Public funding for green energy in a context of crisis

Mike Scott

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Preface

Laurent Vogel,
ETUI

The current crisis is a hydra-headed challenge. It is not just about finance, but about how we produce, distribute and consume, govern and plan the future of our societies. Each separate facet of this crisis interacts with the others. The environmental crisis has long been hotly-debated: how to transform a profit-driven economy that is heedless of the finiteness of natural resources? What forces can drive the necessary changes? What will the cost of that transformation be? The bland “win-win all round” rhetoric (spun to countless triple or quadruple win scenarios) is belied by the clear finding that there can be winners and losers, and that a strategy of radical environmental change cannot brush aside objective discord over the distribution of production, public budget allocation, and access to decision-making.

Before the financial crisis broke, the European Union had set a policy framework on energy and climate change. It was conservative seen against the alarming conclusion that massive cuts in carbon emissions are vital to avert devastating consequences for future generations, but comparatively far-reaching compared to the near-total inaction seen from other big players on the world stage like the United States and most of the emerging industrial nations.

The financial crisis has prompted a change in public policies. How far have the EU and/or its Member States’ responses shaped energy policies? This is the question to which this report seeks to bring the makings of an answer.

Essentially, it is a compendium of survey-based findings from different countries. For that, Spain’s trade union Institute ISTAS (Instituto Sindical Salud Ambiente y Trabajo) was asked to put together a network of experts from different countries and get them to write national descriptive case study reports. The survey’s central question was: how far has public funding for renewable energy been affected by the crisis? It is both a limited and significant question. Limited, because climate policies obviously embrace a much wider set of things. Significant, because it throws into relief underlying trends in public policy development.

The report provides mixed answers to the question. The same overall European framework results in practice in very different policies in different countries. This argues for a significant loss of homogeneity in European integration. As has been seen in other areas, widening gaps are placing question marks over any planned EU policy. This is a trend clearly identified in our Benchmarking
Working Europe 2013 report. The other thing that arguably comes out of the survey is that the main problem is less the crisis itself than austerity policies. Those countries from which the survey evidence is most negative are those where austerity measures are biting hardest, like the United Kingdom, Spain and Bulgaria.

The European Trade Union Institute owes a debt of thanks to the ISTAS team who coordinated this project, especially Begoña Maria-Tomé and Sara Pêrez. We also profited from the expertise of the following national experts: Magdolna Prantner of the Wuppertal Institute for Climate, Environment and Energy (Germany), Serena Rugiero of the Institute for Social and Economic Research (Italy), Nathalie Towner of the Labour Research Department (United Kingdom), Vassil Kirov of the Institute for the Study of Societies and Knowledge (ISSK-BAS, Bulgaria), and Hans Orru of the University of Umea in Sweden.

This summary report was written by Mike Scott. All the national reports and the overall analysis of them can be found on our website: http://www.etui.org/Topics/Sustainable-Development
Introduction

Europe’s policies to encourage sustainable development were the most ambitious in the world, but the financial crisis and its effects on public finances have threatened these policies. While pre-crisis investments in clean energy consistently grew year-on-year, the age of austerity has led governments to reconsider their support for the sector.

Investment was driven by concerns about energy security and climate change, but also by the European Union’s so-called 20/20/20 directive, which targets for renewable energy, energy efficiency, cuts in greenhouse gas (GHG) emissions and transport fuels. The EU target is bolstered by national targets to provide certainty to investors and to encourage the continuing development of renewable technologies.

In an economic crisis, targeted public funding, along with policy and regulatory certainty, are particularly important to maintain growth and realise economic potential. The renewable energy sector employed more than 1 million people in 2010, according to Observ’ER, and many of these jobs are under threat if public funding is cut.

Yet there are strong reasons to invest in clean technology, even in the current economic climate:

- the need to deal with climate change and energy security is as strong today as before the crisis;
- energy efficiency (EE) can reduce costs. In Ireland, for instance, it is reported that €2.25 billion could be saved in the economy in 2020 through avoided energy costs;
- manufacturing and deploying clean energy technologies in domestic markets creates jobs when many other sectors are struggling – the number of jobs in the US solar industry grew 6.8% in 2010/2011 compared to 0.7% for the general economy;
- while some clean energy industries are commercially competitive, others have barely started their journey to commercialisation and risk becoming stalled.

This study analyses the state of public funding for green energy in Europe in the light of the economic crisis, using examples from six EU markets with different economic profiles and levels of commitment to green energy – Germany, Spain, Italy, UK, Sweden/Finland/Norway/Denmark and Bulgaria.
The report examines the policy and regulatory framework, the current situation for renewable energy in Europe and the jobs impact the sector has had and could have in future, against the background of the continuing need to combat climate change and move to a low-carbon economy. The different types of funding instruments are explored, with a focus on those that encourage innovation.
European policy framework

The EU’s climate and energy package was forged in 2008 with the aim of reducing energy consumption and increasing the use of renewable energies in the EU.

Directive 2009/28/CE, widely known as the 20/20/20 directive sets three compulsory goals for all Member States for 2020: a 20% reduction in GHG emissions, a 20% cut in primary energy consumption through energy efficiency and a total share of 20% of renewable energy in final gross energy consumption, as well as a 10% share of renewable energies in transport.

