

# AN ECO-LOGIC MOVE

## A RENEWED LEGAL FRAMEWORK FOR RENEWABLE ENERGY SOURCES

S I M O N A S A P I E N Z A



*Simona Sapienza was educated at the Sawyer Business School (Pittsburgh, US), at the University of Rome «La Sapienza» where she received her MA in Law and PhD.*

*Ms Sapienza has held various academic positions in Italy and has been legal counsel for the Italian Institute of Research for the international protection of human and civil rights. She has been actively engaged in supporting NGOs projects associated with the Department of Public Information of the UN and in inter-cultural projects promoted by the EU Commission.*

*Ms Sapienza is currently Senior Associate in the International Capital Markets department of Allen & Overy (Rome), which she joined in 2000.*

*Ms Simona Sapienza is a Board member of the Spanda Foundation.*

### → | NEW DIRECTIONS

*“The end of law is, not to abolish or restrain, but to preserve and enlarge freedom.”*

JOHN LOCKE

help reduce energy costs, produce a healthier living environment and increase the overall energy supply.

Conventional energy sources based on oil, coal and natural gas have proven to be highly effective drivers of economic progress, but at the same time, they are highly damaging to the environment and human

health. These traditional energy sources are facing increasing pressure on a multitude of environmental fronts, with perhaps the most serious one being the looming threat of climate change and a needed reduction in greenhouse gas emissions. It is now clear that efforts to maintain atmospheric CO<sub>2</sub> concentrations below even double the pre-industrial level cannot be accomplished in an oil- and coal-dominated global economy.

In principle, RES can meet many times the world's energy demand. More important, renewable energy technologies can now be considered major components of local and regional energy systems. As an alternative to centralized power plants, renewable energy systems are ideally suited to provide a decentralised power supply that could help to lower capital infrastructure costs. Renewable systems based on photovoltaic arrays, windmills, biomass, or small hydropower can serve as mass-produced energy appliances that can be manufactured at low cost and tailored to meet specific energy loads and service conditions.

These systems have less of an impact on the environment, and the impact they do have is more widely dispersed than that of centralised power plants, which in some cases contribute significantly to ambient air pollution and acid rain.

Renewable energy systems are now poised to play a major role in the energy economy and in improving the environmental quality of many countries.

A sound vision for a sustainable energy policy has been laid at the European Union level.

In January 2007 the European Commission set out an integrated energy/climate change proposal that addressed the issues of energy supply and climate change. Two months later, European Heads of

**F**OR MANY YEARS RENEWABLE energies were seen as an energy option that, while environmentally and socially attractive, occupied niche markets at best, due to barriers of cost and available infrastructure.

In the last decade, however, the case for renewable energy has become economically compelling as well.

There has been a true revolution in technological innovation, cost improvements and in our understanding and analysis of appropriate applications of renewable energy resources (RES), notably solar, wind, small-scale hydro and biomass-based energy, as well as advanced energy conversion devices such as fuel cells.

There are now a number of energy sources, conversion technologies and applications that make renewable energy options either equal or better in price and services provided than the prevailing fossil-fuel technologies. In a growing number of settings in industrialised nations, wind energy is now the least expensive option among all energy technologies, with the added benefit of being modular and quick to install and bring on-line. Also, photovoltaic panels and solar hot water heaters placed on buildings can

State welcome the plan and agreed upon an Energy Policy for Europe. The plan called for a:

- 20% increase in energy efficiency;
- 20% reduction in greenhouse gas emissions;
- 20% share of renewable energies in overall EU energy consumption by 2020;
- 10% biofuel component in vehicle fuel by 2020.

In January 2008, the European Commission put forward an integrated proposal for Climate Action, referred to as the *Energy-Climate Legislative Package*. After nearly a year of intensive negotiations, the *Energy-Climate Legislative Package* was adopted by the 27 EU member states on 12 December 2008, by the European Parliament on 17 December 2008, and finally by the Council of the European Union on 6 April 2009.

In order to achieve the European renewable energy targets, the Council adopted Directive 2009/28/EC on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directive 2001/77/EC on the promotion of electricity produced from renewable energy sources in the internal electricity market and Directive 2003/30/EC on the promotion of the use of biofuels or other renewable fuels for transport.

The directive aims at achieving by 2020 a 20% share of energy from renewable sources in the EU's final consumption of energy and a 10% share of energy from renewable sources in each member state's transport energy consumption.

To achieve these objectives, the directive for the first time sets for each member state a mandatory national target for the overall share of energy from renewable sources in gross final consumption of energy, taking into account countries' different starting points.

The share of renewable consumption comprises the direct use of renewables like biofuels plus the part of electricity and heat that is produced from RES like wind and hydro, while final energy consumption is the energy of households, industry, services, agriculture and the transport use. The denominator for the RES share includes distribution losses for electricity and heat and the consumption of these fuels in the process of producing electricity and heat.

The main purpose of the mandatory national targets set out by the directive is to provide certainty for investors and to encourage technological development allowing for energy production from all types of RES. To ensure that the mandatory national targets are achieved, member states have to follow an indicative path towards the achievement of their target.

Each EU member state will have to adopt a national renewable energy action plan setting out its national targets for the share of energy from RES consumed in transport, electricity, heating and cooling in 2020 and will have to notify it to the Commission by June 2010.

To reach the mandatory targets, member states will apply national mechanisms of support or measures of cooperation between different member states and with third countries. They will also be able to import physical renewable energy from countries outside the EU and this would provide the possibility of a physical connection with large-scale solar installations in North Africa for example.

The creation of a tradable guarantee of origin regime allows member states to reach their targets in the most cost-effective way: instead of only developing local RES, member states will also be able to buy guarantees of origin, thus certificates proving the renewable origin of energy, from other member states where the development of renewable energy is cheaper to produce.

This table gives national overall targets for the share of energy from renewable sources in gross final consumption of energy in 2020 set under Directive 2009/28/EC.

MEMBER STATE	SHARE OF ENERGY FROM RENEWABLE SOURCES IN GROSS FINAL CONSUMPTION OF ENERGY, 2005	TARGET REQUIRED BY 2020
Austria	23,3%	34%
Belgium	2,2%	13%
Bulgaria	9,4%	16%
Cyprus	2,9%	13%
Czech R.	6,1%	13%
Denmark	17,0%	30%
Estonia	18,0%	25%
Finland	28,5%	38%
France	10,3%	23%
Germany	5,8%	18%
Greece	6,9%	18%
Hungary	4,3%	13%
Ireland	3,1%	16%
Italy	5,2%	17%
Latvia	32,6%	40%
Lithuania	15,0%	23%
Luxembourg	0,9%	11%
Malta	0,0%	10%
Netherlands	2,4%	14%
Poland	7,2%	15%
Portugal	20,5%	31%
Rumania	17,8%	24%
Slovak Republic	6,7%	14%
Slovenia	16,0%	25%
Spain	8,7%	20%
Sweden	39,8%	49%
United Kingdom	1,3%	15%
<b>EU-27</b>	<b>8,5%</b>	<b>20,0%</b>

The directive sets out the following interim targets in order to ensure progress towards the 2020 target:

- 25% of target between 2011 and 2012;
- 35% of target between 2013 and 2014;
- 45% of target between 2015 and 2016;
- 65% of target between 2017 and 2018.

Individual member states are free to decide the most suitable mix of RES to be used to meet their respective targets. They will also be required to report their progress towards the interim and 2020 target every two years, from 2010.

There will be non-financial penalties if a member state fails to meet its interim targets. Said that, the Commission has reserved the right to take legal action against member states if they fail to demonstrate sufficient progress towards the interim targets. Each member state is also permitted to trade any excess renewable energy credits it may have after meeting its respective interim targets.

The directive does not recognize virtual renewable energy from investments in renewable energy projects in other countries nor allows for the creation of a European-wide market in renewable energies certificates. The directive requests that member states encourage the use of small-scale renewable energy in buildings and provide priority grid access to renewable energy sources.

It is worth noting that the directive does not provide for a single EU-wide harmonised support scheme. This is to be appreciated as at present the range of mechanisms of support for the promotion of energy from renewable sources in operation around Europe are too different and it would have been too risky to attempt any form of harmonisation.

