Where Politics and Markets Meet

EUROPEAN ENERGY REVIEW

Transition: Core of the Century

Special Report

Premium Member Edition

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> "Analysts claim that the first thing China needs to do is "to lead its clean energy industry out of the swamp of overproduction and low-end manufacturing"
>
> 11

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Our series on transition

During the summer months European Energy Review assessed the transition process in a range of countries, looking at the similarities but more especially at the differences. So that you, our readers, can gauge where you stand relative to what's happening elsewhere. The chosen countries are scattered throughout the world, each having its own technological and economic energy background. We were looking at major powers such as China, the European Union and the United States. .

The way in which the transition to a sustainable energy future is playing out across the world varies greatly between the different countries and regions. The overall picture is far from homogenous and can best be described as more of a mosaic. While there's a high degree of consensus about the inevitability of a switch to other sources of energy, opinions differ greatly as to the speed at which such a transition should be implemented and why it's needed. There are those who urge a rapid changeover, pointing to melting polar ice caps and an increased incidence of extreme weather as evidence that nature has become dangerously imbalanced. Global warming is already far advanced, they warn, and our environmental footprint is potentially catastrophic. Others argue that such threats have not yet been proven, that global warming is not really an issue and that production has already become cleaner and more efficient. We still have the time, they say. What's more, the reserves of existing fuel have recently increased – at least in terms of prospective sources. Both sides of the debate advance research data and calculations to back up their case. While experts are in a position to judge the finesses of these arguments for and against, they leave most people reeling. And politicians are unable to get a steer on the issue because of the sheer volume of different and often contradictory forecasts and research results.

Broadly speaking there are eight main reasons for the lack of consensus. In the first place, there's *no central problem owner* – unless we were to see humanity as such. But in terms of the centralised control that's needed that won't get us very far. Instead each country assumes ownership of the problem in its own way, based on a mix of national reasoning, local possibilities and insights. That has led to a *global leadership vacuum*, a situation exacerbated by the fact that scientists have not been able to reach a *unified scientific standpoint*. Scientists cannot reach unanimity on the climate issue because there is no final, incontrovertible research outcome – which in itself is understandable, in view of the enormous scope encompassed by questions of environmental impact and global warming. But as a result the *sense of urgency* varies greatly across the world, from minor to major key. *Vested interests* of a political, economic and commercial nature also pose a major obstacle to a globally unified approach. The frequently disappointing outcomes of climate conferences á la Kyoto and Copenhagen are proof of that. At the level of national communities there is *insufficient awareness* of the issue's severity and the need for change, partly because many communities are still too caught up in the struggle for daily existence to concern themselves with wider problems. More generally speaking, *doom mongering doesn't go down well*: people crave security, solutions and good prospects. What's more, critical awareness and an individual sense of urgency are belittled by a psychologically motivated *calculated optimism*: we'll find a solution. We've always come up with a solution up till now, is the soothing mantra.

But may be the solution is that we all have to transcend somehow our traditional way of thinking. EER and its correspondents hope that the selection of articles inspired its readers to take stock and further hone their views.

Ben Warner
editor-in-chief

Reports

Views

Transitions take a long time, unless …

By Marcel Metze

Energy transitions and technology transitions take much longer than most people think. Edison started his Lamp Company for large scale production of incandescent light bulbs in 1881. At that time, experiments with electric light had already been going on for a quarter of a century. It would take another half century for the kerosene lamp toe become (almost totally) extinct and even then, only in the industrialised world. In the 1880's the invention of the combustion engine opened up the perspective of a widespread use of oil for transportation purposes. But it took three to four decades before this combination of a new energy resource and a new engineering technology really broke through. It wasn't until 1912 that the British decided to build a new Fast Division of oil-powered battle ships to replace their coal-powered vessels. A couple of years later, World War I provided the decisive stimulus for motorised vehicles as the new means of military transportation on land and in the air. At the outset of the Great War the British Expeditionary Force had less then a thousand trucks and cars, by the end of it over a hundred thousand. The British entered the war with eighty-four aeroplanes and left it with twelve hundred (the French with almost three thousand). Tanks weren't introduced on the battle fields until 1917. By the end 1918, the British already deployed twenty-six hundred and the French thirty-eight hundred. In a speech during a dinner celebrating the end of the war Lord Curzon, member of the British War Cabinet and former viceroy of India, thanked the oil industry leaders for their support and stated: "in fact, the Allies floated to victory on a wave of oil."

The transition from coal to oil as the main resource for heating, industrial energy and electricity took even longer than that. As late as 1955, coal accounted for 75 percent of European energy production. After the Suez crises president Eisenhower decided that the USA had become too dependent of Middle East oil and imposed import restrictions. What followed was a classic example of policy induced change. The subsequent decline in oil prices prompted the German government to liberalise fuel prices and deliberately cause a price war between coal and oil. The result was a 'coal crises' that quickly spread over the entire continent. Just 15 years later, oil accounted for sixty percent of European energy production and coal for only twenty-two percent.

Thus, the history of oil provides ample indications of the mechanisms behind major energy transitions. The general lesson is: they go slowly but can be accelerated by intervention. On the list of intervention methods, war and political crises rank highly. Market shocks, like the one caused by the recession of the early eighties, are effective too. Once in a while, a political decision like Eisenhower's import restriction provides the stimulus. Recently, the German acceleration of the nascent Energiewende had a profound impact. On the other hand, the Dutch example shows how an attitude of laisser-faire, endless discussions and consistent short-term policies can actually slow down a transition and cause a country to fall into technological arrears.

Earlier this year, a group of young journalists, coached by myself, investigated the mechanisms and corporate interests behind the conservative Dutch energy policies. They found a shimmer of hope. A year into the Energiewende, the Germans are producing so much solar electricity that they sell some of it to The Netherlands at a negative price. If that trend continues, the Dutch may yet be forced into an accelerated transition out of fossil fuels, even if they don't take any initiatives themselves.

Dr. Marcel Metze is an independent researcher, historian and journalist, based in The Netherlands. His political biography of Royal Dutch Shell will be published in 2014.

Group altruism or defending the nest

The European Union counts 28 Member States as of mid-2013. All these countries have a different energy history and their actual energy status reflects their descent and contemporary adulthood. Cultural and political characteristics complete the fundament of today's state of affairs and developments towards a sustainable future. Although the EU has a central government, in many aspects the Member States are still sovereign. Concerning foreign policy, taxation, military actions and many more fields countries act individually, which also is the case for their energy programmes, aside from targets agreed upon in Brussels. This overall situation deviates strongly from more or totally central steered countries like the United States of America and China, where decisions and laws of the central government in principle apply nationwide. A government with less central power and family members with a history significantly older than itself could be considered to be a disadvantage in achieving a hitherto unparalleled result, but opposite to this one can state that Europe is the biggest energy laboratory on earth with 28 'specialised' departments. A wealth of information to each other and the rest of the world in every respect, be it positive or negative.

By Ben Warner

The energy world is more complicated than ever before. One could observe that in former times the energy use in most countries showed much resemblance. Wood, coal, oil and in recent times natural gas as the youngest branch of the fossil tree were the generally available fuels. Nowadays the range of energy resources applied on a large und highly industrial scale has expanded. Nuclear energy, sun (photovoltaic and thermal) and wind power, hydropower and hydrogen, geothermal energy and voluminous biomass joined the energy company. All these players have to perform in harmony to reach the renewable energy targets set by the European Commission. So on the one hand the play shows more intricacy, while on the other hand the urgency for central agreements and consistent political guidance, taken into account the importance of uninterrupted supply, economics and future necessities, rings louder.