The Directive requires each Member State to adopt a National Renewable Energy Action Plan (NREAP) that must include national targets for the share of energy from renewable sources consumed in transport, electricity, heating and cooling in 2020. NREAPS allow people to see how governments are performing in their efforts to meet the 2020 targets, to set out specific goals for each Member State and outline the technology path it will take.

The Directive also requires Member States to develop their electricity networks so that they can manage increasing flows of electricity from renewable energy sources and it establishes strict sustainability criteria for the use of biofuels. A 2014 review of the Directive will look at GHG savings thresholds, the impacts of biofuels and the possible make-up of a post-2020 roadmap.

Because buildings account for 40% of total energy consumption in the EU, in 2010 the Energy Performance of Buildings Directive was introduced, requiring the use of more renewable energy in buildings and mandating minimum energy efficiency standards.

In March 2011, the Commission published a roadmap for a low-carbon economy and a transport white paper and it will shortly publish a roadmap for the EU’s energy system until 2050.

The EU is currently on track to achieve its goals and, according to the European Commission, European policies are working. However, the economic crisis has made investors cautious about the energy sector. The growth of renewable energy depends on private sector investment, which in turn relies on the stability of renewable energy policy.
Unclear political signals in the UK

The UK has abundant renewable resources, particularly wind and ocean energy and the signs were good for the industry when David Cameron declared he wanted his government to be the “greenest ever”. Despite its potential the UK has one of the lowest rates of renewable penetration in Europe – as a result, its 2020 target is just 15% of energy coming from renewables by 2020, compared to Sweden’s 49%. The UK has put most of its eggs in one basket – offshore wind. But while capacity has grown significantly in recent years and is accelerating, many people believe progress is still too slow. The main problem is that mixed messages from the government and the slow progress of a new energy law on Electricity Market Reform have deterred investors from committing to put their money into renewables. Finance minister George Osborne has talked of green initiatives “putting the UK out of business” and he has led a strong push to increase the amount of gas-fired capacity while opposing the setting of a 2030 decarbonisation target, in the face of opposition from many in his own government, a growing number of business leaders and considerable evidence that renewable energy is one of the few sectors in the UK creating jobs and providing economic growth.
Renewable energy development

Over the past decade, the EU has emerged as the world leader in renewable energy; about one third of global investment of $150 billion in energy efficiency and renewable energy went to the EU in 2007.

Substantial growth in renewable energy markets suggest that technologies are maturing. In the period 2005-2010 average photovoltaic system costs fell by 48% and module costs by 41%. The industry expects costs to drop even more based on the growth driven by current government support policies, reforms and removal of market barriers. Onshore wind investment costs fell by 10% between 2008 and 2012. Photovoltaic systems and onshore wind production are expected to be competitive in several markets by 2020.

According to Eurostat, renewable energy in the EU-27 in 2009 produced 148.4 million tonnes of oil equivalent (toe) –18.3 % of total primary production and an increase of 60.2% on a decade earlier, equivalent to average annual growth of 4.8 %.

Renewable energy’s share of gross final energy consumption was 12.4% in 2010 (11.5% in 2009). The countries with highest share of renewables are Sweden, Latvia, Finland, Austria and Portugal. Those with the lowest are Malta, Luxembourg, the UK, Cyprus and the Netherlands. Renewable energy produced 19.8% of total electricity consumption in 2010 (18.2% in 2009).

In 2010, biomass (68.2%) was the most important renewable energy source in Europe, followed by hydro-electric power (18%), wind power (7.4%), geothermal energy (4.4%) and solar power (2%).

The EU-27 market for renewable energy in 2010 was more than €127 billion, 15% up on 2009’s €120 billion. PV was the biggest sector at €45.6 billion, followed by wind and solid biomass. Germany is the biggest market by sales and jobs, followed by Italy, France and Sweden.

Wind

Total installed wind power capacity in the European Union in 2010 was estimated at 84,762 MW, with offshore installations starting to pick up and new markets in Eastern Europe starting to develop. However, new installations in
Germany and Spain fell by 19% and 40% respectively because of the economic crisis and uncertainties around regulatory regimes.

While the slowdown of historic wind power markets in Europe (Spain, Germany and Denmark) is rattling European manufacturers, in 2010 the European offshore market really started to take off. The EU sees offshore wind as a key technology for the future, and a field in which Europe should become a world leader. But policy makers must provide continued R&D support for European manufacturers to maintain Europe’s technological lead. There is also an urgent need to invest in infrastructure such as ports, harbours and grids and in training in order to ensure workforce is ready to fill the thousands of new jobs being created every year by the offshore wind sector.

Total installed capacity of offshore wind in Europe was 2.9 GW in 2010, according to the European Wind Energy Association. The NREAPs suggest that by 2020, this will rise to 213.6 GW.

The UK’s Department of Energy and Climate Change (DECC) stated that installed wind capacity rose to 5.4 GW in 2010 including 1.3 GW offshore capacity, up from 4.4 GW in 2009 (including 941.2 MW offshore). In the next few years, the UK looks set to consolidate its world leadership in offshore wind.

**Solar**

In 2010 for the first time, Europe’s photovoltaic (PV) sector installed more new capacity than any other renewable electricity source. Annual global installations in 2010 more than doubled to almost 30GW MW.

