Clean Technology: Wind, Solar and Energy from Waste Investments Power Ahead

By Charlotte Eddington, Director, EMEA Energy & Sustainability

OVERVIEW

Investment into the alternative energy sector has soared over the past few years. In 2002 the amount of money invested globally into sustainable energy projects was approximately just US$21bn, two years later this had risen to a still modest US$35bn, but by 2008 investment had more than quadrupled to approx $US140bn.

Unsurprisingly the surge of activity slowed at the beginning of 2009; according to New Energy Finance, investments in Q1 09 investments were 53 percent down on the same quarter the year before and 44 percent on the previous fourth quarter 08. However, the market does appear to be recovering with global clean technology investment in the second quarter already surpassing that in the first by a third. Europe and North America continue to lead investment activity globally (more than half) with the rest of the world picking up pace. China has been increasing its investment in sustainable energy projects at a faster rate than either Europe or USA. Brazil, which has a substantial ethanol fuel industry based on sugar cane, India and Africa are also making significant contributions.

Wind is still the largest recipient of sustainable energy funds. In 2008 this accounted for as much as solar power and biofuels put together. Biomass, marine and hydro, geothermal and other projects designed to enhance energy efficiency are all tiny markets by comparison.

WIND

Wind's status as the most established sustainable generation technology continued in 2008, with it attracting the highest new investment (£31.4 billion Globally, 1% growth on 2007). This leading position continues to be driven by asset finance as new generation capacity is added. It is not only a leader on the sustainable energy stage but it also exceeded all other generating capacity installation in the European Union, including gas, coal and nuclear power (see Figure 1).

Germany and Spain are still leading the investment in this sector although in 2008 France, the UK and Italy added considerable capacity as well. Each of these markets have favourable incentives which have enabled investment, such as Feed In Tariffs.

In the UK, the major driver for the industry has been the Renewables Obligation. The main market is therefore for merchant bulk generation and much of the capacity (over fifty percent) is owned by the licensed electricity suppliers on whom the obligation falls. The remainder is owned by market investors or wind energy developers who have retained some of the projects they developed.

The wind sector is expected to retain the highest growth of all the renewable electricity markets for the immediate future. UK has a very open Wind market, with a number of well established wind project developers who are familiar with the process, challenges and best ways of structuring projects to accelerate their progress through the planning and grid connection requirements. Consequently the UK market may be seen as slightly risky for wholly new developers.

SOLAR

According to the European Photovoltaic Industry Association's (EPIA) recent report, the global solar PV (photovoltaic) market grew to at least 5.5 GW of electrical power converted using PV methods in 2008 compared to 2.4 GW in 2007.

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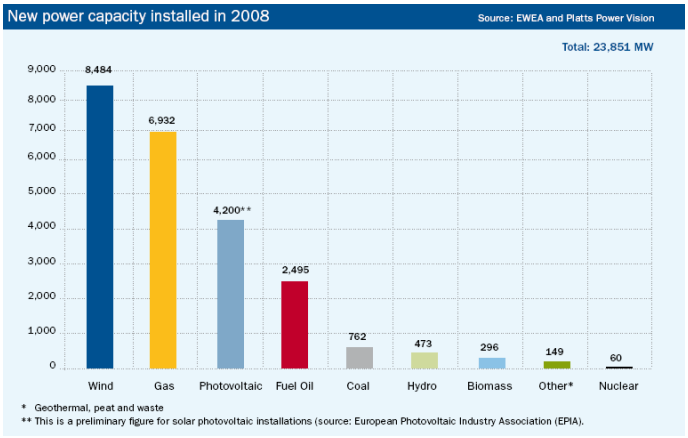
FIGURE 1: 2008 NEW ELECTRICITY PRODUCING CAPACITY



Source:EWEA and Platts Power Vision

According to EPIA's data, Spain ranked first in 2008 new installations with 2,511 MW, followed by Germany with 1,500 MW, and the United States at number three with 342 MW. Following those countries were South Korea, Italy, Japan, Czech Republic, Portugal, Belgium and France.

Those countries leading the race tend to have favourable support schemes that suit the solar market with Spain forging ahead of the pack due to a well established Feed In Tariff. However, Spain has recently changed its support scheme, setting up a cap on efforts and possibly limiting growth.

The relatively high yields and steady income flows on offer from solar has been attracting investment in this field. Income generation is relatively quick once approvals have been gained and technology sourced. With investors looking for security in their funds as well as growth rates, solar investments are proving to be an attractive proposition. In addition, the market continues to become more attractive as the technology prices decrease. As an example, the price of solar PV modules is predicted to fall by over 43% in 2009. This market is predicted to continue to grow in 2009. In the UK, the recent announcement of renewable electricity Feed In Tariffs may well begin to kick start the small scale solar market although there are other locations that are well established and that are likely to prove more economic in the long term with scale of developments and stronger sun resource being available.