The Renewable Energy Directive 2009 established a European framework for the promotion of renewable energy setting mandatory national targets for achieving a 20% share of renewable energy in the final consumption and a 10% share in transport by 2020. Later the targets changed into a clear triptych: 20% more efficiency, 20% less CO_2 and 20% renewable energy. In the beginning the Commission concluded that renewable energy grew strongly. But this conclusion was immediately followed by a worrisome observation: ""while the EU as a whole is on its trajectory towards the 2020 targets, some member states need to undertake additional efforts and there are reasons for concern about future progress."

Current policies to be improved

Member States deviations from their own national energy action plans reflected policy changes which reduce clarity and certainty for investors, increasing their exposure to regulatory risk. Other obstacles were there failure to address barriers to the uptake of renewable energy, such as administrative burdens and delays, slow infrastructure development, delays in connection and grid operational rules. To experienced politicians or business experts this did not come as a surprise. All the reason are common realities if a complex turnaround is at stake with far reaching consequences. And then there is a dominant factor that was not foreseen, at least not for its timeline and duration, the change of the economic climate with a financial crisis as hors d'oevre.

The latest figures (see the graph below) show that for the EU as a whole the progress meeting the 2020 renewables target seems satisfactory, but 14 member states still have to make pace in the coming six years. At present the EU energy consumption is going down, -from an environmental point of view this can be seen upon as desirable- but the Commission also warns that the 2020 target is likely to be missed with current policies. It is without doubt that this decline is not only the consequence of more efficiency, but for the greater part of less economic activity. So the driving force in this respect is not part of the strategy and EU corporate management.

The financial crisis in the EU partly must be solved by production growth and increasing export. International competition is a key element and low energy prices favour trade chances. However, -just to mention one heavy issue in this corner- the level of EU electricity prices are not helping. Since 2005 the end-user prices for industry have risen significantly. With 2005 as an index the price in OECD Europe went up from 100 to 137,7. Japan electricity increased less than half (116.2), while in the USA prices even dropped under the 2005 index (95.9), excluding taxes.

Furthermore the EU Commission is talking about challenges in meeting the 2020 targets to be

> *"All these players have to perform in harmony to reach the renewable energy targets set by the European Commission"*

considered in the framework of 2030. There is increasing concern about energy import dependency and rising energy prices. Not surprising considering the proposed closure of nuclear plants in Germany (part of the Energiewende) or the diminishing of Danish and Netherland gas reserves, to name a few examples. Stability and costs of renewables support schemes, impacts on the internal market, on grid stability and on capital allocation belong also to the challenges. Furthermore there is the need for massive investments in energy transmission and distribution infrastructure. And last but not least there is the current large surplus of ETS allowances, resulting in a low carbon price and low investment incentives. If the crisis continues and experts are right in declaring that the financial valley is not a dip, but displays structural aspects, the question whether the EU is able to rise to its feet on time to catch the targets is justified.

How united is the Union?

Why should this be disquieting? 2020 is a date not a deadline. How damaging is it if the target dates are shifted a couple of years in view of the fact that the transition to the ogling future and green economy will take the greater part of this century after all? But there is feeling that momentum is essential and not only speed is required but also mental mass and delay can trigger the disinterest of people and blur their focus, especially when they are scourged by actual setbacks like depressingly high unemployment figures and lower income. Shall stakeholders accept proposals, let alone start to work on them, if the existing problems and issues are not dealt with? Bear in mind that the 2030 framework will build on the 2050 Roadmaps and that concrete proposals for climate and energy policies are scheduled in Brussels at the end of this year in the midst of the reigning crisis. Planning ahead and a long-term outlook are worthy of praise, but credibility and social support will suffer if nearby targets already are glissando. If a certain level of sustainability is the new foundation for a sound economic future and competitive strength than the EU cannot permit to become the coccyx of the global vertebra. The weakness of the EU is not caused by a major controversy about energy choices as such or the importance of going green it is the structure of the EU itself. If the city Detroit is going bankrupt, it is very sad for the city and a warning for the U.S. government, but this does not disrupt the whole country. Even a financial bleakness of the State of California can be dealt with, the past learns. If in China the economic progress in a large province falls behind and a certain level of poverty is prolonged the government has to come into action, but China will stay in one. However, if in the EU a country goes bankrupt and should decide to leave the Union or is forced to retreat, even if it is a minor member state like Greece, experts fear a tumbling down of the whole EU or at least of the monetary system with far reaching consequences for every member state.

The EU Commission faces a Herculean task, especially as in the present situation in quite some countries the majority of the people have serious doubts about the tenability of the European Union as it is and develops. On the other hand the European Parliament showed faith and unity. Early this year the parliament gave its approval to the report on the Energy Roadmap, voting in favour of setting three post-2020 targets for energy efficiency, renewable energy and greenhouse gas emissions. Stefan Scheuer, Secretary General of the Coalition for Energy Savings, reacted enthusiastically, as could be expected: "this is a clear signal that we need to face the challenges related to energy costs and competitiveness with a comprehensive set of mutually reinforcing targets and that a greenhouse target only is not enough. "But not for long. On May 28, 2013 the headline of a press release of this same Coalition read: "Indicative national energy efficiency targets fall short of 2020 targets." And another quote read: "….However, large Member States are not showing leadership and the EU target is not in reach, signs that the voluntary approach to targets has failed. Rapid repair will be necessary to avoid damaging the EU's commitment to its biggest energy resource –energy savings."

A fortnight before Jean-Francois Cirelli, president of Eurogas and also vice-chairman of the French gas company GDF Suez SA, sounded the alarm over the gas sector. His words could not be misunderstood: "The state of affairs in the gas sector in Europe is disastrous….The exports towards Europe make a mockery of the green EU policy. We reject shale gas and we import coal…The European market has the ingredients for a perfect storm." He appealed to the European leaders to use the Energy Summit, that took

place a week after his outcry, to find ways to restore investments. He said all investment in thermal power generation had ground to a halt, with only renewable energy still attracting investors, but only because of the associated subsidies. Cirelli was backed up by the CEO's of eight leading energy companies. Enel, ENI, E.on, gasNatural fenosa, GasTerra, GDF Suez, Iberdrola and RWE unanimously called upon the EU leaders one day for the Summit to revitalize the energy policy. Such a collective appeal is rare and therefore significant in itself. The CEO's stated that the reality that each of the respective companies has experienced, over recent years, is that the EU and some national energy policies have not delivered the full expected benefits. In concrete terms, European energy companies are the subject of a perfect storm, which is endangering security of supply and the transformation towards a low-carbon economy, as well as undermining their capacity to attract capital.

High electricity prices, failing decarbonisation, market disturbing subsidies, doubts about exploration of shale gas, dilemmas regarding the closure of nuclear plants, fear for one-sided dependency, security of supply under pressure, all these major issues do not even represent the whole list of the obstacles in the EU steeple chase to the Transition Results.

To be one or not, is that the question?