Spain, meanwhile, is the regional leader in concentrated solar technology, although new projects are also being developed in Italy, France, Portugal, Greece and Cyprus.

However, the slowdown in construction caused by the crisis and competition with building-integrated PV systems meant that growth in the solar hot water market was below forecasts.
Solar support in Germany nurtures a global industry

Germany’s feed-in tariff (FIT) system was set up in 1990 and replaced by the EEG, the Erneuerbare-Energien-Gesetz or Renewable Energy Act in 2000. The EEG gives producers of renewable energy a guaranteed rate for electricity production. Grid operators are obliged to give grid access to renewable energy plants and buy at premium prices the electricity they produce. Although it applies to a range of technologies, its biggest impact has been in the solar sector, where there is a good case for saying that the entire global sector was kick-started by German policy. This is unsurprising as in 2005, fees under the new EEG ranged from 5.39 € cents/kWh for electricity from wind energy and 6.65 € cents/kWh for hydropower, to 59.53 € cents/kWh for small-scale solar. This generous rate created large-scale demand for PV equipment, driving down costs, encouraging the establishment of PV companies in countries such as the US and China and leading to the current situation, where there is significant overcapacity that continues to drive down costs towards parity with conventional fuels. Since 2005, the FIT for solar has been cut a number of times to reflect the rapidly-falling costs of the technology, after the IEA criticized the FIT for solar as too high. Support for renewable energy has become politically contentious because domestic consumers have to pay for the support schemes, but businesses do not.

Biomass

Further north, solid biomass heating has seen solid growth thanks to new sources of wood supply in France, Germany, Sweden and Finland, with many facilities also producing electricity.

Sweden leads the way in biomass

Sweden has the highest target for renewable energy in the EU at 49% of total energy consumption, but given that renewables already accounted for 48% in 2009, it is the easiest target to reach of any EU Member State. Sweden has made good use of its natural advantages of many lakes and forests to install large amounts of hydro-electric and bioenergy capacity. From its 1991 tax on CO2, the country has been a pioneer in the development of renewable energy and its per capita emissions are among the lowest among developed economies. Today, the heating sector in Sweden – to a large extent district heating – is practically fossil fuel free as a result of the increased use of biomass and heat pumps. Sweden's experience shows that it is not enough to have ample renewable resources – nations must also pursue an active energy policy with transparent and consistent regulations and support mechanisms.
The displacement of petrol and diesel by biofuels continued, dominated by biodiesel, which accounts for 77.3% of European biofuel for transport, ahead of bioethanol (21.1%), vegetable oil (1.3%) and biogas (0.4%). However, biofuels accounted for only 4.7% of total transport fuel in 2010.

**Hydro**

Growth in small hydropower has been limited by strict regulations on water courses but installed capacity in 2010 was 45,775 MW in 2010, with 25% of that in Italy.
Employment in the renewable energy sector

EurObserv’ER’s report “The State of Renewable Energies in Europe”, published in early 2012, stated that more than 1.1 million people were employed in renewable energy in the EU 27 in 2010, 25% more than in 2009. The biggest employer is solid biomass, with more than 273,000 followed by photovoltaic and wind power with respectively 268,110 and 253,145. Jobs in PV surged as the sector grew, with an increase of 70% in Italy and 50% growth in Germany and France.

Germany (361,360) employs more than twice as many people in the sector as second-placed France (174,735) and over three times as many as in Italy (108,150). Spain ranks fourth (98,300), followed by Sweden (54,780).

The major biomass markets are Sweden and Finland, followed by Germany, France, Poland and Romania. In the Mediterranean, Spain and Italy are showing increasing enthusiasm for solid biomass fuels.

The production of PV cells and modules is a major industry in Europe, although companies have been hit by competition from China, Taiwan and the USA. Most jobs in the sector are in installation and maintenance, with production playing a smaller role. Employment grew by 70% in 2010, overtaking the wind sector.

Jobs in the wind sector were more or less stable at 253,000, but this stability hides changes in the market profile, with the expansion of markets such as Poland and Romania, as well as the growth in offshore wind, offsetting sluggish growth in more established markets such as Spain, Germany, France, and Italy.

European wind jobs have been maintained partly by the success of turbine manufacturers in exporting their expertise to emerging wind markets such as China and the US.

Solar thermal has been hit by the financial crisis because sales are so closely linked to the fortunes of the construction industry, which has seen activity drop sharply due to recession or low growth in markets such as Spain, Austria, Germany, and France. It has also been hit by competition with PV, whose costs have fallen significantly in recent years and employment was 9% lower in 2010 at 49,000.
Hydropower is the most mature renewable energy technology, with many of the jobs in the sector coming from operation, maintenance and upgrading existing facilities. The small hydro sector employed 16,000 people in the EU in 2010.

Although 22 of the 27 EU member states use geothermal heat, just 12,500 people are employed in the sector.

Biogas energy sales grew 31%, mainly in Germany, the UK, Italy, Poland and France and the sector employed 53,000 in 2010. Although ethanol consumption is lower than biodiesel, its sales have been growing faster than the biodiesel market. Biofuels in total employed about 150,000 people throughout the value chain.