ENERGY FROM WASTE

Waste management is a much discussed topic in Europe. The overall growth in the technology and service markets; the impact that legislation is having on regional waste management strategies; the glut of recent acquisitions in the market; and the increasing focus of the private investment community on the sector have all contributed to this. One key thing to note is that waste management in Europe is no longer a collection and disposal business. The shift in legislation over the past few years away from landfill, together with a requirement for more renewable energy generation, has meant that there are huge opportunities for the implementation of advanced technology and innovative recycling solutions. It is estimated that Europe's waste to energy capacity will increase by around 13 million tonnes by 2012[1] and with this is likely to come almost 100 new plants.

Those getting involved in the sector is also changing. Traditionally, the public sector has been the owner of Energy from Waste (EfW) facilities but this is changing with investment required to construct the new facilities using cleaner technologies (as opposed to large scale incineration). The attractiveness of these investments is driven by the sale of the electricity / heat generated from the plants together with the gate fees received for the waste (as landfill costs increase). These revenue streams mean that the plants are attracting private sector companies, albeit the investors to date have mainly been from a background in utilities or technology development and operation.

Within the UK, waste management is a significant sector with over 3,000 active companies, from large multinational corporations to smaller technology-led firms, employing over 70,000 people. A study carried out jointly for UK Department for Business, Enterprise and Regulatory Reform (BERR) and the UK Department for Environment, Food and Rural Affairs (DEFRA) forecast that revenues in the sector are likely to double by 2015 and industry experts suggest that up to £30 billion will need to be invested across sector by 2020.

To achieve the Government's goals (landfill and renewable energy), the UK needs to build sufficient infrastructure to process waste and to dispose of the residues remaining after minimisation, recycling and re-use have taken place. By 2020 some £9-£11 billion of capital expenditure is likely to be required to meet the UK's landfill diversion targets[2]. Only a combination of all the waste disposal activities will enable the country to divert enough waste from landfill to meet the EU Landfill Directive obligations.

[1] Frost & Sullivan Studies

[2] In order to curtail the landfilling of biodegradable municipal waste the Landfill Allowance Trading Scheme Regulations (LATs) have been announced. These place a cap on the amount of putrecible waste which waste disposal authorities in England can dispose of to landfill. The cap, which is in the form of a target tonnage reduces each year and if the cap is exceeded, a fine of £150 per tonne is levied on the authority.

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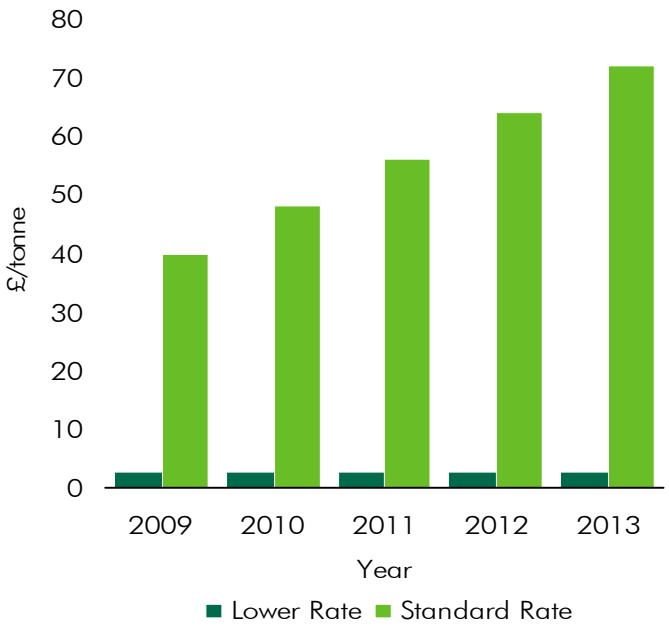
From a local authority (LA) perspective, greater regional collaboration is being seen. The LA's are beginning to focus private finance initiatives (PFI) on the infrastructure required for residual waste disposal. This is helping to stimulate markets for solid recovered fuel disposal and encouraging a mixed-economy approach to both financing and procurement methods.

LANDFILL TAX ESCALATOR



Currently, the collection, management, recovery and disposal of waste are predominantly contracted out to private sector companies. Those carrying out this work are in a good position to take advantage of the emerging EfW sector, providing waste management and treatment technologies and services. Indeed, some of these companies are moving into the EfW plant development and operation sector themselves.

It is likely that merger and acquisition activity in the EfW should also increase in the next five years due to consolidation and the desire for new investors to enter the EfW market. Over the last three years there have been around 40 acquisitions or private equity investments made in EfW firms in the UK with a value in excess of £300 million.

It is expected that approximately 25 per cent of municipal waste will be used to generate energy by 2020, compared to 10 per cent today. This presents a significant opportunity for investors, plant manufacturers, technology providers and waste management contractors over the next years. Major shifts in the global economy have had a significant impact on many aspects of the renewables sector.