So far member states have maintained or established their preferred support mechanism, be that premium systems/feed-in tariffs or certificate systems. In premium/feed-in systems the support levels are often differentiated for different technologies. Certificate systems are often technology neutral. All this has led to different results.

The circumstance that the Commission did not attempt to create a harmonised EU-wide payment mechanism for electricity production from RES (RES-E) must also be welcome. At this stage in fact it would have put European leadership in renewable energies at risk.

Harmonisation of a payment system for RES-E will make sense after a single EU truly competitive electricity market is established. At present, we have 27 different electricity markets with different electricity prices and it would have been highly risky to set only one support mechanism for renewable electricity.

Were the Commission to pursue a harmonised EU system, the optimal way to do so would be through the application of the polluter pays principle<sup>1</sup> and by imposing a tax on electricity production.

A part from the targets imposed by the directive, a successful framework for the development and deployment of RES-E at EU level will require political effort in four fields:

- Well designed payment mechanism;
- Grid access and strategic development of the grids;
- Good governance and appropriate administrative and planning procedures;
- Public acceptance and support.

If one or more of these key components are missing, little progress will happen. Looking at payment mechanisms in isolation may lead to wrong

conclusions about the effectiveness of a specific mechanism of support for the promotion of RES-E. It is therefore important that any analysis of the success or failure of national support mechanisms seeks to identify whether a positive or negative development can be attributed to the design of the payment mechanism, or whether other factors in the form of administrative, grid access and, or public acceptance barriers affected the development.

It should also be noted that no country has ever managed to develop a market for renewable electricity through the application of just one policy. Historically, success has been the result of combinations of policies as stated by the International Energy Agency<sup>2</sup>: *“Significant market growth has always resulted from combinations of policies, rather than single policies. (...) In no case is there evidence of strong market growth with only one policy in place. Those countries that have experienced strong growth in ‘new’ renewables, such as wind and solar, including Germany, Spain, the United States and Denmark, have done so through a combination of financial incentives and guaranteed prices, underpinned by strong R&D.”*

The Commission's efforts to identify successful and unsuccessful approaches to support mechanisms in the member states will have to take a more holistic approach, and will have to include identification of the sources leading to success or to failure. In addition, prior to a decision on harmonisation, the Commission should conduct an analysis of the various market distortions that exist, such as the varying grid connection costs throughout the EU and the differing administrative barriers, for example planning procedures, as well as specify the steps to be taken to remove the various market distortions prior to the harmonisation of the support mechanisms.

There are requirements that any future EU-wide mechanism must meet in order to create a sound investment climate for renewable energies such as compatibility with the polluter pays principle, high long-term investor confidence, simple and transparent implementation, high effectiveness in deployment of renewables, encouraging technology diversity, innovation, manufacturing, R&D, technology development and lower costs, compatibility with the liberalised electricity market and with other policy instruments, facilitating a smooth transition, encouraging local and regional benefits, public acceptance, transparency and integrity, protecting consumers, avoiding fraud and free riding.

With regard to biofuels, the directive sets the 10% target for renewable energy in the transportation sector at the same level for each member state in order to ensure consistency in transportation fuel specifications and availability. Member states that do not have the relevant resources to produce biofuels will easily be able to obtain renewable transport fuels from elsewhere. While it would technically be possible for the European Union to meet its biofuel needs solely from domestic production,

it is both likely and desirable that these needs will in fact be met through a combination of domestic EU production and imports from third countries.

Within the past few years, concerns have been raised about whether biofuel production is actually sustainable. If biofuels are a crucial part of renewable energy policy and a key solution to growing emissions in the transport sector, they must not be promoted unless they are produced sustainably.

Although the majority of biofuels currently consumed in the EU are produced in a sustainable manner, the concerns are legitimate and need to be addressed.

The directive therefore sets out stringent environmental sustainability criteria to ensure that biofuels that are to count towards the European targets are sustainable and that they are not in conflict with overall environmental goals. This means that they must achieve at least a minimum level of greenhouse gas savings and respect a number of requirements related to biodiversity. Among other things this will prevent the use of land with high biodiversity value, such as natural forests and protected areas, being used for the production of raw materials for biofuels.

Regardless of whether the raw materials were cultivated inside or outside the EU territory, biofuels can be accounted for with respect to the target of 10% renewable energy in transport and, therefore, with respect to the national targets in terms of renewable energy, and benefit from possible financial support from the member states, only if they fulfil the following sustainability criteria:

- The greenhouse gas emission saving from the use of biofuels shall be at least 35%;
- Biofuels shall not be made from raw material obtained from land with high biodiversity value, such as primary forest and other wooded land where there is no clearly visible indication of human activity, areas designated for nature protection purposes or for the protection of rare, threatened or endangered ecosystems or species, or highly bio-diverse grassland;
- Biofuels shall not be made from raw material obtained from land with high carbon stock, such as wetlands, continuously forested areas;
- Biofuels shall not be made from raw material obtained from peat land.

Although targets themselves do not guarantee success they act as an important catalyst as they encourage investors to commit, enable stable technological deployment and cost reductions, and encourage research.

A critical strategy for effectively promoting energy efficiency is implementing new standards for buildings, appliances and equipment. Significant advances in the efficiency of heating and cooling systems, motors, and appliances have been made

in recent years, but more improvements are technologically and economically feasible.

The current status of legislation and the different mechanisms of support for the promotion of renewables, and of RES-E in particular, currently in place at national level need now to be briefly outlined also for a better understanding of the impact that the new mandatory targets imposed by Directive 2009/28/EC may have on the renewable energy policies of each member state.

This table gives the reference values of national indicative targets for electricity produced from renewable energy sources set under Directive 2001/77/EC.

MEMBER STATE	RES-E% 2010 INDICATIVE TARGETS
Austria	78,1
Belgium	6,0
Bulgaria	11,0
Cyprus	6,0
Czech Republic	8,0
Denmark	29,0
Estonia	7,5
Finland	31,5
France	21,0
Germany	12,5
Greece	20,1
Hungary	21,0
Ireland	13,2
Italy	25,0
Latvia	49,3
Lithuania	7,0
Luxembourg	5,7
Malta	5,0
Netherlands	9,0
Poland	7,5
Portugal	39,0
Rumania	33,0
Slovak Republic	31,0
Slovenia	33,6
Spain	29,4
Sweden	60,0
United Kingdom	10,0

#### A U S T R I A

With a share of 70% RES-E of gross electricity consumption in 1997, Austria was the leading EU Member State for many years. Large hydropower is the main source of RES-E in Austria. More recently, a steady rise in the total energy demand has taken place, and a decrease of the share of RES-E has been noted.

Austrian policy supports RES-E through feed-in tariffs that are adjusted annually by law. The responsible authority is obliged to buy the electricity and pay a feed-in tariff. The annual allocated budget for RES support has been set at EUR 17 million for new RES-E up to 2011. This yearly budget is pre-allocated to different types of RES (30% to biomass, 30% to biogas, 30% to wind, 10% to photovoltaic and other RES). Within these categories, funds will be given on a first demand basis.

Biofuels are completely exempt from fossil fuel taxes. On 1 October 2007 an Order entered into force regarding a tax rebate for biofuel blends.



A variety of federal programmes for the support of the production of heat and cold from RES is being applied. These consist mainly of investment subsidies.

#### BELGIUM

With a production of 1,1% RES-E of gross electricity consumption in 1997, Belgium was at the bottom of the EU15. Targets differ between the three regions of the country (Flemish region, Walloon region and the Brussels-Capital Region) and national energy policies are implemented separately, leading to differing supporting conditions and separate, regional markets for green certificates. Policy measures in Belgium contain incentives to use the most cost-effective technologies. Biomass is traditionally strong in Belgium, but both hydropower and onshore wind generation have shown strong growth in recent years.

Two sets of measures are key to the Belgian approach to RES-E: obligatory targets have been set through the obligation for all electricity suppliers to supply a specific proportion of RES-E and guaranteed minimum prices have been foreseen. In all three of the regions, a separate market for green certificates has been created. Due to the low penalty rates that will increase over time, it is at the moment more favourable to pay penalties than to use the certificates. Little trading has taken place so far.