Finally, EurObserv’ER estimates that nearly 40,000 workers are directly and indirectly employed in the European Ground Source Heat Pump sector, with more than 25,000 working in the renewable municipal solid waste.

**Jobs in Italy**

In Italy, the main support instruments for renewable energies appeared between 2008 and 2010 and because of that, jobs in the sector continued to grow even though economic growth was muted. It is estimated that the sector employs more than 100,000 people, with one study putting the figure at 170,000. Italy has performed well in terms of its renewable electricity target, with 20.1% of power in 2010 coming from renewable sources against a 2020 target of 26.1%. However, there is still work to do in transport and heat. The rapid growth of the sector, combined with falling technology costs, triggered in 2010 a debate on whether incentives should be abandoned. As in many EU countries, the system was revised to cut the financial burden on the state and also to shift the emphasis towards biomass and in particular to renewable heat. The debate has tended to focus on the cost of support and whether to put a ceiling rather than on the jobs that the sector can create.

**Jobs potential in the renewable energy by 2020-2030-2050**

The EU is facing the most serious economic crisis since its creation and its Member States need to find jobs for their many unemployed workers. Looking further ahead, securing the future of the European economy is vital. Renewable energy can help, and its impact is even more important because it is creating jobs in the regions where they are most needed, such as coastal and rural areas.
The Commission calculated in 2009 that achieving its 2020 renewable energy targets would create around 2.8 million jobs in the sector, generating a total value added of around 1.1% of GDP by 2030.

In its report, “A 100% Renewable Energy Vision for the European Union”, the European Renewable Energy Council estimated that if 45% of energy comes from renewable sources in 2030, 4.4 million jobs would be created. If Europe’s energy system is 100% renewable by 2050, the sector will employ 6.1 million people.
European unions' view of green energy

Ambitious climate change policies

The European Trade Union Confederation (ETUC) supports higher binding energy efficiency standards and investment in renewables to ensure that EU targets reflect the Intergovernmental Panel on Climate Change’s recommendation that developed countries should cut emissions by 25-40% by 2020 and by 80-95% by 2050.

Unions know that climate change is a direct challenge to the energy sector and that the transformation from fossil-based energy production to an energy sector mainly based on renewable energies and energy efficiency is crucial to achieving the EU’s carbon reduction aims.

Renewable energies for an independent, secure and distributed energy supply

Europe must aim to ensure its energy independence and diversify its energy supply by switching from fossil fuels to renewable energy, which is why ETUC, as a member of Spring Alliance, called for at least 35% of electricity to come from renewables by 2020 and for the EU to promote a more decentralised energy system.

To achieve this, enormous and immediate public and private investments are required – not just in renewable generation capacity but also in smart grids, energy storage and back-up generation (mainly natural gas).

A European energy pact with public investments

Europe must develop this low-carbon capacity collectively, on the basis of common, ambitious policies, a unified energy market and linked infrastructure.

A new energy pact is needed that includes clear policy support for ambitious investment targets in renewable energy and strong government regulation to create publicly-owned renewable energy and efficiency sectors. Market-based solutions for energy efficiency, in particular white certificates trading and independent auditors, are ill-suited to the scale of the changes that are needed.
There must be massive public investment in renewable generation, smart electric grids and infrastructure such as charging facilities for electric cars. Public procurement through public electric utilities also has a huge role to play. Public energy research and development should be doubled and focused on the green energy system.

Finally, ETUC says that a European regulation authority should ensure renewable energy targets for each member state are stringent enough, taking into account factors such as the level of economic development and the potential for increasing renewable energy production.

**Development of new jobs and transformation of existing jobs**

Unions know that, while the creation of renewable energy jobs is crucial, these new energy sectors could not exist without existing industries such as chemicals and steel. Some of these “old economy” jobs will go as the economy decarbonises, so governments must ensure that the transition creates decent new jobs to offset job losses in high-carbon sectors.

ETUC aims “to develop transition programs to anticipated changes in employment patterns, together with stakeholders”. Likewise, a European framework should adapt education curricula and training to reflect future environmental and social changes, providing training for jobs throughout the value chains of sectors including renewable energy, energy efficiency, building refurbishment and public transport.

It is also important to monitor these new green jobs, which may be less well-paid and involve more health and safety risks than jobs in the established sectors (e.g. toxic materials from solar panels).
Support schemes and public funding for renewable energy

The main support schemes are feed-in tariffs, feed-in premium and quota obligations.

Support policy for electricity

Feed-in tariffs (FITs)

Feed-in-tariffs (FITs) are minimum payments for all renewable energy sources. Tariffs are differentiated by technology and project size, guaranteed for different time periods, and adjusted to inflation and other factors such as operation efficiency of the system, cost of technology used, market development of the technology, etc. Renewable electricity also has priority to grid access and use.

FITs remain the principal instruments of support in the EU, used in: France, Germany, Spain, UK, Greece, Ireland, Luxembourg, Austria, Hungary, Portugal, Bulgaria, Cyprus, Malta, Lithuania, Latvia and Slovakia. Most countries differentiate according to technology, allowing the development of a range of technologies. However, a few countries, including Cyprus and Estonia, apply a common FIT for all technologies.