The EU should be aware of a the fact that goals are set now. They are based on present insight and represent actuality. They can be altered. Results, however, lie in the future and cannot be changed, but they consist of a long line of connected interim small but consistent resulting steps, everyday again. It sounds contradictory but for whom results are holy targets have to follow results going back in time to the present. In this respect the outcry of The Institutional Investors Group on Climate Change (IIGCC) is an example of such important steps to be considered, in this case necessary in the eye of investors. IIGCC is a forum for collaboration on climate change for European investors. It provides investors with a voice on climate change and platform from which they can engage with policymakers, investors and other stakeholders on addressing long-term risks and opportunities associated with climate change. The group currently has around 80 members, representing assets of around €7.5 trillion. In its response (June 2013) to the European Commission's 2030 Climate and Energy Green Paper this group states that European investors urgently asks the EU to make its energy and climate vision investable by setting out comprehensive policy proposals to 2030.

Stephanie Pfeifer, Chief Executive of the Institutional Investors Group on Climate Change said: "Transitioning to a low-carbon economy requires investment of €1 trillion by 2020, increasing to perhaps €7 trillion in the next 40 years, according to the European Commission's own projections. New capital requirement rules mean institutional investors will need to provide more of this capital, but to do so they will need clear policy signals. Without clear policy signals, allocations to infrastructure, especially low carbon infrastructure, will be limited. Investors are therefore calling on the EU to put in place stable, long-term climate and energy policies, to make its vision of a low-carbon future investable." And this is just one of many advices or warnings that can be heard throughout the year.

The 'EU-Triangle' is formed by a triptych (financial, economic and political) of crisis, stormy issues and shrinking popularity of the EU in a number of Member States. As everything in this phase indicates the whole journey will consist of a step by step and sometimes on a step by stop character. May be in the end the conclusion must be that the progress concerning the transition towards a sustainable energy future in the EU will depend on a very intriguing choice: Shall these 28 Member States show EU-group altruism or defend their own nest?

A recent EU-report of the International Renewable Energy Agency (IRENA) presents country profiles and the prognosis for 2020 based on actual expectations. The report covers 27 Member States; Croatia is not yet involved. 15 Countries expect to reach a share of 20% of final energy from renewables. Sweden and Austria are leading the pack. Renewables in the transport sector with a share of 10% in 2020 is foreseen in the majority of countries. The UK and The Netherlands are the exception with a share of only 5%. Sweden aims high, no fossil energy in vehicle stock by 2030. Electricity from renewables show more promising scores. For instance, 50% in Denmark, 25% in Estonia 27% in France, 35% in Germany, some 40% or more in Greece, Ireland, Latvia, Romania and Spain, 35% in Italy, over 50% in Portugal. The shares of wind, bioenergy, solar and hydro are still modest with some exceptions. Finland is expanding remarkably concerning wind, hydro and bio, Denmark aims at 50%. Overall solar is still in its infancy. Figures for 2050 are scarce. Denmark plans 100% electricity from wind in 2050, while Germany is striving for 80% electricity from renewables by that time.

Overview of Member States' progress

Member State	2005 RES share	2010 RES share	1st interim target	2020 RES target
Austria	23.3%	30.1%	25.4%	34%
Belgium	2.2%	5.4%	4.4%	13%
Bulgaria	9.4%	13.8%	10.7%	16%
Cyprus	2.9%	5.7%	4.9%	13%
Czech Republic	6.1%	9.4%	7.5%	13%
Germany	5.8%	11.0%	8.2%	18%
Denmark	17%	22.2%	19.6%	30%
Estonia	18%	24.3%	19.4%	25%
Greece	6.9%	9.7%	9.1%	18%
Spain	8.7%	13.8%	10.9%	20%
Finland	28.5%	33%	30.4%	38%
France	10.3%	13.5%	12.8%	23%
Hungary	4.3%	8.8%	6.0%	13%
Ireland	3.1%	5.8%	5.7%	16%
Italy	5.2%	10.4%	7.6%	17%
Lithuania	15%	19.7%	16.6%	23%
Luxembourg	0.9%	3%	2.9%	11%
Latvia	32.6%	32.6%	34.0%	40%
Malta	0%	0.4%	2.0%	10%
Netherlands	2.4%	3.8%	4.7%	14%
Poland	7.2%	9.5%	8.8%	15%
Portugal	20.5%	24.6%	22.6%	31%
Romania	17.8%	23.6%	19.0%	24%
Sweden	39.8%	49.1%	41.6%	49%
Slovenia	16.0%	19.9%	17.8%	25%
Slovakia	6.7%	9.8%	8.2%	14%
UK	1.3%	3.3%	4.0%	15%
EU	8.5%	12.7%	10.7%	20%

The most objective measure is to judge Member States against their first interim target, calculated as the average of their 2011/2012 shares. Whilst on average such progress to 2010 is good, this does not reflect the policy and economic uncertainties that renewable energy producers appear to face currently.

Progress towards the first interim target:

>2% above interim target
<1% from or <2% above interim target
>1% below interim target

Europe and energy – Like a rabbit caught in the headlights?

By Beate Raabe

The economy down, energy prices up, fears of blackouts, a heyday for coal and unhappy voters – a nightmare for "sustainable" politicians. The angst of getting it wrong (again) seems to be paralysing. The EU Heads of State or Government met on 22 May 2013 and decided to start discussing the way forward in March 2014. In the meantime, all objectives shall continue to be pursued – with more market and less subsidies.

But what will happen to the internal energy market if in the absence of adapted common policies Member States reinforce their individual national policies? And would you invest your money today into energy that risks being politically unacceptable or uneconomic tomorrow? Unregulated, regulated or subsidised business - investors are careful because there is no knowing of what comes next.

What is the current problem? Firstly, there is a growing market share of renewable energy sources, a fledgling that has been fed and brought up with great love and care but has not learnt to fly. Its parents are becoming annoyed, but who is the one to blame for a spoilt child? In many Member States, renewables have enjoyed extensive subsidies. Their electricity is allowed into the grid before all other and paid for even if it is not needed.

Secondly, the U.S. went big on shale gas, selling cheap coal to Europe, which eagerly sucked it up because carbon dioxide emissions are not an issue if they only cost a few Euros per tonne. At the same time, Asia is eagerly sucking up gas, ready to pay much higher prices than Europeans.

Thirdly, gas, emitting up to 50% carbon dioxide less than coal when burnt and with combined-heat-and-power plants reaching efficiencies of up to 90%, is losing its market share to the extent that gas-fired power plants go out of business. But the rising share of electricity from variable renewables actually requires the flexible gas plants to come in when the wind is not blowing or the sun is not shining. Power plant capacity mechanisms for thermal power stations are applied or considered to secure electricity supply and, indeed, they can be an effective measure, but is all this what we really want or can achieve?

There is no lack of wisdom for what should be done. It is just that this wisdom varies depending to whom you speak. Let's simplify things and divide the wise people up into three groups.

Group 1 believes that the different forms of energy should be left to themselves to compete with each other on the basis of price. This would make energy cheaper and more reliable and subsidies unnecessary. Climate action makes no sense to this group in the absence of an appropriate global agreement.

Group 2 believes that no expense, effort or even sacrifice should be spared for Europe to save energy, go renewable and become import independent.

Group 3 believes that energy can be secure, competitive and clean if we make things less complicated and agree on only one goal, to reduce greenhouse emissions, with the overarching regulatory lever being an emissions cap that is gradually and predictably been brought down, by at least 40% by 2030. Government revenues from the auctioning of emissions allowances replace tax or are recycled to support low-carbon investment, so energy does not become more expensive. The rest is left to the market, which decides how the cap is met, by being more energy efficient, by switching to gas or renewables or both, by developing carbon capture and storage (if allowed) …

But all the options offered by the wise people seem to confuse the rabbit rather than making it jump. Or perhaps I am just not wise enough.