Investment support schemes for RES-E investments are available. Among them is an investment subsidy for photovoltaic. Production of heat and cold from RES is being supported by investment incentives in all three regions. The maximum level of support is as high as 15% in the Walloon region and 20% in both Flemish and Brussels-Capital regions.

#### BULGARIA

The RES-E target to be achieved in 2010 is about 11% for electric energy consumption. The goal of Bulgaria's National Programme on Renewable Energy Sources is to significantly increase the share of non-hydroelectric RES in the energy mix.

RES-E policy in Bulgaria consists of a green certificate trading system under which public providers are required to supply minimum mandatory quota as a percentage of the total annual electricity production. Highly efficient combined heat and power plants is also included in the tradable green certificate scheme. In Bulgaria, biofuels have been exempt from excise tax since 2005.

In order to promote production of heat and cold from RES, Bulgaria implemented the Bulgarian Energy Efficiency and

Renewable Energy Credit Line. RES projects are eligible for a 20% grant. Large-scale hydropower exhibits a high penetration rate. Some pilot projects have been implemented using wind power, but in absolute figures, the contribution made by wind power is minimal.

#### CYPRUS

The leading RES in Cyprus is photovoltaic, and wind power offers high potential. An issue regarding policy integration has been observed as there is investment at present in a new fossil fuel power plant creating excess capacity. Until 2005, measures that proactively supported renewable energy production, such as the New Grant Scheme, were not very ambitious. In 2006, a New

Enhanced Grant Scheme for Energy Conservation and Promotion of the Use of RES was agreed upon. It regulates RES-E policy and provides financial incentives (30-55% of investments) in the form of government grants and feed-in tariffs are part of this scheme. In order to promote the use of biofuels, a measure was taken to exempt the biomass percentage of biodiesel from excise duty, as of 2005.

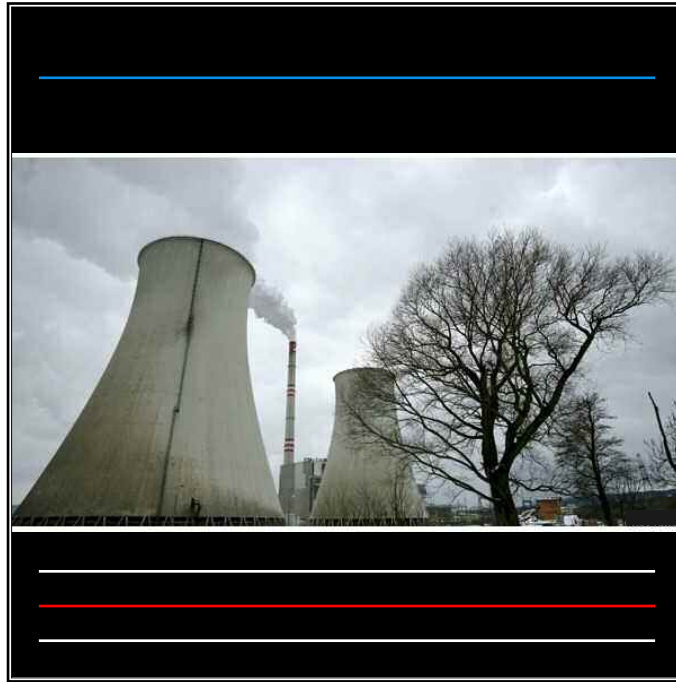
The New Enhanced Grant Scheme for Energy Conservation and Promotion of the Use of RES also provides financial incentives for RES heating and cooling activities: 30-45% of investment in solar systems for central water heating systems and 40-55% of investment in space heating and cooling can be recovered in this way.

#### CZECH REPUBLIC

The Czech Republic's legislative framework in relation to RES has been strengthened by a RES Act adopted in 2005 and a Government Order regulating the minimum amount of biofuels or other RES fuels that must be available for motor fuel purposes. Targets for increasing RES in total primary energy consumption have been set at national level. The use of biomass in particular is likely to increase as a result of the new legislation.

In order to stimulate the growth of RES-E, the Czech Republic has decided on the following measures: a feed-in system for RES-E and cogeneration in 2000. The RES Act extends this system by offering a choice between a feed-in tariff, thus a guaranteed price or a green bonus, thus an amount paid on top of the market price.

Premiums to the electricity price are foreseen for producers of electricity from combined heat and power plants. Besides this, investment support from 30-80% is available whenever the applicants are non-profit organizations.



The use of biofuels is being encouraged through an air protection act, which requires that a minimum amount of biofuel, or other fuels produced from RES, is made available to the market. Government Resolution no. 1080 of 20 September 2006 provides for a minimum quantity of biofuels in the range of motor-vehicle fuels without any subsidies or state support.

#### DENMARK

Due to an average growth of 71% per year, Danish offshore wind capacity remains the highest pro-capite. Denmark is at present close to reaching its RES-E target for 2010. RES other than offshore wind are slowly but steadily penetrating the market, supported by a wide array of measures such as a new repowering scheme for onshore wind.

Denmark has been slow in introducing biofuels to the market and is behind on its EU target.

In order to increase the share of RES-E in overall electricity consumption, Denmark has implemented a tendering procedure for two new large offshore installations. A spot price, an environmental premium and an additional compensation for balancing costs for 20 years is available for new onshore wind farms. Furthermore, fixed feed-in tariffs exist for solid biomass and biogas under certain conditions. Subsidies are available for combined heat and power plants based on natural gas and waste.

The generation of heat and cold from RES is supported by means of tax exemptions. Biomass, being CO<sub>2</sub> neutral, is exempt from CO<sub>2</sub> duty. Solar heating plants are exempt from both energy and CO<sub>2</sub> taxes. The Executive Order *Solar heating obligations in new buildings outside the district heating areas*, adopted in 2001, requires the introduction of solar heating from owners of new buildings, excluding the domestic sector. Solar thermal installations are also eligible for subsidies. Both regulations apply only outside district heating areas.

Biofuels have been exempt from the CO<sub>2</sub> tax imposed on ordinary petrol and diesel for transport since January 2005. This is currently the main supporting measure for biofuels. As of 1 January 2010 all filling stations have to sell at least 5.75% biodiesel and bioethanol.

#### ESTONIA

Estonia's potential lies mainly in biomass, biogas, wind and cogeneration from biofuels. Small-scale hydroelectric is being developed as only about half the potential is currently exploited. By end-2005, 36.2MW were produced from hydroelectric and wind. The use of renewable fuels did not change significantly between 1999 and 2005, and in 2006 the percentage of biofuels in the transport fuel mix was just 0.12%.

For electricity, feed-in tariffs will be paid for some years but not beyond 2015. There is a single feed-in tariff level for all RES-E technologies. Relatively low feed-in tariffs make new renewable investments very difficult. In 2001, a voluntary mechanism involving green energy certificates was created by the grid operator, the state-owned Eesti Energia Ltd.

District heating law promotes the use of indigenous sources and RES for heat production. Biofuels used for transport or heating have been exempt from excise tax since 2005. In 2006 a development plan to promote the use of biomass and bioenergy for 2007-2013 was drawn up, and direct aid is available to expand the energy crop area.

New RES-E regulation in force since 2007 includes three support options: feed-in tariff, premium and certificate of origin, and is valid for RES-E production from facilities with capacity less than 100MW.

#### FINLAND

Finland continues to adjust and refine its energy policies in order to enhance the competitiveness of RES. Through subsidies and energy tax exemptions, Finland encourages investment in RES. Solid biomass and large-scale hydropower dominate the market, and biowaste is also increasing its share. Additional support in the form of feed-in tariffs based on purchase obligations or green certificates is being considered for onshore wind power.

Biomass is the most important renewable energy source in Finland, with its use accounting for about 20% of primary energy consumption.

The main measures to encourage the use of RES-E in Finland consist in tax subsidies, the RES-E has been made exempt from the energy tax paid by end users, in discretionary investment subsidies, new investments are eligible for subsidies up to 30%, up to 40% especially for wind and in guaranteed access to the grid for all electricity users and electricity-producing plants, including RES-E generators. Taxes imposed on heat are calculated on the basis of the net carbon emissions of the input fuels and are zero for RES. Further encouragement of the production of heat and cold from RES takes the form of direct biomass investment support.

