share of the 22 modern wind turbines is still small, but Luxembourg has finally caught on to wind power. Luxembourg has limited renewable resource potential, explained partly by the country's small land area and lack of a coastline. Wind power has a share of only 1.7%. In 1997, the first 3 MW of wind power capacity was installed, producing about 3 GWh of electricity. The most recent figures for total installed capacity are 22 MW at the end of 2003. (EWEA)

## RE Policy Outlook

The most important legal instrument concerning RES in Luxembourg is the Framework Law of August 1993, whose fundamental objective is the rational use of energy and an assessment on Renewable Energies. However, the existing legislation continues to be marginal, in the sense that there are no provisions for Renewable Energies for the future, only active and passive solar energy will certainly be fostered by the Ministry for Energy and Environment. In 1994, Luxembourg passed legislation to support generation of electricity from renewable energy and cogeneration. This legislation provides for subsidies on the price of electricity received by the generator and also capital cost subsidies. In addition to this there are further premium payments available for electricity generated from wind and photovoltaics. Since December 1996, expenditure on certain technologies, including renewable energy systems, is tax deductible. Information and education measures relating to renewables are not followed. No public funding is allocated to renewable (or other) energy R&D. Some of the support measures seem to have had no or only limited effect. Support measures in general aimed at municipality-level or specific technologies have not resulted in the promotion of RES-E. In February 2004, the national Parliament approved a modification to the Framework Law for transposing Directive 2001/77.

Renewable energy policy is overseen by the government's Energy Agency, which was created in 1991. The Energy Agency, set up as a company under private law whose shareholders are the Government (50%), CEGEDEL (40%) and SEO (10%), is focusing its renewable energy activities on the modernisation of 11 small hydropower plants in Luxembourg, the use of thermal solar energy in swimming pools, sports installations and camping sites, and the evaluation of the potential for wind power use in Luxembourg. The national energy supply company Cegedel just started this year with selling green electricity. The latest support program is limited to 5 years, and there is a limit on RES resources for creating new capacity. Development therefore seems to be restricted.

## Electricity

RES –E promotion in Luxembourg is based on a combination of feed-in tariffs, fiscal incentives and investment subsidies. Development of the **renewable electricity production** in Luxembourg over the last decade is shown in Figure 1. **Hydropower** accounts for the largest contribution to the overall renewable electricity production, with a share of around 65-70% over the last few years. **Wind** makes a small contribution of 27 GWh in 2002. Production of electricity from **biowaste** shows more stability over time. In the period 1990-2002 electricity production from biowaste was around 23 GWh per year. The contribution of enewable energy sources to the overall electricity generation in Luxembourg was 2.1% in 1997 and 2.2% in 2002. **(source COMMISSION STAFF WORKING DOCUMENT**

The share of renewable energy in the EU Country Profiles, Overview of Renewable Energy Sources in the Enlarged European Union, **{COM(2004)366 final}** 2004)

The law that is in force for the promotion of electricity produced from RES dates from 1994. This law sets the buy-back tariff for electricity from non-industrial co-generation and renewable sources. This a Regulation of the Great Dukedom (does it mean this is a regulation, or that thee is is a separate one?), of 30.5.94, concerning electricity production from RES and cogeneration, establishes a premium for wind energy and PV, the adaptation of the tariffs to the cost of living index, some model contracts, auto supply of the autoproducers if possible, and the tariffs that are negotiated from 1.500 KW. There is a different feed-in tariff for producers with outputs of up to 500 kW and for those operating in the 501-1,500 kW range.