Beate Raabe was appointed Secretary General of Eurogas, the association representing the European gas wholesale, retail and distribution sector, in 2011.

The coughing engine that won't stop - China confirms global leadership in renewable energies

Driven by its increasing demand for electricity, security of supply concerns and the need to reduce the emission of greenhouse gasses, renewable energy has become an engine of global proportions in China. It doesn't run smoothly but it's not about to stop. The political top acknowledges the huge potential and strategic value of renewables. However, inefficiencies in the energy system are of such scale that rigorous reform is urgently required to avoid further damage. Everything points at less government intervention and much more efficient regulation. "China needs an integrated and open electrical power market if we want to develop new energy extensively."

By Rudolf ten Hoedt

Let's first roam through a map of impressive figures to paint the right picture. China is already the biggest electricity market globally, overtaking the US in 2010. Capacity doubled in less than 10 years to reach 1,1 TW in 2011 and is expected to reach 2, 4 TW by 2030. It was producing roughly 4700 TWh or 22% of the world's electricity versus the USA's 20% and Japan with 5% ranking third.

Coal accounts for 65% of Chinese electricity mix. It's the energy backbone of the country and electric power is the biggest coal consumer. Realistically, a rigorous decline in coal consumption cannot be expected. China has huge coal reserves and with energy security in mind, government will prioritize domestic resources. To this end it's strengthening the coal industry by consolidating and modernising its 11.000 coal companies and encouraging the vertical integration of coal and power enterprises. According to some estimates, China will burn 35% more coal by 2020 than it did in 2010.

Renewables in the fast seat

Its dependency on fossil fuels cements China as the highest emitter of greenhouse gasses. Government has pledged to reduce emissions by 'greening' the energy mix and other means. An ambitious Five Year Plan for 2011-2015 highlights sustainability as key for economic growth. Plans for the energy sector include a minimum investment of USD 830 billion in the power industry with gas fired power plants, renewables, and transmission network as key investment targets. China is also promoting the development of renewable energy technologies and industries so that essential renewable energy equipment can be produced at home.

The leaders in Beijing decreed that by 2015, 15% of energy output should come from non-fossil energy sources including nuclear. China has the biggest nuclear energy program in the world. By the end of 2010, the installed capacity of nuclear energy reached 10,8 GW or just 1% of installed capacity. But China has 28 plants and a total capacity of 34 GW under construction. Nuclear will rise further, although more cautiously after Japan's atomic stroke at Fukushima in 2011.

According to Solidiance, an Asia focused consultancy, China's investments in renewables have already grown at 80% per annum since 2004. As a result, a quarter of global renewable capacity is installed in China. The Chinese overtook the US as the greatest investor in clean energy for the first time in 2009. Investments exploded from USD 1,5 billion in 2004 to 49 billion in 2010. In 2012, China was again the biggest investor in clean energy with a record 68 billion dollar according to Bloomberg, a quarter of what was invested in the sector worldwide. That confirms China's global leadership in renewable energies.

Only this year 2013, the country plans to add 49 GW of clean power: 18 GW from wind, 10 GW of solar and last 21 GW being hydro. Hydroelectric power in China is the biggest worldwide, the country is home to 20% of global output. Its China's most developed source of green power and the country's second source of electricity. Hydro accounts for 22% of installed capacity in 2011 and 18% of national output. But growth is losing steam. Although 120 GW of new hydro power should be under construction by 2015, hydro's increase is

> *"Inefficiencies in the energy system are of such scale that rigorous reform is urgently required to avoid further waste"*

plateauing. Suitable sites for dams are more and more difficult to find. That leaves other renewables to help China to live up to its green ambitions.

China has become the world's biggest wind power with 26% of what is globally installed. Wind accounted for 4,5% of installed power generation capacity in 2011. Output was 73 TWh in 2011, 1,5% of total power generation. Wind has already had a true bonanza for a decade and is now catching its breath for another sprint. The Chinese say there is no excessive construction of wind power in their country. Compared to Denmark, wind's share in total Chinese power generation is low, so there is plenty growth potential of up to 250 GW or even more. Government target is to have totally installed 100 GW by 2015, with an aggressively growing share of off shore wind.

Fast growth also has its down side

Solar PV is entering growth. Although still dominated by Europe with roughly 70% of the world's total capacity installed, China is already the fastest growing solar PV market globally with installed capacity jumping from 68 MW in 2005 to 3,1 GW in 2011. That is still an almost invisible share of 0.3% of Chinese installed capacity. With its export orientated solar panel industry hindered by the financial crisis, adjusted energy policies and anti-dumping measures in Europe, China's government is now set to develop the domestic solar PV market even more quickly, providing more subsidies and incentives for private manufacturers. The official target of 21 GW by 2020 has been brought forward to 2015.

As modest as they are percentage wise within the domestic power generation, in absolute terms Chinese renewables are of a tremendous scale and moving at a breath taking speed already. And so are the problems that come with it. Heavy subsidization generated unsustainable growth, with the solar PV industry as a pronounced example. Flawed renewable energy practices on a local level have brought mediocre enterprises to life that hampered technological innovation. "To expand their market share, producers tended to rely on the price advantage they received from higher shares of the subsidies, rather than lowering the real costs of production or improving efficiency" according to a report of the World Watch Institute.

Although solar has attracted much attention in Europe for obvious reasons, the situation of wind power in China is far worse, if only for its scale. The development of the wind power industry has been slowed down as a result of a series of traps.

> *"Wind, solar and biomass are set to increase further, confirming China's global leadership in renewable energies"*

Too complicated a system for subsidizing on-grid wind power is one of them. Tax policy is another. That worked out to be an incentive for local governments to force wind power companies to buy locally produced equipment, encouraging low-level manufacturing and affecting the development of a competitive industry. Then the access to the grid and transmission to the centres of demand along the Chinese coast has been hindered. The construction of wind power is concentrated in three remote and poor areas in the north of China but encounters big difficulties to branch out. Captured in the regions of origin, it stays under used. Wind power in these areas has in some periods been curtailed by more than 50%, according to the China National Renewable Energy Centre.

"Construction and exchanges of electrical power have been seriously restricted by local interests" wrote Shi Lishan earlier this year in a cover story of the China Renewable Energy Magazine. "The construction of power plants is mainly for increasing GDP, rather than meeting the demands for electrical power, leading to serious blind construction of power plants in various areas. Inter-provincial power exchange is restricted by much administrative interference and influences by interest rather than based on supply, demands and price.

Open market required

Strong and critical wording of someone who is not just somebody. Shi Lishan is the deputy director general of the New Energy and Renewable Energy Department of NEA, the National Energy Administration. NEA is the executive body of the National Energy Committee, the supreme coordinating entity in charge of China's energy strategy and security that was set up in 2010 and is presided by China's prime minister. Shi Lishan advocates simpler subsidy mechanisms and a fair and open market environment. "It is necessary to establish an integrated and open electrical power market with fair competition and strengthen market-based power price policy (in order to) create conditions for development of renewable energy (..) extensively."

Beijing is trying to assess these and other issues. Since August 2011, all wind projects, including those with installed capacity less than 50 megawatts (MW), have to be reviewed and registered at the National Energy Administration before they can receive government approval or subsidies. Such restrictions are meant to contain corruption and reckless expansion at local levels and to fight the over-construction of small-scale wind power projects under 50 MW. As a result, there is a consolidation and temporarily decline in new installations in the highly competitive, biggest wind power market in the world.