Feed-in tariff for biogas plants started in 2008.

Biofuels benefit from tax exemptions under certain conditions. Biogas used as motor fuel, for instance, is exempt from excise duty. A law on the promotion of biofuels, entered into force on 1 January 2008, obliged fuel distributors to supply a minimum of 2% biofuels to the transport market in 2008, with annual increases so that it will be at least 5.75% by end of 2010.

#### FRANCE

France has centred its RES approach around feed-in tariffs on the one hand, and a tendering procedure on the other. Hydropower has traditionally been important for electricity generation, and the country ranks high when it comes to biofuel production. France has vast resources of wind, geothermal energy and biomass. Wind power and geothermal electricity have shown growth. In addition, there is potential in the area of solid biomass.

The French policy for the promotion of RES-E includes feed-in tariffs introduced in 2001 and 2002, and modified in 2005 for photovoltaic, hydro, biomass, sewage and landfill gas, municipal solid waste, geothermal, offshore wind, onshore wind, and combined heat and power, a tender system for large renewable projects.

Stimulating the uptake of production of heat and cold from RES is done in three ways: tax credits of 50% are available, a 5.5% reduction in VAT has been introduced for residential energy equipment using RES, and subsidies of up to 40% are granted for biomass heating plants. Policy exists to ensure electricity is bought from biomass installations of less than 12 MW capacity. There is a tax credit for private individuals who purchase renewable energy products for their homes like wood heating.

Law no. 2005-781 of 13 July 2005 ensured that biofuel use reached 5.75% by 2008 rather than by 2010 as mentioned in Directive 2001/77/EC, and reaches 7% by 2010 and 10% by

2015. Suppliers who do not meet these targets pay an additional tax for polluting activities. Partial tax exemption exists to cover the currently higher costs of biofuel production compared with fossil fuels, with the percentage changing annually, depending on economic conditions. Capital grants are also in place to promote biofuels.

#### GERMANY

Germany is a EU leader in wind utilisation, photovoltaic, solar thermal installations and biofuel production. Its onshore wind capacity covers approximately 50% of the total installed capacity in the EU. A stable and predictable policy framework has created conditions favourable to RES penetration and growth. Feed-in tariffs for RES-E, market incentives for the production of heat and cold from RES, and tax exemptions for biofuels have proven to be a successful policy mix leading to a very dynamic market for RES. In 2006, about 70% of renewable energy was generated from biomass, and 11,8% of electricity was generated from RES.

Germany has already exceeded its 2010 biofuel target of 5,75%. With the aim of promoting RES-E, Germany through its Renewable Energy Act of 2004 has introduced feed-in tariffs for onshore wind, offshore wind, photovoltaic, biomass, hydro, landfill gas, sewage gas and geothermal, large subsidised loans available through the DtA (Deutsche Ausgleichsbank) Environment and Energy Efficiency Programme.

A Market Incentive Programme provides subsidies for the production of heat and cold from RES, with excellent results in solar thermal and small-scale biomass heat generation.

From 1 January 2007, firms have been obliged to market biofuels using a quota system: 4,4% for diesel and 1,2% for petrol; this will be increased annually. Second generation biofuels, biogas and pure bioethanol will be granted a decreasing tax incentive until 2015.

#### GREECE

Hydropower has traditionally been important in Greece, and the markets for wind energy and active solar thermal systems have grown in recent years. Geothermal heat is also a popular source of energy. The Greek parliament has recently revised the RES policy framework partly to reduce administrative burdens on the renewable energy sector.

General policies relevant to RES include a measure related to investment support, a 20% reduction of taxable income on expenses for domestic appliances or systems using RES, and a concrete bidding procedure to ensure the rational use of geothermal energy. In addition, an inter-ministerial decision was taken in order to reduce the administrative burden associated with RES installations.

To stimulate the growth of RES-E, Greece has introduced feed-in tariffs in 1994 as amended by the recently approved Feed-In Law. Tariffs are now technology-specific, instead of uniform, and a guarantee of 12 years is given, with a possibility of extension of up to 20 years, fuel taxes are not applied to biofuels.

#### HUNGARY

Geographical conditions in Hungary are favourable for RES development, especially biomass.

Whilst environmental conditions are the main barriers to further hydropower development, other RES such as solar, geothermal and wind energy are hampered by

administrative constraints like the permit process. As regards the policy framework, promotional schemes are being used and refined, and subsidies are available under certain conditions for the development of RES.

RES-E 2010 target was achieved in 2006 (5%), with the main contribution being from biomass. However, domestic production was at 4,4%.

For the promotion of RES-E Hungary as introduced a feed-in system. It has used technology-specific tariffs since 2005, when Decree 78/2005 was adopted. These tariffs are guaranteed for the lifetime of the installation. A green certificate scheme was introduced with the Electricity Act of 2001, as amended in 2005. In July 2007, two advantageous tax levels were introduced for bioethanol. In particular bioethanol for E85 has been completely exempt since 2007. A similar procedure was introduced in January 2008 for biodiesel.

#### IRELAND

Hydro and wind power make up most of Ireland's RES-E production. Despite an increase in the RES-E share during the past decade, the target is still far off. Ireland has selected the Renewable Energy Feed-In Tariff as its main instrument. From 2006, this new scheme has provided some investor certainty, due to a 15-year feed-in tariff guarantee. No real voluntary market for renewable electricity exists. There is also an absence of a genuine market for biofuels, however, support schemes have been in place since 2005 so this is expected to change.

Between 1995 and 2003, a tender scheme, the Alternative Energy Requirement, was used to support RES-E. Since 2006, the Renewable Energy Feed-In Tariff has become the main tool for promoting RES-E. Feed-in tariffs are guaranteed for up to 15 years, but may not extend beyond 2024. During its first year, 98% of all the REFIT support has been allocated to wind farms.

Since 2005, the Biofuels Mineral Oil Tax relief scheme allows for excise relief on biofuels for a total of EUR 3 million per year. In 2006, a five-year biofuels excise relief package worth EUR 200 million was also approved. The Energy Crops Scheme provides further support, with aid of EUR 45 per hectare for areas sown under energy crops, topped up by EUR 80 of Irish funds. A scheme was launched in early 2007, primarily for vehicle fleets, using pure plant oil: they will receive a 75% grant for modifying engines.

Grant aid is available through the Greener Homes Scheme and the ReHeat Programme for the development of the production of heat and cold from RES.

An Energy White Paper was published in March 2007, setting the energy policy framework for 2007-2020. The government has presented policy proposals to significantly increase the use of biomass in electricity generation by co-firing it in peat-fired power stations.

#### ITALY

Despite strong growth in sectors such as onshore wind, biogas and biodiesel, Italy is far from the targets set at both the national and European level. Several factors contribute to this situation. First, there is a large element of uncertainty due to recent political changes and ambiguities in current policy design. Second, there are administrative constraints such as complex authorisation procedures at local level. Third, there are financial barriers such as high grid connection costs.

In Italy, there is an obligation on electricity generators to produce a certain amount of RES-E. At present, the Italian

government is working out the details of more ambitious support mechanisms for the development and use of RES.

In order to promote RES-E, Italy provides that a priority access to the grid system is granted to electricity from RES and combined heat and power plants. Italy has also introduced the obligation for electricity generators to feed a given proportion of RES-E into the power system.

In case of non-compliance with national targets, sanctions are foreseen, but enforcement in practice is considered difficult because of ambiguities in the legislation.

Tradable Green Certificates, which are tradable commodities proving that certain electricity is generated using RES, are used to fulfil the RES-E obligation. A feed-in tariff for photovoltaic exists. This is a fixed tariff, guaranteed for 20 years and adjusted annually for inflation.

National legislation is being developed, both for the production of heat and cold from RES and for biofuels. Subsidies are already in place for bioethanol production and tax exemptions for biodiesel production.

As yet, no national policy framework exists that supports the production for heat and cold from RES. In the meantime, certain regional and local governments have introduced some measures to promote RES. These have taken the form of incentives for solar thermal heating and compulsory installation of solar panels in new or renovated buildings.