The advantage of tariffs, compared to feed-in premiums and quota obligations (see below), lies in the long-term certainty of receiving a fixed level support, which lowers investment risks considerably.

The costs of capital for renewable energy support in countries with tariff systems have been significantly lower than in countries with other instruments that involve higher risks to future returns on investments. By guaranteeing the price and providing a secure demand, FITs reduce both the price and market risks, and create certainty for investors about rates of return. Lower costs for the investor result in lower average support costs for society.

Tariffs are less effective when policy makers overestimate the cost of renewable electricity, because the level of tariffs is based on future expectations of the generation cost of renewable electricity. When these turn out lower than expected, producers receive a windfall profit. It is therefore important to regularly review tariffs and adjust them in line with the latest generation cost projections and to stimulate technology learning. Payments should be guaranteed for a limited time (approx. 15-20 years) that allows recovery of the investment, but avoids windfall profits over the lifetime of the plant.
Feed-in premiums

Feed-in-premium (FIP) is a payment on top of the electricity price. Minimum and maximum prices for overall remuneration are determined and tariffs are guaranteed for different time periods. Power is sold on conventional markets. Often a feed-in premium or a quota obligation for large-scale and/or mature technologies is combined with a feed-in tariff for small-scale and/or less mature technologies.

Feed-in premium systems have gained ground in recent years and are used as the main support instruments in Denmark and the Netherlands. In Spain, Czech Republic, Estonia and Slovenia premiums exist in parallel to the tariff system. These Member States allow project developers to choose between feed-in tariffs and premiums for some technologies. The flexibility and coverage of the systems differs from country to country.

Premium systems provide a secure additional return for producers, but expose them to electricity price risk. Compared to feed-in tariffs, premiums provide less certainty for investors and hence, imply higher risk premiums and total costs of capital.

Premiums linked to electricity price changes, e.g. limited by cap and floor prices, provide higher certainty and less risk of over-compensation than fixed premiums.

Premium levels are based on future expectations of renewable electricity generation costs and average electricity market revenues, so premium systems also risk creating extra costs for society and windfall profits for producers when production costs are overestimated, or electricity prices and learning rates are underestimated by policy makers. Time limits, regular review of cost projections and adjustment of premiums based on these projections is therefore also important in premium systems. Both Denmark and the Netherlands have applied such practices. Denmark has capped the overall return for producers, thereby limiting societal costs. In the Netherlands the level of the premium is determined annually and a cap is set on the total cost of support.

Quota obligation

Under quota obligations, suppliers must provide a minimum share of renewable electricity that increases over time. If obligations are not met, financial penalties are levied, which are recycled back to suppliers in proportion to how much renewable electricity they have supplied.

Obligations are combined with tradable renewable obligation certificates (ROCs) which provide additional support and are used as proof of compliance. Quota obligations with certificates expose producers to market signals, which can help smooth power system operation.

A related advantage is that support is automatically phased out once the technology is competitive because when the costs of renewable technologies
fall, ROC prices fall too. However, prices can move for other reasons, creating volatility. Uncertainty about the current and future price of certificates increases financial risks for developers and reduces their willingness to invest. As costs are usually transferred to consumers, the societal costs of support are usually higher than under feed-in tariff and premium systems.

Quota obligations tend to stimulate the development and deployment of lower-cost technologies and generally discard innovations in more costly options, particularly if they are technology-neutral. For more mature technologies such as biomass combustion and possibly onshore wind, such a system may be appropriate. However, they can lead to windfall profits if the marginal price is set by more expensive technologies.

Renewable quota obligations have been introduced in Belgium, Italy, Sweden, UK, Poland and Romania.

**Tendering schemes**

Tendering schemes are used for specific (large-scale) projects or technologies (commonly for offshore wind). Such schemes are in use in the Netherlands, UK, Denmark and Spain.

Tendering highlights investment opportunities and is competitive so it encourages lower costs. But so far, few projects have been implemented.

**Loan guarantees**

Loan guarantees, in which governments guarantee debt, can provide access to low-cost capital for projects that private investors might consider high risk. They are widespread in the US.

**Soft loans**

Soft loans are loans with a rate below the market rate of interest. Soft loans may also provide other concessions to borrowers, including longer repayment periods or interest holidays. Soft-loans are available in Germany, Netherlands, Bulgaria, Estonia, Malta and Poland.

**Investment grants**

Investment grants are often used to stimulate the take-up of less mature technologies such as PV. In Finland, investment grants and subsidies are the only support available on a national level.
Tax exemptions

Tax exemptions often complement other incentive programmes. They are powerful, highly flexible and can be targeted towards specific technologies or market participants, especially when used in combination with other policy instruments. A wide range of tax incentives are used in the EU.

Some countries, including Spain, the Netherlands, Finland and Greece provide tax incentives related to investments. Others, including Latvia, Poland, Slovakia, Sweden and the UK, have devised production tax incentives that provide income tax deduction or credits at a set rate per unit of produced renewable electricity, thereby cutting operational costs.

**Support policies for renewable energy source (RES) heat and cooling**

By contrast, support for renewable heat and cooling has been scarce in the past. However, these options are now receiving more attention from policymakers with the main instruments being investment grants and tax exemptions, and in some cases soft loans.