## Heating

Only **biomass heat** contributes to RES-heat production in Luxembourg with 25 ktoe in 2001. Production from **solar thermal** and **geothermal** sources in 2001 and the years before has been virtually zero. The same is true for the production of liquid biofuels. **(source COMMISSION STAFF WORKING DOCUMENT** The share of renewable energy in the EU Country Profiles, Overview of Renewable Energy Sources in the Enlarged European Union, **{COM(2004)366 final}** 2004)

The company LUXENERGIE was set up in July 1990 to promote CHP on the Kirchberg plateau. On 31 December 1997, 16 CHP unit were operational in the domestic sector with a total installed capacity of about 10 MW. On 31 December 2000, 40 CHP units (cat. 2) were in operation with a total installed capacity of 46.2 MW and 6 CHP units (cat. 1) were in operation with a total installed capacity of 158.5 kW.

The National Plan for Sustainable Development of 1998 sets the target to increase the share of co-generation in electricity consumption from 7% in 1997 to 15% in 2010. The Grand Ducal regulation of 11 August 1996, which set up the PEEC, promotes CHP units in municipal buildings through the grants mentioned above on the condition that they operate more than 2 000 hours per year with an annual efficiency of more than 80%. **(source IEA Energy Efficiency Update 2003 Luxembourg)**

### Transport

The systems in place in the transport sector are as follows:

- Cheap public transport with prices covering only 15% of the actual costs
- \_The 1998 National Plan considers an increase in taxes on cars to internalise better the environmental cost of transport.
- A wide range of measures such as the use of bio-fuels, electric vehicles, and the introduction of car-pooling, etc., is being considered.

(source IEA Energy Efficiency Update 2003 Luxembourg)

### 3. RE Highlights

On the basis of the Energy Lawm which came into force on the 5<sup>th</sup> August 1993, the Luxembourg government concentrated on promoting the use of renewable energies. Wind power has come to have an important role as it has the greatest economic development potential of all the renewable energy possibilities in Luxembourg. The project was the establishment of a large wind farm in the commune of Heinerscheid, located on the northern tip of Luxembourg. In 1996 the local council assigned the Energy Agency the task of developing a concept for making use of wind energy. Many interested parties had addressed the council to obtain permission to set up a wind farm in Heinerscheid. The council proposed that all parties join together with the united aim of planning, building and managing a wind farm. The wind farm was established in three Building Phases. The first was of 3 turbines with an output of 600 kW per machine and was completed by autumn 1998, the second was of 5 wind turbines at 1000 kW per turbine and they were running by the end of 1999. The final phase set up 3 turbines with an output of 1800 kW each. The total installed capacity of the Heinscheid wind farm is 12.200kW. The energy produced each year is enough to supply 6000 households (at 4000 kWh per household) this equates to 0.6% of the total energy demand on the public Electricity grid.

#### Success Factors

**Political** In Heinerscheid feed-in tariffs for electricity produced from wind power, which were established by the Grand-Ducal regulation of May 30<sup>th</sup>, 1994, are set at levels that render wind farm operation a profitable endeavor.

**Financial** The financial outlay for the wind farm was divided by the different companies participating, each of them having a certain amount of shares in the farm. Approx 1.1 m of the total investment was financed through national government subsidies.

**Innovative Actions** The partnership scheme between the interested parties, who after much organizing, founded the Wandpark Gemeng Hengsicht S.A. The capital 3,200.000 Euro, divided into 12,800 shares at 250 Euro each. The local council is the legal holder of 22.5% of the shares and aims to sell 20% to the local community. This keeps the community involved with and concerned for the success of the wind farm

### 4. Websites

Name	Description	Website
Ministry of the Environment	Develops programmes to aid the fianancing of renewables in conjunction with the AEL	<a href="http://www.environnement.public.lu/">http://www.environnement.public.lu/</a>
AEL (Agence de l'Energie du Luxembourg)	Government national energy agency, in charge of overseeing energy policy.	e-mail: <a href="mailto:ael@pt.lu">ael@pt.lu</a>
CEGEDEL	Assures the distribution of electricity through Luxembourg and is a stake holder in the AEL	<a href="http://www.cegedel.lu">www.cegedel.lu</a>
SEO	The third stakeholder in AEL	