#### LATVIA

In Latvia, almost half of the electricity consumption is provided by RES, with hydropower being the key resource. The growth observed between 1996 and 2002 can be ascribed to the so-called double tariff, which was phased out in 2003. This scheme was replaced by quotas adjusted annually. Wind and biomass would benefit from clear support since the potential in these areas is considerable.

The two main RES-E policies which have been followed in Latvia consist of fixed feed-in tariffs, which were phased out in 2003 and a quota system which has been in force since 2002, with authorised capacity levels of installations determined by the Cabinet of Ministers on an annual basis.

In addition, biofuels are subject to a reduced excise tax rate. Rapeseed oil is subject to 0% excise tax, regardless of its end use.

#### LITHUANIA

Lithuania depends to a large extent on the Ignalina nuclear power plant that currently generates up to 70% of total electricity. The National Energy Strategy includes plans related to the start of operation of a new nuclear power plant that will result in a major rise of electricity generation output in 2016. In order to provide alternative sources of energy and electricity in particular Lithuania has set a national target of 12% RES by 2010. The implementation of a green certificate scheme was however postponed for 11 years. The biggest renewables potential in Lithuania can be found in the field of biomass, with an expected nine fold rise in electricity generation between 2006 and 2017. Furthermore, electricity from wind is expected to rise by 54 times between 2006 and 2017.

The core mechanisms used in Lithuania to support RES-E are feed-in tariffs. In 2002, the National Control Commission for Prices and Energy approved the average purchase prices of green electricity. The tariff levels will remain unchanged until December 2020.

In September 2006, the procedure for promoting generation and purchasing of RES-E was updated to include wind, biomass, solar and hydropower plants with a capacity of less than 10 MW.

The National Energy Strategy provides for the improvement of the procedures for the promotion and purchase of electricity from RES to encourage competition among the producers and to introduce the system of green certificates or other systems beyond 2020.

In order to promote biofuels, the Law on Excise Taxes of 2001 provides for excise tax relief. Besides this, the Law on Pollution Tax further stimulates the uptake of biofuels.

Through the Law on Heat of 2003, municipalities encourage the purchase of heat fed into heat supply systems produced from RES. Investment subsidies and loans on favourable terms are also made available by the Lithuanian Environmental Investment Fund.

#### LUXEMBOURG

Despite a wide variety of support measures for RES and a stable investment climate, Luxembourg has not made significant progress towards its targets in recent years. In some cases, this was due to limitations on eligibility and budget. While electricity production from small-scale hydropower has stabilised in recent years, the contributions from onshore wind, photovoltaic and biogas have now started to increase.

The 1993 Framework Law, amended in 2005 determines the fundamentals of Luxembourg RES-E policy.

Preferential tariffs are given to the different types of RES-E for fixed periods of 10 or 20 years.

The feed-in system might be subject to change due to further liberalisation of the sector. Subsidies are available to private companies that invest in RES-E technologies, including solar, wind, biomass and geothermal technologies.

Tax exemptions are made for biofuels for transport. The setting of maximum levels of tax exemption is foreseen. Pure biofuels are tax-free from 2007 to encourage captive fleets to switch.

To promote the production of heat and cold from RES, Luxembourg provides investment subsidies for combined heat and power plants, for the installation of heat pumps (25%) and for installation of solar thermal (40%).

#### MALTA

The market for RES in Malta is still at an early stage and, at present, penetration is minimal. RES has not been adopted commercially, and only solar energy and biofuels are used. Nevertheless, the potential for solar and wind is substantial. In order to promote the uptake of RES, the Maltese government has created framework for support measures. It has set national indicative targets for RES-E lower than the ones agreed to in its Accession Treaty, between 0,31% and 1,31%, instead of 5%.

In Malta, RES-E is supported by a fixed feed-in tariff of 46,6 EUR/MWh for photovoltaic installations below 3,7 kWp; and a reduction in value-added tax on solar systems from 15% to 5%.

Since 2005, excise taxes no longer apply to the biomass content in biodiesel.

#### THE NETHERLANDS

In 2003, after a period during which support was high but markets quite open, a system was introduced that installed sufficient incentives for domestic RES-E production.



Although successful in encouraging investments, this system, based on premium tariffs, was abandoned in August 2006 due to budgetary constraints. Political uncertainty concerning renewable energy support in the Netherlands is compounded by an increase in the overall energy demand. Progress towards RES-E targets is slow, even though growth in absolute figures is still significant.

RES-E policy in the Netherlands is based on the 2003 Environmental Quality of Power Generation policy programme, and comprises source specific premium tariffs, paid for 10 years on top of the market price. These tariffs were introduced in 2003 and are adjusted annually. Tradable certificates are used to claim the feed-in tariffs. The value of these certificates equals the level of the feed-in tariff. Due to budgetary reasons, most of the feed-in tariffs were set at zero in August 2006.

A Guarantee of Origin system was introduced, simply by renaming the former certificate system.

Biofuels have traditionally been supported by means of R&D funds. To date, technological innovations in this field are encouraged by means of financial support. In 2006, a tax relief system was introduced.

The mechanism that was chosen links the quantity of biofuels to the national targets, by requiring of suppliers that regular fuels contain a 2% share of biofuel from 2007 onwards, and a 5,75% share from 2010 onwards.

No resources are specifically allocated to biomass production, but there are instruments for RES-E such as a tax bonus.

Limited investment subsidies are available for RES heating and cooling activities. Feed-in tariffs are also applied to combined heat and power plants.

#### P O L A N D

Progress towards the RES-E target in Poland is slow. The penalties designed to ensure an increased supply of green electricity have not been adequately used. The potential of hydropower, biomass and landfill gas is high in Poland. Hydro power plants have not been fully used to date, biomass resources in the form of forestry residues, agricultural residues and energy crops are plentiful in Poland, and landfill gas is promising as well.

Polish RES-E policy includes the Tradable Certificates of Origin introduced by the April 2005 amendment of the Law on Energy of 1997. The Obligation for Power Purchase from Renewable Sources of 2000, as amended in 2003 involves a requirement on energy suppliers to provide a 27,5% minimum share of RES-E in 2010. Failure to comply with this legislation leads, in theory, to the enforcement of a penalty.

An excise tax exemption on RES-E was introduced in 2002. The Energy Act of April 2007 incorporates a principal support mechanism of Certificates of Origin for RES-E: all energy companies selling electricity to end users have to obtain and present for redemption a specified number of Certificates or pay a substitution charge. A liquid biofuel quality requirement regulation entered into force in September 2006.

Since January 2007, biocomponents for liquid fuels and liquid biofuels have been exempt from excise duty. Preferential excise duty treatment was planned to increase under an Act of May 2007. An obligation to add a specified volume of bio-component to fuels was also introduced by two acts in June 2006.

Another element in this policy mix is structural funds, which can be used to improve the infrastructure of biofuels and other RES.

#### P O R T U G A L

What has been adopted so far in Portugal in relation to renewable energy constitutes a comprehensive policy mix, complete with monitoring system. Portugal has been moving further away from its RES-E target between 1997 and 2004. In part, this is due to the fact that the target was not entirely realistic as it was based on the exceptional hydropower performance of 1997. As a consequence, Portugal is not expected to reach its target, even if measures are successful. In 2006, 74% of total RES-E production was from hydropower.

The world's first wave power plant with a capacity of 4 MW is operating, and a licence has been awarded for a photovoltaic power plant with forecast production of 76 GWh per year.

To stimulate the uptake of RES-E, Portugal has introduced fixed feed-in tariffs per kWh for photovoltaic, wave energy, small hydro, wind power, forest biomass, urban waste and biogas. Investment subsidies up to 40% can be obtained. Tax reductions are available.

A law was adopted in August 2007 providing the legal basis for government use of public maritime areas for producing electricity from sea-wave power.

Since January 2006, when Directive 2003/30/EC was transposed into national law, the form of support for biofuel production consisted in the total or partial exemption from excise duty up to a quota set annually, total Petroleum and Energy Products Duty exemption for biofuels produced in certain pilot projects. Besides this, there is the possibility of imposing a quota for biofuels in transport fuels, and of establishing voluntary agreements whenever the biofuel share in blends exceeds 15% in the case of public passenger transport fleets.