According to consultant Solidiance, the Chinese urgently need to tackle infrastructure and grid policy. Many renewable projects will be stalled or remain unconnected until a costly improvement and expansion of the Chinese grid gets under way. Problem is, the electricity grid is monopolised by state owned companies and is lacking a liberal market system. That leaves a question mark behind the chances of a radical overhaul of the grid to facilitate the access of wind power and remains a challenge for the future development of all forms of renewable energy in China.

Analysts claim that the first thing China needs to do is "to lead its clean energy industry out of the swamp of overproduction and low-end manufacturing". The recent demise of Suntech and the king of all solar panels Shi Zhengrong is an indication that markets are taking care of this. ■

View

Slow Down

The EU-energy policy has three objectives: reducing CO_2 greenhouse gas emissions, securing energy supply and supporting economic growth and competitiveness.

Since Kyoto the reduction of CO_2 emissions is the main objective, the climate is in danger, global warming is the ultimate horror scenario dominating political debates. In a recent article in a Dutch newspaper the efficiency of measures to save energy was simply expressed in avoided CO_2 emissions, it seems to be a new unit for energy. To kill the CO_2 ghost, a rat race started. In 2050 the energy supply should and must be almost carbon free. Is this policy still valid?

Let's see what has happened in the past ten years.

First of all the climate issue. The support for the idea of anthropogenic (man made) global warming is dwindling more and more. Although there has never been scientific consensus about this subject, at best to some extent political consensus, we now see that even renowned climatologists are becoming more sceptical. A recent Norwegian report "The debate on man made global warming" (SINTEF) confirms this mind shift. One conclusion of the report is that the assertion that doubt has been eliminated on anthropogenic global warming is plainly false. Although the CO_2 content in the atmosphere has increased steadily in the past years and even exceeded the 400 ppm last month, the global temperature did not increase during the past 15 years. The least one can say is that the climate models failed to predict this correctly.

As far as security of supply is concerned the development of shale gas has been shown to be a game changer. The exploitation of shale gas will enlarge the economical recoverable reserves of natural gas by at least 50%. This implies that we will have more time to complete the transition towards a sustainable energy supply. Furthermore the diversification of resources will be larger. The increasing share of LNG will contribute to energy security as well.

The third important change in the energy scene is the decrease of solar energy costs, more specifically of photo voltaic solar power (PV). Costs came down in the past decade to the level of less than two Euro/Watt for a turnkey home system leading to a kWh-price for a household in Southern Europe of 10 Eurocent. For households competitive. PV will be competitive for industries as well within a few years. Utility parity will most probably be reached before 2025. As a consequence the shares of solar energy will grow inevitably and steadily, even unsubsidised. Sustainable energy will find its way, it is not necessary to speed it up with billions of Euros in the form of subsidies.

The current high amount of subsidies is increasing the general costs of energy, which is an obstacle for a competitive economy, our third objective.

Carbon Capture and Storage (CCS) will push up the energy costs even more as a result of the EU pursuing CCS in achieving a carbon free energy supply. Moreover, the promise of CCS in recent years has already facilitated new coal fired capacity hindering a clean environment and creating waste of energy.

Summarized, global warming is not as hot as the Intergovernmental Panel on Climate Change wants us to believe, security of supply has been improved and solar energy will become more and more competitive. Time to change the policy. Slow down, the transition towards a sustainable energy supply will happen anyway.

Jaap Hoogakker is strategic advisor and former employee of GasTerra.

The two-way approach

The US Administration can promulgate laws that apply to the whole nation, while on state level strong opposition arises sometimes, and on national level political opponents often react vehemently, as for instance the republicans do against proposals of the Obama-government. If the Republicans win the next elections it will not come as a surprise for anybody, if the energy wardrobe will partly change, if not the fashion itself. But may be a bigger, somewhat hidden design is already in the air?

By Ben Warner

If we compare China and the European Union using centralised power as a criterion, it is clear that the Chinese government and its operational hierarchy can make act the country as one. The EU-commission on the contrary constantly has to deal with the sovereignty of the Member States and their 28 differing histories and political characteristics. The EU acts like a family in which the children are more grown up and older than the parents. This mosaic of national decisive powers also regards the policy and strategies of the transition towards a sustainable energy future and every step along the road up till now. If China and the EU represent both ends of a measuring rod ranging from centralised to decentralised the USA finds its self in the middle.

Reactions from the republican camp give reason to draw such a conclusion as mentioned above. Just one example out of many. When on February 12 this year in his State of the Union Address the American president pledged to implement a climate change agenda and pass legislation for a market based mechanism to reduce emissions republican Blaine Lutkemeyer came with a quick response and introduced legislation to prohibit the United States from contributing taxpayer dollars to the IPCC and UNFCCC. Such a move indicates that not only the right wingers are questioning the authority or objectivity of those institutions, they above all prefer the private sector to take the lead in investments and advancements, thereby keeping the power and pace of change in the hands of the industry and the market.

Independency the heart is beating

However, these counter 'attacks' indicate that the crux in the attitude of the Republicans still lies in their believe that private initiatives and the market should prevail over an ordering or prescribing government where White House modesty is in place. But this type of opposition is not an absolute sign of a party denying global warming or rejecting the greening of energy. It is making clear that there are diehards who still live in the past when oil was generally considered to be America's lifeblood and private initiative should stand high. The young right wingers have a more open mind towards sustainable developments for two reasons at least. Firstly the New Energy World (NEW) represents innovation, advanced technology and therefor empowers business, leadership and brings new jobs. Secondly entering the NEW ensures independency more than dwelling in the past. And Americans probably have a gen for independency.

Although a majority of the Democrats is more in favour of a firm sustainable strategy than the Republican opponents, the ruling party also meets local dilemma's within its own bosom. A situation that can be compared with EU Member States that suffer from difficulties caused by the central EU-government. For instance, President Barack Obama's goal of limiting carbon-dioxide emissions has put Democratic leaders in energy-producing states such as Montana in a bind, caught between bellicose Republican statements of a "war on coal" and emboldened environmentalists who are calling for swift action. The threat of losing jobs concerns both political camps. Obama's plan to fight climate change would include executive action to place limits on carbon pollution from new and existing power plants, while expanding development of renewable energy. Therefor Energy Secretary Ernest Moniz answered that the president's energy policy will still embrace traditional energy sources such as coal and oil. Republican leaders in Montana were unconvinced. They predicted dire consequences for the state, calling the plan a war on energy and a job killer. The reaction sounded fiercely": "This is a war on Montana energy, Montana families and small businesses and Montana jobs, and I will remain steadfast in the fight to stop the President's job-killing agenda," U.S. Rep. Steve Daines said in a statement.

Another Republican, Attorney General Tim Fox, warned the plan will blow a hole in the state's budget, "In attempting to rule by decree and legislate by regulation, President Obama has failed to take a balanced approach to energy policy and has failed to recognize the diverse interests and economies of 50 states," Fox said. It is obvious that president Obama needs a balancing pole to cross the canyon from here to a more green future.

These incidents show there will be political battles every step of the way. Nevertheless the results concerning the development of green energy and measures that lower greenhouse emissions do not deviate much from those in other parts of the world. For instance, according to the U.S. Energy Information Administration, CO_2 emissions are back to their 1994 level, fulfilling the Kyoto Protocol of 1997 which the USA ironically never ratified.