Renewably-fuelled district heating is another option that has been generally neglected, with the exception of Austria, Finland, Hungary and Lithuania. Member States should consider regulation rather than financial incentives, given the latter's ineffectiveness, the European Commission has said. At present, only Spain and Germany mandate renewable heat or cooling.

**Support policies for biofuels**

Support for biofuels is often a combination of obligations with tax exemptions but levels of support are opaque. The EU is working on new rules to ensure that only biofuels made from energy crops and waste from sustainable plantations can count towards the targets because of concerns over sustainability.

**Support schemes’ effectiveness**

A study by the consultancy Ecofys shows that renewable heat support can be subject to stop-go policies which deter investors and that regulations such as building obligations or fuel surcharges can be effective. It adds that the roll-out of renewable heat is limited by the long reinvestment cycles for heating equipment.

In electricity, the higher the FIT the more effective the policy has been in rolling out renewable energy. While quotas worked well for low-cost technologies, the worked less well for higher cost or smaller scale projects.
Some countries, such as Spain and Bulgaria, became victims of their own success, with higher than expected growth putting a strain on government finances. Support payments for technologies where costs are falling fast need to be frequently readjusted (for new projects only) but this must be done predictably using clear, transparent formulae that are publicized well in advance.

Support payments are concentrated in just a few countries, with Germany leading the way in 2009, with about €11 billion, followed by Italy and Spain (both about €5 billion), France (€3 billion) and Sweden and the UK (about €2 billion each). The overwhelming majority of payments were for electricity, although Austria and the Nordic countries had significant support for heat and France and Germany also made significant payments for biofuels.

In terms of payments per unit of energy consumed, Sweden has the highest level of support by some distance, followed by Germany and Spain, then Lithuania, Portugal, and Italy, with Austria, Belgium and Greece close behind.

There is also a range of support schemes at EU level, including Regional Development and Cohesion funds, which had a budget for renewables of almost €4.8 billion from 2007 to 2013. Biomass attracted 38% of the payments, with 24% going to hydro-electric and geothermal, 22% for solar and 16% for wind. There were also investments from the European Investment Bank, the Intelligent Energy Europe scheme and the Sustainable Energy Initiative.

**Bulgaria – newcomer grapples with competing priorities**

Renewable energy is low on the list of priorities in Bulgaria, where the government was forced to resign in early 2013 as a result of protests over corruption, poverty and rising energy bills, which take a large proportion of monthly incomes, particularly in the winter. The country was hit hard by the financial crisis and lower economic activity led electricity consumption in 2009 and 2010 to fall. Power demand only returned to 2008 levels in 2011. Only about 5,000 workers were employed in the sector in 2010, mainly in wind and hydropower, although there is limited data on jobs in Bulgarian renewable energy. However, the country’s hydro resources are fully exploited, so further capacity is likely to be wind, solar and biomass. Before this can happen, the country’s grid needs to be modernized and governance around issues such as environmental protection needs to be strengthened. Renewable energy regulation has had its teething problems and current regulation has removed priority access to the grid for renewable projects, a move that critics say is in breach of EU rules. Another barrier is that investors only find out the price at which they can sell their power once construction is completed so they have no idea what their returns will be when they commit to invest. Like many other countries, Bulgaria cut overgenerous FITs in 2012, while a retroactive grid usage fee for all RES plants connected to the grid since 2010 was also introduced. The main barrier to the sector in Bulgaria is erratic market support.
Funding for innovative renewable energy sources

Introduction

With many policy makers looking to the green economy to generate economic growth and create jobs at the same time as promoting sustainability, the race is on to become leaders in green technology.

Leading innovators in clean energy are likely to become the dominant players and research shows that the US, Japan and Germany have dominated the sector since 1990, with 47% of patents related to solar, followed by biofuels (24%) and fuel cells (10%).

Clean energy investment in the G20 countries hit $160 billion in 2011, according to Bloomberg New Energy Finance, but many are skeptical that Europe can continue to support the growth of clean energy. Some experts say that capital constraints actually favour renewables because governments are more reluctant to finance big-ticket capital investments such as nuclear power, the carbon capture and storage that fossil fuel power stations need or even LNG infrastructure. Renewables, by contrast, can add capacity in smaller increments that are less contentious.

However, it should not be forgotten that some 80% of the total energy subsidies in the EU-15 go to fossil fuels and nuclear, with just 19% going to renewables.

Global public spending on research, development and demonstration (RD&D) for renewable energy

Countries belonging to the Clean Energy Ministerial (CEM) tripled their RD&D budgets in the decade to 2010, although spending was still dwarfed by spending on nuclear ($56 billion) and fossil fuels ($22 billion). The US is the biggest spender on renewables RD&D, spending 40% of the global total from 2005 to 2010, some $4.9 billion, of which more than half went towards biomass. Brazil, Japan and Canada spent more than $1 billion between them on biomass. There is little data available on RD&D spending from the large emerging economies.
NER300: The European funding programme for innovative renewable energy technologies

The NER300 is a European programme to finance demonstration projects for innovative renewable energies. It is funded by 300 million allowances from the EU Emissions Trading System and its aim is to co-finance innovative renewable energy technologies and CCS demonstration projects in the EU, including bioenergy, concentrated solar power, PV, geothermal, wind, marine and hydro power, and distributed energy.