A broad range of policy measures has been implemented to ensure the uptake of the production of heat and cold from RES. Investment subsidies are available, and the new Portuguese building code introduces the obligation to install solar thermal systems in certain cases. On top of this, accelerated depreciation on solar thermal equipment investments has been made possible. In the region of Madeira, non-returnable grants are also available for domestic solar thermal systems.

In September 2007, new incentives for the micro-generation of renewable electricity were approved as part of a package for reducing carbon emissions. The micro-generation tariff is EUR 650/MWh for an initial five-year period. By 2015 national micro-generation capacity will be around 200 MW.

#### R O M A N I A

In terms of RES of gross electricity consumption, Romania is on target. The majority of all RES-E is generated through large-scale hydropower. To a large extent, the high potential of small-scale hydropower has remained untouched. Provisions for public support are in place, but renewable energy projects have so far not been financed.

To promote RES-E, Romania introduced a quota system with Tradable Green Certificates for new RES-E in 2004. The mandatory quota increased from 0,7% in 2005 to 8,3% in 2010. Tradable Green Certificates are issued to electricity production from wind, solar, biomass or hydropower generated in plants with less than 10 MW capacity. Mandatory dispatching and priority trade of electricity produced from RES has been introduced since 2004. Legislation on biofuels was transposed into national legislation in December 2005.

The list of priorities of the Romanian Energy Efficiency Fund established in 2002 includes the use of RES for heating.

#### SLOVAK REPUBLIC

In the Slovak Republic, large-scale hydro energy is the only RES with a notable share in total electricity consumption. An extended development programme with 250 selected sites for building small hydro plants has been adopted. In the Slovak Republic, the highest additional mid-term potential of all RES lies with biomass. The Government has decided to only use this source in remote, mountainous, rural areas, where natural gas is not available.

The Strategy of Higher Utilisation of RES in the Slovak Republic was approved in April 2007.

RES-E policy in the Slovak Republic includes measures that gives priority regarding transmission, distribution and supply of RES-E, guarantees of origin, and tax exemption

for RES-E. This regulation is valid for the calendar year in which the facility commenced operation and then for five consecutive years. A system of fixed feed-in tariffs has been in place since 2005.

Subsidies up to EUR100,000 are available for the (re)construction of RES-E facilities.

In 2005, the National Programme of Biofuel Development was adopted. Production of heat and cold from RES is promoted through the Programme supporting Energy Savings and Utilisation of RES aiming to create a favourable climate for investments. Subsidies up to EUR 100,000 are also available for the (re)construction of facilities for the production of heat and cold from RES.

#### SLOVENIA

Slovenia is currently far away from meeting its RES targets. The potential of solid biomass is high, with over 54% of land covered with forests. This RES has recently started to penetrate the market. Hydropower, at this time the principal source of RES-E, relies on a large amount of very old small hydro plants.

The Slovenian government has made their refurbishment part of the renewable energy strategy. An increase in capacity of the larger-scale units is foreseen as well. In Slovenia, a varied set of policy measures has been accompanied by administrative taxes and complicated procedures.

In Slovenia, the RES-E policy provides that RES-E producers can choose to receive either fixed feed-in tariffs or

premium feed-in tariffs from the network operators. According to the Law on Energy, the uniform annual prices and premiums are set at least once a year. Subsidies or loans with interest-rate subsidies are available. Most of the subsidies cover up to 40% of the investment cost. Investments in rural areas with no possibility of connection to the electricity network are eligible to apply for an additional 20% subsidy.

Since 2004, pure biofuels used as motor fuels have been exempt from the excise inspection and payment system.

When blended with fossil fuels, a maximum 5% exemption from the payment of excise duty can be claimed. Slovenia applies a system whereby distributors are obliged to place on the market a percentage of biofuels that corresponds to the national target. This measure was introduced in 2005. Since 2004, Slovenia has supported the growth of heat and cold production from RES through subsidies, up to 40% of the investment, and through loans with interest-rate subsidies.



#### SPAIN

Spain is currently far from its RES-E target. In 1997, a strong support programme in favour of RES was introduced. In 2004, hydropower still provided 50% of all green electricity, while onshore wind and biomass had started penetrating the market. Photovoltaic energy is also promising, with an average growth rate of 54% per year. Proposed changes to the feed-in tariffs and the adoption of a new Technical Buildings Code in 2006 show increased support for biomass, biogas, solar thermal electricity, and solar thermal heat.

RES-E in Spain benefits from a feed-in tariff or a premium price paid on top of the market price. The possibility of a cap and floor mechanism for the premium is being considered. Recently support for biomass, biogas and solar thermal electricity has been considered. Low-interest loans that cover up to 80% of the reference costs are available. In May 2007 a new renewable energy legislation was passed that increased the tariffs for renewables from 50-100% for biomass, and from 16-40% for biogas.

The fuel tax exemption currently in place is applied specifically to the volume of biofuel.

The production of heat and cold from RES is supported through the new Technical Buildings Code of 2006 which includes an obligation to cover 30-70% of the domestic hot water demand from solar thermal energy and it applies to all new buildings and renovations. The assumed volume of hot water demand and the geo-

graphical location of the building determine the exact percentage that applies. Investments in the production of heat and cold from RES are eligible for investment subsidies of 36,4% of the total cost.

#### S W E D E N

Sweden is moving away from its RES-E target. In absolute figures, RES-E production has decreased mainly due to a lower level of large-scale hydro production. Other RES like biowaste, solid biomass, off-shore wind and photovoltaic have, however, shown significant growth. In Sweden, a comprehensive policy mix exists with tradable green certificates as the key mechanism. This system creates both an incentive to invest in the most cost-effective solutions, and uncertainty for investment decisions due to variable prices.

Swedish RES-E policy is composed of Tradable Green Certificates introduced in 2003. The Renewable Energy with green certificates bill that came into force on 1 January 2007 shifts the quota obligation from electricity users to electricity suppliers, and incorporates a new target of 17 TWh by 2016.

Since 2005, renewable fuels must make up at least 3% of all petrol and diesel consumption for transport operations. Green taxes such as the carbon dioxide tax promote biofuels in an indirect way. In addition, the Swedish government is currently increasing the number of alternative fuel pumps. Finally, a subsidy is granted for investment in filling stations for biogas and other renewable fuels.

In Sweden, the production of heat and cold from RES is supported in an indirect way by raising taxes on fuels. Biofuels, solid waste and peat are tax-exempt for most energy uses. Investment grants are available for solar heating installations.

#### U N I T E D   K I N G D O M

In the United Kingdom, renewable energies are an important part of the climate change strategy and are strongly supported by a green certificate system with an obligation on suppliers to purchase a certain percentage of electricity from RES, and several grant programmes. Progress towards meeting the target has been significant. Growth has been mainly driven by the development of significant wind energy capacity, including offshore wind farms.

The United Kingdom's policy regarding RES consists of three key strands: obligatory targets with tradable green certificate system, in particular renewables obligation on all electricity suppliers in Great Britain to supply a specific proportion of RES-E, Climate Change Levy which means that RES-E is exempted from the climate change levy on electricity of £ 4.3/MWh; grant schemes such as funds reserved from the New Opportunities Fund for new capital grants for investments in energy crops/ biomass power generation, for small-scale biomass/combined heat and power heating, and planting grants for energy crops. A £ 50 million fund is available for the development of wave and tidal power, the Marine Renewables Deployment Fund.

The UK has developed a regional strategic approach to planning and targets for renewable energies.

A five-year capital grant scheme for biomass heat and biomass combined heat and power systems was launched in December 2006. Wood fuel and waste strategies were published in March and May 2007 respectively.

In April 2008 the Renewable Transport Fuel Obligation took effect to ensure the UK meets its 2010 target of 5% of transport fuel from biofuels, however, this falls short of the EU target of 5,75% under Directive 2003/30/EC. Certificates can be claimed when biofuels are supplied and fuel duty is paid on them, enabling certificate trading to take place.

The production of heat and cold from RES is supported by grant schemes and investment subsidies, biofuels are currently supported by a tax exemption.