Rationale for renewables

What can be said about the actual state of green energy and the targets or plans for the future as a pointer to further developments? Non-political support serves a steady progress and transition projects materialise the steps forward. A few examples. In a letter to president Obama the influential MIT Technology Review argued early this year, that addressing climate change must take top priority in the next four years. A remarkable sound came from private insurers blaming $139 billion claims on 'disasters related to climate change'. (The Economist 8 June). We know as money speaks Americans listen. A majority of Americans continue to favour alternative, clean power sources over traditional fossil fuel. In a 2010 Chicago Council on Global Affairs public opinion survey an overwhelming 91 percent believed "investing in renewable energy" is important for the United States to remain economically competitive with other countries, with 62 percent considering this very important. The same poll found strong support for tax incentives to encourage development of renewable energy sources specifically as a way to reduce foreign energy imports. Eight in ten (80 percent) favoured tax incentives, 47 percent even strongly, and only 17 per cent were opposed. Other businesses than the usual energy enterprises see new opportunities: Some 180 large-ale solar projects could be built on farm land this year as developers rush to take advantage of the subsidies. New business invites. Renewable energy technologies, as we know, encompass a broad, divers array of technologies, including solar photovoltaics, power plants and heating/cooling systems, wind farms, hydroelectricity, geothermal power plants, and ocean power systems and the use of biomass. All of these are applicable in the USA.

The report Outlook On Renewable Energy In America explains that America needs renewable energy, for many reasons: America needs energy that is secure, reliable, improves public health, protects the environment, addresses climate change, creates jobs, and provides technological leadership. America needs renewable energy. If

> *"But this type of opposition is not an absolute sign of a party denying global warming or rejecting the greening of energy"*

renewable energy is to be developed to its full potential, the U.S. will need coordinated, sustained federal and state policies that expand renewable energy markets; promote and deploy new technology; and provide appropriate opportunities to encourage renewable energy use in all critical energy market sectors: wholesale and distributed electricity generation, thermal energy applications, and transportation.[12]

In 2009, President Barack Obama in the inaugural address called for the expanded use of renewable energy to meet the twin challenges of energy security and climate change. Those were the first references ever to the nation's energy use, to renewable resources, and to climate change in an inauguration speech of a U.S. president. President Obama looked to the near future, saying that as a nation, the United States will "harness the sun and the winds and the soil to fuel our cars and run our factories." The president's New Energy For America plan calls for a federal investment of $150 billion over the next decade to catalyse private efforts to build a clean energy future. Specifically, the plan calls for renewable energy to supply 10% of the nation's electricity by 2012, rising to 25% by 2025. And it looks like the targets can be met.

Renewable energy in the United States accounted for 13.2 percent of the domestically produced electricity in 2012. Renewable energy reached a major milestone in the first quarter of 2011, when it contributed 11.7 percent of total U.S. energy production (2.245 quadrillion BTUs of energy), surpassing energy production from nuclear power (2.125 quadrillion BTUs). 2011 was the first year since 1997 that renewables exceeded nuclear in US total energy production. Hydroelectric power is currently the largest producer of renewable power in the U.S. It produced around 6.2% of the nation's total electricity in 2010 which was 60.2% of the total renewable power in the U.S.] The United States is the fourth largest producer of hydroelectricity in the world after China, Canada and Brazil. The Grand Coulee Dam is the 5th largest hydroelectric power station in the world.

U.S. wind power installed capacity now exceeds 60,000 MW and supplies 3% of the nation's

electricity. Texas is firmly established as the leader in wind power development, followed by Iowa and California. Since the U.S. pioneered the technology with Solar One, several solar thermal power stations have also been built. The largest of these solar thermal power stations is the SEGS group of plants in the Mojave Desert with a total generating capacity of 354 MW, making the system the largest solar plant of any kind in the world.[8] The largest photovoltaic power plant in North America is the over 200 MW Agua Caliente Solar Project in Yuma County, Arizona. The Geysers in Northern California is the largest complex of geothermal energy production in the world.

Current trends

The United States has some of the best renewable energy resources in the world, which have the potential to meet a rising and significant share of the nation's energy demand. A quarter of the U.S. land area has winds strong enough to generate electricity at the same price as natural gas and coal. Thanks to subsidies (renewed in January 2013) wind power did well in 2012 with the Department of Energy 'expecting' that by 2030 20% of energy demand could be met by wind, compared with the3,5% share in electricity supply today. Without the PTC (production tax credit) there will still be a trickle of demand for new turbines.

Many of the new technologies that harness renewables — including wind, solar, geothermal, and biofuels — are, or soon will be, economically competitive with the fossil fuels that meet 85 percent of U.S. energy needs. Dynamic growth rates are driving down costs and spurring rapid advances in technologies. Energy technologies also receive government subsidies. In 2010, federal government subsidies for electricity production from renewables, fossil fuels, and nuclear were $6560 million, $1843 million and $2499 million respectively.

The United States uses about 4,000 billion kWh/year of electricity, in 2012, and about 98 Quadrillion btu/year (30,000 billion kWh). Due to efficiency improvements this is expected to drop to 15,000 billion kWh by 2050. The United States has the potential of installing 11 million MW of onshore wind power and 4 million MW of offshore wind power, capable of generating over 47,000 billion kWh. Solar has the potential of installing 10 to 20 million MW of concentrated solar power in the Southwest, capable of generating over 10,000 billion kWh. Other than geothermal, no other resources come close to providing the energy demands of the United States in a post fossil fuel world. All but four U.S. states now have incentives in place to promote renewable energy, while more than a dozen have enacted new renewable energy laws in recent years.

An unexpected motto

If we return to the comparison between these three majors mentioned above it can be said in general that the transition efforts so far are not diverging blatantly from those in other parts of the world. China – please read the contribution of Rudolf ten Hoedt in this series- still shows an extensive expansion of the fossil volumes, but bear in mind that the country is still busy to overtake the arrears. How a slowdown of the stark economic growth, as the Chinese government recently announced, will influence the building scheme in the energy sector remains to be seen. The EU is struggling in its own way to leave the 'old' energy world behind with clear differences on Member State level, while the US seems to drive on two highways at the same time. The US apparently is experiencing an energy/shale and tight oil boom. Although new technology is applied, the fuels are conventional. Over the last three years oil went up by more than 20% and the use of gas is reaching new heights with a growth of over 30% in the last seven years. This is also powered by the will to strengthen the competitiveness of the economy versus those of Asia and Europe. Lower energy prices than elsewhere form unmistakably a strong factor. Gas is trading around a third of the price in Asia and Europe. Us Crude oil prices are some 10% lower than the global Brent benchmark and consumers power prices are half of what most Europeans have to pay. If all this helps strengthening the competitiveness an economic renaissance could be the outcome with an interesting possibility: More money will be available for investment in projects and technology that enhance sustainable developments. May be the two-way approach entails a strategy after the fact: Old for NEW. ■

ENEL GREEN POWER, GROWING THROUGH DIVERSIFICATION

Enel Green Power (EGP) is the Enel Group company fully dedicated to the development and management of renewable energy sources at the international level, with a presence in Europe and in the American continent.

Enel Green Power is a world leader in the renewable sector, with an installed capacity of approximately 8,700 MW, as of June 30th, 2013, thanks to a well-balanced generation mix, which includes wind, solar, hydroelectric, geothermal, and biomass. Currently, EGP has around 740 operational plants throughout 16 countries in Europe and the Americas.