By end-June 2012, the EIB had sold some 140 million allowances, raising some €1.14 billion. NER300 money will supplement other support for renewable energy, such as green certificates or feed-in tariffs, with the aim of hastening the deployment of new technology and ensuring information-sharing. All projects must be operational by the second half of 2016 and no Member State can receive funding for more than three projects.

Sweden is line to receive funding for three proposals, the UK and Greece for two apiece and Belgium, Portugal, France, Finland, Czech Rep., Germany, Austria, Italy, Poland and the Netherlands for one each.

But as the European Renewable Energies Federation points out: “The NER 300 is a useful tool, but it is not and cannot be able to replace stable framework conditions and markets adapted to the needs of a renewable energies-based energy system”.
The development of public support for renewable energy sources

Global trends in renewable energy investment

The momentum of clean energy investment over recent years has been strong, but with many jolts and bumps on the way, including the biofuel boom of 2006-07 and subsequent bust; and the impact of the financial crisis and recession on Europe and North America.

In Europe, the compound annual growth rate from 2004-2010 was 25%, notwithstanding a fall of 22% in 2009. New investment was significantly lower in 2010 in both Europe and North America, although China and other emerging economies more than offset this.

Evolution of renewable electricity support schemes in Europe

In 2000, just 16 countries provided targeted support for renewable electricity; in 2010, almost every major economy in the world had some form of support scheme.

In 2010 and 2011, a number of countries adapted their photovoltaic FIT schemes, with the Czech Republic, Spain, France, Italy, UK and Germany revising policies and tariff rates as a result of unexpected rapid growth that resulted in escalating policy cost.

Currently, 15 Member States offer market oriented feed in premium or tradable green certificate support schemes.

Recent changes in RES support

The cost of renewable energy is not determined solely by renewable resources; project costs are also driven by administrative and capital costs.

Complicated authorisation procedures, planning processes that may hold up projects for months or even years and fear of retroactive changes to support schemes increase project risk. Such risks, particularly, in countries with stressed capital markets, result in a very high cost of capital, raising the cost of projects and undermining their competitiveness.
Thus simple administrative regimes, stable and reliable support schemes and easier access to capital (for example through public support schemes) will make renewable energy more competitive.

All Member States are adjusting their support schemes to reflect the falling costs of renewable technologies, the rapid growth in support payments and to encourage the sector to become more competitive. While such changes are necessary, they have often lacked transparency and been imposed retroactively and without warning. For new technologies and investment still dependent on support, such practices undermine investor confidence in the sector.

Support schemes need to strike a balance between certainty and sufficient incentives to invest in new technologies on the one hand; and avoiding overcompensation on the other.

If the scheme can adapt to changing circumstances (cost reductions, fiscal constraints, excess production), forced or unexpected changes are not necessary. Schemes where payment reductions are clearly signposted and timetabled can provide revenue stability without breaking the bank. Applying criteria commonly across Member States could also reduce distortions and the Commission plans to publish guidance that it hopes will reduce fragmentation of the internal market.

### Spain’s renewable boom and bust

Spain was an early leader in renewable energy in Europe, identifying the sector as a strategic priority because of its ability to reduce the country’s dependence on oil imports and greenhouse gases. It was also seen as a source of jobs and significant contributor to Spanish GDP and exports. Companies such as Gamesa, Iberdrola and Acciona remain among the biggest players in renewable energy. However, the sector has been hard hit by a combination of overexpansion caused by support payments that were too generous – particularly in the light of falling technology costs – and the financial crisis, which constrained the government’s ability to pay for the support. An estimated 20,000 of the 150,000 jobs in the sector in 2010 have been lost as a result of government actions to reduce support payments, including a moratorium on payments to new renewable energy projects and retrospective cuts to FITs. The cuts have caused anger in the industry, but the government believes it has little option given Spain’s parlous economic situation.
Main expectations of renewable energy sector by 2020

Progress towards 2020 targets in RE in 2010

In 2007 the European Union set the ambitious goal of deriving 20% of its energy from renewable sources and 10% of transport fuel being renewable by 2020 and it is currently on track to meet these goals. In 2009 and 2010 renewable energy capacity grew significantly and the EU reached its target for 2011/2012 (10.7%) in 2010.

The most recent data from Member States set out their progress towards the 2020 targets. All the Member states reached or exceeded their interim targets for 2011/2012 by 2010, except Ireland, Cyprus, Latvia, Luxembourg, Malta, Netherlands and United Kingdom.

Future perspectives on 2020 renewable energy targets

A report released by the European Renewable Energy Council (EREC) in early 2011 forecast that the EU would exceed the 20% target, with renewables accounting for 34.3% of electricity consumption by 2020, led by wind energy at 14%, followed by hydropower (10.5%), biomass (6.6%) and PV (2.4%).

Renewable heating and cooling should reach 22.2% in 2020, it predicted, with biomass representing 17.2%, heat pumps 1.6%, solar thermal energy 1.2% and geothermal energy 1.3%. The share of renewables in transport was forecast to reach 11.27%.