The different targets set out by the EU and the steps taken by the member states towards a greener Europe are not isolated moves. Against the background of global climate change certain states in the US and Israel set the political goal of becoming 'carbon-neutral' by 2015. To achieve this goal they have developed a local climate-protection-concept with different topics. Especially in the sector of planning and building, they intend to reach a high energy efficiency standard for existing buildings and also for planning new building areas and use renewable energies for the energy supply of planned housing and commercial areas.

#### U N I T E D   S T A T E S   O F   A M E R I C A

The United States has a variety of existing and proposed legislation to encourage both more energy efficient buildings and the use of renewable energies. The primary institutions involved in this effort are states and municipalities. Consequently, there are many innovative approaches to the construction and retrofitting of building to green them and to promote the use of alternative energy, but, as is typical in the United States, these initiatives are decentralised.

There is some coordination through the Mayors' Climate Protection Agreement. In this respect, the mayors of US most large cities have committed themselves to meet or beat the Kyoto Protocol targets.

The existing federal legislation does not impose energy efficiency or alternative energy use duties on either municipalities or individuals. In general, the focus is on information provision, but increasingly mandatory duties are being imposed by the federal states that in turn are imposing more duties on municipalities. The American Clean Energy and Security Act of 2009, includes provisions for a smart grid system. The system may include time of use pricing for individual homes.

A variety of federal acts provide incentives and subsidies for retrofitting and new energy efficient construction. The Energy Conservation and Production Act of 1992, created a pilot programme to ensure a small number of loans for the purchase of existing energy efficient residential buildings and the installation of cost-effective improvements in existing residential buildings. In 2009, the Act was amended to grant the owners of residential buildings who install qualified energy efficiency improvements a tax credit of 30% of the cost of the improvements. States have their own tax credit programs for green buildings.

The federal Department of Housing and Urban Development provides a great deal of best practices information to municipalities. This information includes model building code upgrades to mandate more energy efficient construction.

The Department of Energy (DOE) has developed voluntary labelling standards for consumer appliances such as clothes washers and dishwashers. The DOE also has the power to compel states to adopt commercial energy conservation codes as stringent as a widely accepted non-



governmental standard. These codes are important but do not apply to all residential development.

With regard to Federal Legislation for the Use of Renewable Energy the first federal legislation to encourage the production of alternative energy was passed in 1978. The Public Utilities Regulatory Policies Act encouraged the construction of small hydroelectric and co-generation projects. Public utilities were required to purchase electricity from these sources at avoided cost rates. As concern over Global Climate Change mounted, states took the basic idea further and adopted green portfolio standards for public utilities. Portfolio standards specify the percentage of a utility's load that must be generated by renewable sources. Some states also allow homeowners who generate their own electricity to sell the surplus to the local utility. The United States Congress is currently considering Global Climate Change mitigation legislation that includes weak portfolio standards. The American Clean Energy and Security Act of 2009 requires that 6% of US energy be renewable by 2012 and 20% by 2021.

At the present time, with the exception of the DOE mandated commercial energy codes, there are no federal or state mandated green building standards. Therefore, communities are free to adopt their own energy efficiency standards<sup>3</sup>. Most municipalities use the standards developed by the non-profit United States Green Building Council. The Council has developed the Leadership in Energy and Environmental Design (LEED) rating system. The system awards points for all aspects of design from selecting environmentally degraded land to the use of rainwater irrigation. Like airline points programmes, there are four levels of certification: certification, silver, gold and platinum. The certification level is based on the energy saved over a conventional building.

In general, LEED certification is not mandatory. The major of Chicago has committed the city to the goal of becoming the greenest city in the US. To obtain a building permit for a LEED certified building, a process fraught with difficulties including a high level of corruption, developers can choose from a list of menu items<sup>7</sup> that work for the project. Few cities have mandated LEED certification for large buildings. For individual homes, a few cities have adopted the federal Environmental Protection Agency's Energy Star program standards.

Most states do not pre-empt municipalities from adopting higher energy standards. Municipalities are only prohibited from adopting lower standards.

The promotion of renewable energy is a primarily federal state function. There has been considerable federal state legislation to promote sustainable communities. But, this legislation is primarily concerned with encouraging the development of higher density residential and commercial development clustered around public transportation nodes. The proposed federal legislation dealing with alternative fuels focuses primarily on the production of electricity. The most relevant planning provisions in the legislation are the sections amending the Energy Conservation and Production Act to revise conservation standards for new buildings. The proposed legislation establishes i) standards for a national building retrofit policy for residences; ii) a building energy performance labelling programme; and iii) a rebate programme to assist low income people living in pre-1976 homes to purchase new Energy Star homes.

The renewable energy source with the closest link to land use planning is solar energy. The United States does not recognize a general right of a property owner who installs solar panels to be free from interference by neighbouring

structures<sup>4</sup>, although interference with solar access may be a nuisance<sup>5</sup>. The sunny state of New Mexico has created a statutory right to solar access based upon the first beneficial use of sunlight for solar power. However, this legislation, which has not been replicated in other states, can be challenged as an unconstitutional taking of property without compensation.

States and municipalities promote solar energy in several ways. Many sunny states such as California and Colorado prohibit home owner associations from imposing private servitudes which prohibit the installation of solar collectors. Many cities have zoning codes specifying the angle of protected solar access to which a building is entitled. Municipal zoning codes in a few cities specify the southern exposure angle for new residential construction.

The next likely alternative energy source in the US is wind power. The United States is seeking to promote wind energy, but municipalities often see themselves as victims of unwanted wind farms rather than active participants in the production and use of this energy. The primary federal incentive for investment in wind energy is the Production Tax Credit of 2.1 cents per kWh for electricity generated from wind. The federal states encourage the construction of windmill farms through a variety of means such as renewable portfolio standards for public utilities.

Were a zoning ordinance to mandate in the installation of individual turbines on new or existing construction or allow them as a matter of right, property owners who install them face the risk that a neighbour could sue for nuisance relief based on the noise and the annoying strobe effect of the turning turbine blades<sup>6</sup>. Cities are beginning to address the nuisance issue through zoning ordinances that promote the use of individual turbines. California had a law between 2001 and 2005 that required communities to adopt small wind turbine ordinances or face review of proposed turbines under a default law that provided for expedited review. Some 21 communities in the United States now have ordinances to regulate small turbines.

#### I S R A E L

Israel is a small country encompassing characteristics of a developed economy on the one hand, as for its GDP per capita it is approximately the 30th country in the world, and of a developing country on the other as it has the highest natural growth rate among the developed economies. Israel's emerging policies regarding energy may therefore be pivotal lessons for a range of other countries that do not yet belong to the richest group of nations.

The country's policies about renewable energy are relatively new. There is no national legislation that imposes renewable energy production, but there is government policy that, if properly implemented, will mandate all government ministries to work together to achieve the goal. In 2003 the government adopted an overall national policy about sustainability, with a distinct energy policy. The production share for renewable sources is currently less than 1% but the target is for 10% by 2020 and 20% by 2030. Given the country's year-round sun on the one hand and relatively scarce open areas suitable for wind farms, the major part of renewable energy will come from solar energy (about 70%), 25% from wind power and 5% from biomass.

There are several factors, most of which unique to Israel, that explain the relative low and delayed target: first, as in most developing countries, until a society becomes more affluence, public policy is oriented to what were con-



ceived to be more basic needs. There are many NGO's active in this area – though less than in many other advanced economies, due to the special Middle East security issues that capture much public attention. While public opinion and therefore public policy has in recent years been showing a growing awareness of environmental issues, water scarcity, the need to conserve water, protect the aquifer and encourage the construction of desalination plants has drawn more attention than the energy issue. Second, Israel's geographic and security context has created a sort of energy island. Unlike Europe and North America, Israeli's electric network is not linked with the grid of neighbouring countries, so that Israel must be totally self sufficient and must be able to accommodate even the infrequent peak periods. Third, unlike other advanced economy countries, Israel has a strong positive natural growth rate alongside a gradual rise in the standard of living. These trends mean that the demand

for electricity, and thus for new electric-production facilities, is constantly growing. Every few years there is an energy crisis threat. These combined factors have meant that the Electricity Corporation has been able to wield its influence to go for the traditional power plants. Third, there are no nuclear power plants and none are on the agenda. Fourth, while sunlight is ample, Israel is one of the most densely populated countries in the world. Both solar energy and wind power require large tracts of open space. These are not easy to find and often compete with other environmental considerations, especially open space and biodiversity preservation.