The global financial crisis has made access to capital for even the largest players in the sector difficult and funding for EfW project will remain challenging for the rest of 2009, especially on long-term private finance initiative projects. Proving technology and gaining long term waste contracts as well as finding attractive sites with good electrical connections and in a favourable planning environment are key aspects to making a project work. The boom is to come, we do not doubt.

CONCLUSION

Overall, despite the investment growth figures that have been outlined in this Viewpoint, advances in alternative energy and in ways to become more efficient in our use of fossil energy still faces a number of issues.

One is the hunger of investors. Government measures have encouraged alternative energy (the United States, Europe and Asia have developed more than 250 policies since July 2008 that support alternative energy such as solar and wind power and climate-change mitigation), but still the industry relies largely upon far-sighted private sector finance. This was made harder in the last year with the financial crisis hitting early stage investment into projects. Those alternative energy sector projects with a distant pay-off have especially suffered.

Despite the financial difficulties, the market view is that renewable energy projects will continue to be viable and attract investment, and importantly the fundamental drivers which have made the renewables market such a dynamic sector in the last few years remain, notably the climate change agenda, dwindling fossil fuel stocks and concerns over the security of energy supply. Governments are continuing to support the sector. In the UK, we've seen for the first time an announcement (Low Carbon Transition Plan, July 2009) by the Government that energy bills will be going up to pay for advances in the bid to reduce carbon. This marks a step change in their commitment and the measures outlined in the Plan should result in greater confidence by investors and in turn greater investment in the Clean Tech sector going forward.

Overall, there is a bright future for renewable energy development going forward and opportunities are certainly there for not only those that have been traditionally involved in project development and financing but also for landowners with development sites. With carbon reduction high on Local Authority agendas, there are certainly planning advantages that can be had from the inclusion of on-site renewable energy as well as opportunities to package up suitable sites for specialist energy developers to maximise site value.

GOVERNMENT WHITE PAPER JULY 2009: LOW CARBON TRANSITION PLAN
Renewable Energy Strategy

The release of the UK's Low Carbon Transition Plan (LCTP) has outlined how the UK Government plans to meet its targets for carbon reduction. Releasing the report, Ed Miliband, Energy and Climate Change Secretary, said that the under the Plan "we will get 40% of our electricity from low carbon energy by 2020 and more in the years afterwards".

The LCTP and all of the existing and forthcoming environmentally-based legislation will increase the total cost of energy and force businesses to take action to reduce their usage. The essence of the Plan is to make every person and every business take responsibility for their impact on the environment. One of the key points is that the Government has committed to energy bills increasing with a prediction that the Policy will add 15% to average household bills.

From a renewable energy perspective, there have been a number of commitments, with a plan to increase renewable electricity power contribution from 5.5% today to 30% by 2020 (the remainder of the 40% is to come from nuclear and clean coal). A summary of the key messages are as follows:

- There will be renewable electricity Feed In Tariffs (FITs) in April 2010. FITs will be introduced for generation up to 5MW & Government is currently consulting on this.
- Renewable Heat Incentives (RHIs) will be introduced by April 2011.
- The Government are to facilitate £4 Billion of lending from the European Investment Bank.
- Offshore wind is to be reviewed to look at support increasing from 1.5 Renewable Obligation Certificates (ROCs) to 2ROCs if orders placed in 2009/10 and up to 1.75 ROCs if orders placed 2010/11.
- Planning is to be speeded up and be more predictable for renewables.
- Up to £60 Million is earmarked for wave & Tidal Technology.
- Help is to become available for communities to install their own renewable generation.
- The Renewables Obligation (RO) is to be extended to 2037 but no support after that and support limited to 20 years per project.
- The ROC headroom (the level that is set above the expected amount of actual renewable electricity generation) will be changed to 10% from 8% and continually reviewed to keep the value of ROCs up.
- The RO banding on tide and wave technology may be revised to encourage more investment.
- A revenue stabilisation level to be consulted on this summer to look at a cap and collar on ROCs when wholesale power prices are very high - this would probably not apply to Biomass or co-firing generation.
- The Government are looking at setting up PPAs to buy power from generators for the public sector.
- By April 2010, Defra will report on methodologies for determining the biomass content of mixed waste. This will enable energy from waste plants with Combined Heat & Power (CHP) to obtain the appropriate level of ROCs (and in the future, the RHI) more easily.
- If State Aids approval is granted, DEFRA will implement a Solid Recovered Fuel grant scheme by 1 April 2010, designed to encourage the use of solid recovered fuel in industrial scale CHP facilities.
- The Forestry Commission is aiming to bring an additional 4TWh of wood fuel to the UK market (and basing this on combustion in a CHP plant).
- The result of asking Local Authorities to take waste wood into consideration when applying for waste PFI credits (in RES 2008), was that many of have now included plans for a Waste Incineration Directive (WID) compliant CHP plant.