Of the 27 National Renewable Energy Action Plans submitted to the European Commission, 25 expect to reach or exceed their 2020 targets domestically. Only Italy and Luxembourg plan to resort to co-operation mechanisms to achieve their 2020 goals.

Another report from the Joint Research Center, published at the end of 2011, says that Member States’ NREAPs show that renewable energy will make up 20.7% of the energy mix, with almost half of Member States planning to exceed their own targets and therefore able to provide surpluses for other nations. It also said that renewably-powered electricity would make up 34% of supplies, while 21.4% of heating and cooling and 11.7% of transport fuels would be renewable.
Taking all types of energy, it says that biomass and biofuel will account for almost 60% of renewables, followed by hydro energy (12%), onshore wind (12%), offshore wind (12%), PV (2.3%) and solar thermal (2.4%).

Wind will be the biggest source of electricity, followed by hydro and biomass, with biomass dominating heating and cooling at 81% and also renewable transport fuels, with 88% (biodiesel 66% ethanol 22%).

However, according to the “RE-shaping” study at the start of 2012, current support for renewables will fail to produce the investments required to meet the 2020 target. Renewables would make up just 14.8% (instead of 20%) and renewable electricity would cover 25.4% of gross electricity demand.

Retaining current support but removing some of the non-financial barriers would lift the share of renewables in the energy mix to 16.8%, with 29.6% of electricity coming from renewable sources, while stronger support schemes brings the share of renewables in the total energy mix to within a whisker of the 2020 target at 19.8%, with renewable electricity rising to a share of 35.4%.

The report suggests that meeting the target through stronger national policies would cost an extra €5 billion a year (€56 billion compared to €51 billion).

Under business as usual conditions, only four of the EU 27 – Sweden, Austria, Finland and Estonia, will meet their targets, the report says, while Latvia, Netherlands, Slovenia, France, UK, Greece, Ireland, Lithuania and Malta will fall short by more than 6%.

The EU as a whole would fall short by 5.2% of gross final energy demand under business as usual, falling to 3.2% if non-economic barriers are removed. But to meet the targets, stronger financial support is needed and co-operation is vital for Member States to meet the target effectively and efficiently.

**European debate about support for renewable energy post-2020**

At the end of 2011, the European Commission launched a public consultation to look at how to develop renewable energy strategy in the EU to 2030. This strategy should cover the three pillars of energy policy – sustainability, security of supply and competitiveness – and be consistent with the long-term decarbonisation scenarios in the 2050 Roadmap.

The consultation centred on the present and future roles of EU and national policies. It explored a range of options for post-2020 support mechanisms ranging from quantitative targets to fixed price schemes, administrative reform and R&D support.
Responses to the consultation suggest the need for a more differentiated approach, with most people (57%) favouring support for selected technologies and just 13% calling for all renewables support to be phased out.

Most respondents believed that some renewables technologies would be competitive by then and so support should therefore be targeted to those that are not yet competitive, such as wave and tidal energy, geothermal, offshore wind and second-generation biofuels, with the support varying depending on how close to market the technology is.

Many people said that support would still be justified if external costs were still not being internalized, particularly if subsidies for conventional generation were still in place and there was not a robust carbon price. However, some respondents argued that limits should be placed on renewables support e.g. in terms of deployment volume, market penetration or time frame.

Support for greater co-operation was mixed, with 27% in favour of EU-level benchmarks, 22% preferring benchmarks at a national level and 36% keen to keep support exclusively under national control.

The industry was more in favour of EU-wide arrangements than public authorities or NGOs but there was widespread support from all players for making support schemes more market-oriented.

A number of respondents stressed the importance of exposing renewables to market price signals in order to reduce distortions and suggested a move from feed-in tariffs to feed-in premiums as a step in the right direction.
Conclusions and key messages

The European Union was ground-breaking in its efforts to drive forward the installation of renewable energy capacity though initiatives such as its 20/20/20 directive.

Despite the problems created by the global financial crisis and the recessions in a number of EU countries, the policy has been a success that can most clearly be seen in the plunging price of solar panels, falling costs for wind energy and the increase in renewable energy capacity not just in Europe but around the world.

However, the growth of the sector has not been without casualties. Many countries, if not all, that implemented feed-in tariffs were caught out by the dramatic fall in costs of technology, particularly PV, which led to windfall profits for developers that put an increasing strain on national budgets and led many to question the wisdom of support payments to the industry (while conveniently ignoring the much higher payments that other forms of energy receive).

The sector is going through a period of readjustment that will be painful for many in the industry. However, as technologies approach cost-competitiveness with traditional fuels, this should be less of an issue.

Despite all the upheavals of recent years, renewable energy sectors have shown that they can provide significant numbers of jobs and considerable impetus towards bringing economic growth back to Europe. However, both the positive experiences, such as Germany and Sweden and the negative ones such as the UK, Spain and Bulgaria show that transparent, consistent policy is crucial to the development of the sector if investors are to be persuaded to put their money into the sector and create the jobs that Europe desperately needs.

It is important to recognize that it is not just projects themselves that need investment – so too does the relevant infrastructure that will support increasing amounts of renewable energy countries use for electricity, heating and transport. Above all, the successes and failures of EU renewables policy should not obscure the fact that the sector remains in its infancy and it will require government support for a number of years to come.