In 2012 the company generated more than 25 billion kWh from water, sun, wind and the Earth's heat - enough to meet the energy needs of approximately 10 million households and avoid the emission of over 18 million tonnes of CO_2 into the atmosphere.

Enel Green Power strongly believes that the combination of geographical and technological diversification can offer strength and earning stability to its business by netting the variability of production and of any adverse macro-economic scenario. Moreover, such diversification enables EGP to choose from a large matrix of projects, allowing the company to select the best opportunities in the targeted markets. EGP's growth model is based on the competitive selection of projects, in countries with strong fundamentals such as growing electricity demand, abundance of resources and opportunity to develop in more than one technology. For this reason, the 2013-2017 business plan ensures further technological diversification and adds new markets to the portfolio. Out of the 4.4 GW of additional capacity in renewables targeted by EGP in the period, approximately 60% will be developed in emerging countries, with Brazil (16%) and Chile (11%) leading the way. As a result, approximately 3.8 billion out of the 5.5 billion euros dedicated to growth for 2013-17, will be invested in emerging markets such as South Africa, Morocco, Peru, Turkey, Colombia, Brazil, Mexico and Chile. While focusing on development in areas featuring strong fundamentals for renewables, European markets remain EGP's core legacy business with an attractive backbone of hydro and geothermal assets which are strongly cash generative.

In Latin America, Enel Green Power currently runs a total of 990 MW, operating renewable energy plants in Mexico, Costa Rica, Guatemala, Panama, Chile and Brazil.

Brazil represents for Enel Green Power a strategic market due to a strong economic growth and an abundance of resources which enable renewables to play a major role in meeting the energy demand. In addition to the 93 MW of hydro capacity it already operates, in 2013 EGP started the construction of wind farms for a total of 283 MW.

Enel Green Power's current portfolio in Chile includes hydro and wind, foreseeing developments in the geothermal and solar power fields. In the hydroelectric

sector, EGP operates two hydro power plants for a total installed capacity of 92 MW. In March 2013 EGP has connected to the grid its first wind farm in Chile, the 90 MW Talinay, while in December 2012, the company started the construction of Valle de Los Vientos, in the region II of Antofagasta, which will have a total installed capacity of 90 MW. Finally, in April 2013 the company announced it won a public tender organized by the Chilean Ministry of National Assets for a wind farm site, named Sierra Gorda Este, located in the region of Antofagasta. As a result, the company has been granted the exclusive right to develop, build and operate up to 130 MW.

In Chile, Enel Green Power is also a pioneering company in geothermal exploration, with the drilling of wells at more than 4,500 meters of altitude, in extreme climatic conditions. Thanks to more than 100 years of experience in the sector, EGP has the ability and know-how to sustain the challenge of being the first company to generate electricity with this technology in Chile, which offer great untapped geothermal resources.

In Mexico, Enel Green Power operates three hydroelectric plants for a total installed capacity of 53 MW. The company's total wind installed capacity has reached 144 MW after EGP started operations in 2012 at the 74 MW Bii Nee Stipa II, its first wind farm in the country, and at the 70 MW Zopiloapan wind farm, both located on the Isthmus of Tehuantepec, in the state of Oaxaca. Furthermore, in December of the same year, EGP won the Sureste I public tender, for the construction of a 102 MW wind farm, which will also be located on the Isthmus of Tehuantepec. In July 2013 EGP signed two long-term supply contracts for the 100 MW Dominica wind farm that Enel Green Power will start to build in coming months in the Mexican state of San Luis Potosí.

In North America, Enel Green Power operates through Enel Green Power North America, Inc. (EGPNA) which develops and operates wind, geothermal, hydroelectric, solar and biomass plants for a total installed capacity of 1,673 MW (1,549 MW in the US and 124 MW in Canada). In the US, more specifically in Nevada, EGPNA operates the Stillwater and Salt Wells geothermal power plants, for a total installed capacity of around 47 MW. The two medium-enthalpy geothermal plants are the only geothermal plants in the world that employ large scale electric submersible pumps for the extraction of geothermal fluid. In May 2012 EGPNA began construction work of a new geothermal plant located in Cove Fort, in southern Utah (USA), which will have a gross installed capacity of 25 MW. Since 2013, EGP's portfolio also includes the Prairie Rose and Chisholm View wind projects. With Prairie Rose, which has an installed capacity of around 200 MW, EGP pioneered a regulated "net-zero interconnection", which is a way to share with a peaker power plant the interconnection, therefore reducing the overall costs of the project. Chisholm View has an installed capacity of 235 MW, being the biggest wind project EGP has ever built. The project is located in Oklahoma, thus making EGP the first company to produce wind energy in the Midwest and sell it to Southern states, specifically Alabama, thanks to the so-called "intrastate wheeling".

It is worth mentioning that in 2011 EGPNA implemented its first solar project, the Stillwater Solar Geothermal Hybrid Project located in Fallon, Nevada. It has an installed capacity of 26 MW and it was developed to operate in conjunction with Stillwater geothermal power plant, making it the first hybrid renewable energy project in the world that combines the continuous generation capacity of binary-cycle, medium-enthalpy geothermal power with the peak capacity of solar power. Combining two technologies to produce electricity from renewable sources at the same location increases the generation of zero-emission energy, but also makes it possible to use the same infrastructures such as, for instance, electrical interconnection lines, thereby further reducing environmental impact.

In Europe, Enel Green Power has an installed capacity of 5.0 GW, with great part of it coming from wind (3.4 GW). In 2013 EGP made progresses in the European photovoltaic sector, as confirmed by the connection to the network of its first two photovoltaic plants in Romania, which have a combined installed capacity of around 19 MW.

Access to the grid is still the bottleneck

Renewables in Japan at a cross roads

"Many new stake holders will make Japan's conservative energy business unsustainable". Japan will almost certainly reduce its dependence on nuclear power. But will it alternatively shift to renewable energy? At first glance, this may seem likely. After Fukushima, Japan's green energy sector has expanded. Investors have rushed to build solar parks, bio gas installations and wind farms. This new clean energy capacity roughly equals the output of two nuclear plants. But according to promoters of renewables, Japan has not only acted too late and too slow in allowing the development of alternatives for nuclear and fossil-fuel fired power plants. In their view, Japan's delayed surge of green energy may even stall as a result of counteraction and reluctance.

By Rudolf ten Hoedt

"The electricity industry is still trying to marginalise renewables" says Iida Tetsunari, the executive director of the Institute for Sustainable Energy Policies ISEP in Tokyo. "If government does not push industry to grant clean energy priority access to the grid, the potential of renewable growth will rapidly diminish." According to policy expert Tomas Kåberger, a Swede who plays a prominent role in the on-going tussle in the energy sector in Japan, there are institutional obstacles creating home-made costs for renewables and obscuring the outlook for clean resources. "The Japanese government and parliament have not managed to deregulate the market in such a way that renewables get a fair chance to compete" he says (see below for a complete interview with Kåberger).

After Fukushima

Lida Tetsunari: "Till the Fukushima nuclear accident in March 2011, the ministry of economics METI strongly opposed the introduction of feed-in tariffs. The vertically integrated utilities promoted nuclear and tried to protect their regional monopolies."

After Fukushima, things have definitely changed . With all nuclear plants except two on hold and a very generous Feed-in Tariff system in place since July 2012, at least solar power is taking off in a big way across Japan. In Higashi-Matsushima north of Fukushima, in an area that was flooded by the tsunami following the Great East Japan Earthquake in March 2011, workers are currently installing panels on 4,7 ha of land. The park is to become a mega solar-power plant, operated by trading house Mitsui that expects to have all panels up and buzzing this fall, selling 2,1 GWh of electricity annually to regional power monopoly Tohuku Power Company.