Whilst all of these statements are very positive and demonstrate a shift in Government commitment to renewable energy, the proof of the pudding will be in the delivery.

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DEFINITIONS

The Fuels

Biofuels: Any fuel (liquid fuels and blending components) produced from biomass sources such as plants, agricultural or forestry waste, animal wastes or food waste. Common biofuels include ethanol and biodiesel.

Biomass: Living and recently dead biological material that can be used as a solid and gaseous fuel. In this context, biomass refers to plant matter grown to generate electricity or produce heat. Specialist biomass fuels include miscanthus, switchgrass, coppiced willow, hemp and a variety of tree species such as oil palm. Waste agricultural products such as poultry litter or straw also fall within this category.

Solid Waste: Solid or semi-solid, non-soluble material such as agricultural refuse, demolition waste, industrial waste, mining residues, municipal (black bag waste), and sewage sludge.

Energy Generation

Geothermal Power: Power extracted from heat stored in the earth, usually recovered by use of a heat pump or by tapping heated water.

Hydro Power: Power that is derived from the force or energy of moving water. This includes hydroelectric dams or run-of-the-river setups as well as damless hydro (capturing kinetic energy), tidal power (capturing energy from the tides), wave power, osmotic power (channels river water) and marine current power (capturing the kinetic energy from marine currents).

Solar Power: Solar power is the process of directly capturing and converting sunlight into energy. Technologies include direct production of electricity using semi-conductor based photovoltaic (PV) materials, use of concentrated sunlight to heat fluid to drive power generation equipment, and passive methods which use solar to replace fossil fuel energy such as heating water.

Wind Power: Wind power is the conversion of wind energy into a useful form, such as electricity, using wind turbines which convert the kinetic energy in wind into mechanical energy.

Anaerobic Digestion: Micro-organisms break down biodegradable material in the absence of oxygen. Produces methane and CO2 rich biogas to produce energy.

Gasification: Converts any material containing carbon into a syngas by carefully controlling the amount of oxygen present. The syngas is burnt to produce electricity or processed further to manufacture chemicals, fertilisers, liquid fuels, etc.

Pyrolysis: The thermal degradation of waste in the absence of air to produce char, pyrolysis oil and syngas.

Renewable Obligation Certificates (ROCs)

The Renewables Obligation is the main support scheme for renewable electricity projects in the UK. It places an obligation on UK suppliers of electricity to source an increasing proportion of their electricity from renewable sources.

A Renewables Obligation Certificate (ROC) is a green certificate issued to an accredited generator for eligible renewable electricity generated within the United Kingdom and supplied to customers within the United Kingdom by a licensed electricity supplier.

Up until April, one ROC was issued for each megawatt hour (MWh) of eligible renewable output generated. However from the 1st April, the system was changed to take account of the fact that certain technologies are more commercially viable than others, and so technologies that need more support for effective market deployment receive it.

The new 'banded' system uses onshore wind power as a reference technology, so any technology which needs more support is granted additional ROCs and similarly more commercially viable technologies are granted less ROCs.

The banding system (ROC per unit of electricity produced) is as follows overleaf:

Technology	ROC Banding
Hydro-electric	1
Onshore Wind	1
Offshore Wind	1.5
Wave	2
Tidal	2
Solar Photovoltaic	2
Geothermal	2
Geopressure	1
Landfill Gas	0.25
Sewage Gas	0.5
Energy from Waste with CHP	1
Standard gasification	1
Standard pyrolysis	1
Advanced gasification	2
Advanced pyrolysis	2
Anaerobic Digestion	2
Co-firing of Biomass	0.5
Co-firing of Energy Crops	1
Co-firing of Biomass with CHP	1
Co-firing of Energy Crop with CHP	1.5
Dedicated Biomass	1.5
Dedicated Energy Crops	2
Dedicated Biomass with CHP	2
Dedicated Energy Crops with CHP	2
Microgeneration (under 50kW)	2

CBRE ENERGY & SUSTAINABILITY GROUP

CB Richard Ellis formed an Energy & Sustainability Group in 2007 to advise clients on the fast moving climate change agenda. The Clean Technology team deals specifically with the power generation sector.

We will work flexibly for the client through a variety of means including:

- Strategic partnerships
- Consultancy at any stage – from conception to completion
- Specialist Agency
- Project Due Diligence

Our core capabilities include:

- Innovative site negotiations and land deals
- Technical strategy & technology selection
- Technical implementation
- Contract negotiations (fuel supply, Power Purchase Agreement, electrical connection, EPC, O&M)
- Financial modelling
- Funding routes
- Due diligence for investors

For additional clean technology market information please contact:

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