There is no mandatory national legislation on energy efficiency, but there are indirect policies, mostly based in planning and building law.

In 2008, the government adopted a national incentives policy for private solar energy production to be sold back to the national grid. The incentives are based on a high price offered currently, which is to decline with time. Roof space may be used on either public facilities such as schools and municipal buildings or private buildings being them commercial, industrial or residential and of whatever dimension. During less than one year, a growing number of both public and private entities have been joining the scheme. If the trend grows, it is expected to make the renewable energy goals attainable. Local planning authorities faced with this new trend are now discovering the urgent need to draw up urban design guidelines for the new roof usage.



In 2005 the Israel Standards Institute adopted a Green Buildings Code<sup>7</sup>. It is based largely on the American LEED code, but draws also on EU, German and UK codes. It is a comprehensive code that includes a major passive energy and energy conservation component. In addition to the usual energy conservation elements, the code also sets conditions for concealing open-air laundry drying zones, including apartment buildings. The adoption of the code is elective and it may be applied either to new or refurbished residential or office buildings. Developers or public

entities can obtain a Green Building Label at two levels of achievement. The first building to receive this code in 2007 was Bank Leumi in Tel Aviv. In 2009, the government began incorporating the code in tenders for national infrastructure projects, such as desalination plants. Compliance with the code grants the bidder additional points in the tender. National government is unlikely to support legislation of the Code as a compulsory

element for all private construction because the cost of housing is a major political issue.

Municipalities in Israel have relatively weak legal powers and independent financial resources than their counterparts in West European countries. None have yet taken any initiative to create their own energy code or incentives beyond the regulatory instrument available through planning law, discussed next.

National statutory planning is a major legal tool for planning and implementing renewable energy production and conservation on the national level. Although there is no special clause in the planning law that requires energy efficiency, this policy has been indirectly incorporated by means of legally binding national spatial plans. Full compliance with these plans is mandatory on all local plans and building permits, but older plans usually remain in force. The 1965 Israel Planning and Building Law as amended, are used for energy conservation in several ways: solar heating in residential buildings, production of renewable energy, and regulation of new construction, potentially retrofitting as well. Since the Sixties, Israel was a pioneer in the use of solar energy for household water heating. By means of the Planning and Building Law and the National Standards Institute, solar heating is mandatory in all residential construction, including apartment buildings. The code was changed to require one central energy absorbing facility for each building, and the water containers were moved down to the balconies of the individual apartments.

However, Israel did not continue to pursue additional solar energy policy until very recently.

In recent years national planning policy promotes the establishment of wind and especially solar energy plants. Nationally-owned land is allocated for this purpose. This provides an indirect subsidy, but is also a factual necessity. The land ownership pattern in Israel is such, that there aren't enough inbuilt private land tracts large enough to enable the construction of a solar energy plant on private land. Wind farm developers of small size could perhaps find some private land.

The decisions over the locations for solar energy plans as well as wind-farm areas of significant size are a matter for national-level statutory plans and decisions. Both types of renewable energy sites inevitably create a conflict with other environmental considerations. Two major wind farms were incorporated in national statutory plans a few years ago, after a long battle with opposing environmental movements. They objected on two

grounds: the interference with the bird-migration routes as Israel hosts the major migration routes from Europe to the Southern Hemisphere, and the infringement of aesthetic qualities of the scarce open spaces in the hilly regions where the wind turbines were to be sited. Sites for solar plants were difficult to find even in Israel's southern desert area due to conflicts with other land uses and environmental considerations. An operative peace in the Middle East could in the future lead to contracts with Egypt for locating solar plants in the sparsely populated Sinai desert. After much debate, currently there are tenders for the construction and operation of two large solar energy sites in the southern part of the country that is mostly desert areas with many tracts declared as environmentally sensitive areas.

A major national plan approved in 2005 contains a written policy on sustainable development. Such policy is also derived from the general government decision of 2003 mentioned above. Direct implementation through planning regulation is currently only at its start. The district planning commissions, which oversee local planning decisions and are to implement national policy, have recently issued guidelines to local planning bodies. These guidelines contain a major energy component.

The guidelines are advisory, but since district commissions have the authority to decline approval of most local planning initiatives, one can expect that this policy will be gradually implemented through a case by case review. The pace of implementation through this route is, however, expected to be slow because planning bodies are already criticized for over regulation and for causing major delays, and thus raising housing costs, a very sensitive topic.



Much more effective is the national statutory planning policy on compact city development. This has a major indirect influence on promoting energy efficiency through innovative and strict rules. In the Israeli context, the major motivation is not energy conservation but rather efficient use of scarce land resources in order to conserve some open spaces. Efficient use of public transportation is a second goal. Both goals of course also mean energy conservation. Since 2005, and in some parts of the country since the late Nineties, there are nation-

wide planning rules that mandate minimal density level not just the traditional maximum level. In central cities, this can mean at least 140 housing units per net hectare. It is graded lower in towns further away from the central district. No new ex-urban areas are to be established, unless they are contiguous with built up areas and meet these requirements. These national policies are legally binding on all local planning decisions, unless

they implement plans approved before 2005.

Another effective, though small-scale route is the implementation of the Israeli Green Building Code through *ad hoc* municipal initiatives. Several local governments in high-demand areas, where buyers of housing units can absorb some extra costs and where profits of developer are assured, have begun to negotiate with developers over green building certification for a few pace-setting new housing and office projects. The legal basis for this is the same as any other development agreement: it relies on the fact that most new development requires an amendment of the existing statutory plan or at least, the granting of a variance. Thus, the developers very much depend upon the local planning authorities. Although the number of municipal initiatives of this type is still small, experience with similar new policies on other environmental topics, such as leaving water retention areas in built up areas, has proven that after a few successful models, the pace will accelerate.

We stand at a critical point in the energy, economic, and environmental evolution of the world. Renewable energies and energy efficiency are now not only affordable, but their expanded use will also open new areas of innovation. Creating opportunities and a fair marketplace for a clean-energy economy requires leadership and vision. The tools to implement this evolution are now well known. We must recognize and overcome the current roadblocks and create the opportunities needed to put these renewable and energy-efficient measures into effect.

<sup>1</sup> Pursuant to Article of the Treaty establishing the European Community, Community policy on the environment is to contribute to the preservation, protection and improvement of the quality of the environment.

<sup>2</sup> OECD/IEA: *Renewable Energy. Market and Policy Trends in IEA Countries*, p. 94.

<sup>3</sup> To date, preemption issues have arisen with state statutes enacted to regulate the use of solar panels. E.g. *Kurcera v. Lizza*, Cal.Rptr.d (California Court of Appeals). Solar Shade Control Act did not preempt local government ordinances regulating tree planting that could interfere with active and passive solar energy use.

<sup>4</sup> The leading case of *Fountainebleau Hotel Corp. V. Forty-Five Twenty-Inc., So.d* (Fla.Dist.Ct. App.) rejected the English doctrine of ancient lights, which recognizes implied easements based on prescription. The case is still good law. *Wolford v. Thomas*, Cal.Rptr. (Cal.Ct.App.).

<sup>5</sup> *Prah v. Maretti*, N.W.d (Wis.).

<sup>6</sup> *Burch v. Nedpower Mount Storm, LLC, S.E.d* (West Virginia).

<sup>7</sup> *Israel Standard (SI): Buildings with reduced environmental impact ("Green buildings")*. On energy topics, the code includes requirements relating to the maximum proportion of windows relative to the total wall area, the maximum thermal conductivity (U-value) of different wall sections, rates of night ventilation, and the properties of external wall surfaces. Window sizes have been prescribed according to orientation and climatic regions. Theoretically the standard consists of two compliance options: a prescriptive path in which specific requirements for energy related elements should be followed, and a performance method that measures the energy consumption in the apartment against a reference apartment using a simulation tool. However, the latter has not yet been finalized.

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