New sites for the construction of big solar farms and other power-related facilities is up 66-fold on the year, totalling 2,039 hectares in 2012, according to the Ministry of Economics and Trade METI. More than 20% of the mega solar-farms that have popped up since the beginning of last year are located in the northernmost island of Hokkaido with abundant vacant plots of land. The sunny southern island of Kyushu has also been a popular location. In May, energy engineering company JGC officially opened its mega solar-power station on the island. According to the company, the facility's 26,5 MW output capacity is the biggest power output of any solar power plant currently operating in Japan.

Only a handful of foreign companies have moved into this growing market, such as PVDP from Germany and Spain's industrial group Gestamp. However, a huge majority of the companies are still Japanese. Telecom giant Softbank has promoted a plan to build large solar facilities capable of producing a total of more than 200 MW. Softbank's involvement in renewables was the decision of wealthy company CEO Masayoshi Son after the March 2011 disaster in Fukushima. Son, one of the most prominent enfants terribles in entrepreneurial Japan, wants to make an to end to nuclear power generation and to crack down on the regional monopolies of the 10 main vertically integrated utilities. He is the second richest man of his country and is putting his money where his mouth is.

Willing investors

The solar sector has been the main beneficiary of the FiT with an initial JPY43/kWh, much higher than the retail commercial power price of JPY14,59/kWh on average. Between the FiT introduction in July and November 2012, applications for new renewables capacity reached 3.6GW, of which solar represents 3.3GW. Government recently reduced the solar FiT to JPY37,8/kWh for new projects starting April 1 or later. President Jun Arai of oil company Showa Shell Sekiyu KK, a Shell joint venture in Japan that also manufactures solar cell modules on a large scale, told the Wall Street Journal recently, he did not expect the interest of solar-project investors to slow down as a result of the lower tariff, because "there are huge backlogs". Stressing continuous interest, Goldman Sachs announced in May it will enter the Japanese market with a renewable investment fund. The Ministry of Economy METI plans to make low-interest loans available to companies that borrow rooftop space from homeowners to install solar panels.

> *"The electricity industry is still trying to marginalise renewables"*

So investors have rushed to build renewables capacity in Japan last year. The country saw overall investment rising to 12,4 billion dollars in 2012, an increase of 75%, bucking the trend of falling investments in clean energy among developed countries. Nevertheless, Japan's 10 major utilities output of fossil-fuel plants rose 10,2% last year and accounted for 88,3% of their total production that covers roughly 90% of national output. Geothermal and other renewables excluding large hydro increased 12,5%, to reach only a meagre 1,6% of the utilities output. Of the overall electricity production in Japan, renewables accounted for just 3,8 %. This is not the dramatic change, promoters of renewables have been counting on. "After one booming year, we are at a cross roads" says Tetsunari. "Renewables are very profitable in economic terms but after one year they are facing barriers in the grid. The grid is still in monopolistic hands of the utilities. They use all kinds of excuses to deny renewable power access." Japan's powerful ministry of economics METI should force the utilities to give way to renewables, but according to Tetsunari, the ministry is internally divided and conservative as a whole. "Most of METI and the industry is keeping a centralised supply model in the air. These bureaucrats do not want a more diversely distributed power scheme and keep up a monopolistic market. They maintain a positive stance towards nuclear and keep renewables at a distance because of security of supply issues."

Investors in wind power in particular are facing headwinds. Softbank's energy subsidiary SB Energy is planning a 111MW plant, and discussing 340MW and 1GW wind developments in northern Hokkaido. Trading house Marubeni and partners have announced plans for a 250MW project off the north of Tokyo. Nuclear plant manufacturers Toshiba and Hitachi are part of a joint venture proposing a 300MW offshore wind development. But they have more problems getting access to the grid than solar (see the interview with Tomas Kåberger) and are also confronted with complex environmental impact assessments. Green Power Investment, a Tokyo-based company plans to install 55 wind turbines near the city of Kizukuri where constant buffeting by winds has caused a forest of pine trees to stand diagonally. According to press reports, the project was to become the largest on shore wind farm in Japan but has come to a standstill after authorities ordered dozens more environmental studies.

In spite of these hurdles, Iida Tetsunari still believes renewables have the future, also in Japan. "Because of the overall global trend and because there are so many local initiatives, so many local energy companies setting up all over Japan. This will force Japanese institutions to change. METI and the power industry have always been able to negotiate under the table. But with so many new stake holders coming into the market, this conservative business model will become unsustainable."

INTERVIEW WITH TOMAS KÅBERGER

In the summer of 2011, 6 months after the Fukushima disaster, telecom tycoon Masayoshi Son founded the Japanese Renewable Energy Foundation. The mission of the foundation is to research and develop market based policies that promote and deploy renewable energy. For the post of executive chairman of the board, Son recruited Tomas Kåberger, an academic from Sweden. At the time, Kåberger was Director General of the National Swedish Energy Agency. Back in the 1990's he had been involved in the liberalization of the electricity sector in Sweden. EER talked extensively with Kåberger, who is now a frequent flyer between Tokyo and Göteborg.

Is the surge of renewables in Japan losing momentum?

"I am not sure if there has ever been a momentum because it is very difficult for new competing power producers in Japan to get on to the market. There are institutional obstacles creating home made Japanese costs for renewables. To establish solar, wind and geothermal power generation in Japan is significantly more expensive than elsewhere. So new producers need these generous feed-in-tariffs, so to say. But at the same time these tariffs are not even generous enough because vertically integrated Japanese power companies still control the electricity market and the grid. They are using the right to block the connection of new renewables as we speak. That is not very convenient for any investor."

But in the last twelve months or so Japanese companies and other investors rushed into the solar market.

"Yes, you see the main activity in solar because the Japanese utilities are not blocking investments there as you see them doing in wind. Last year there were wind power applications of 5000 Mw in the northern part of the country and only 400 Mw was permitted. I guess there are a couple of reasons for that. Solar

installations are usually smaller and well fitted to the electricity demand. They are not seen by the utilities as a competitor. Wind on the other hand is considered to be a threat by Japanese power companies. Wind power can substitute what is traditionally called base load power generation by the existing capital intensive coal and nuclear power stations. Along with solar, wind power has the lowest marginal costs and will out compete coal and nuclear, when there is abundant solar and wind available."

So what is the solution then to let renewables fly in Japan?

"Access to the grid is still the bottom line. The transmission of electricity needs to be completely separated from the production. Legal unbundling will not work in Japan. You cannot trust utilities to take objective decisions beyond all suspicion for transmission access when it comes to treating all producers fairly in situations where there are bottlenecks in the system. You need ownership unbundling, a totally separate ownership of the transmission system. Unbundling and the creation of a spot market where producers can compete and the lowest cost electricity would have access. That will give Japan a more efficient power system and lower electricity rates."

How big is the chance that Japan will unbundle?

"I think it has been difficult previously because the power companies as wealthy monopolies that have been allowed to tax the Japanese consumers. Wealthy as they were, these utilities have also been very politically influential. But after Fukushima these companies have come into a desperate economic situation. They are losing a lot of money and that should provide an opportunity for the democratic government to take control over the electricity market and to deregulate it to the benefit of the Japanese customers."

How do you see the chances that that will actually happen under the current administration.

"The current government well understands the need for reinvigorating the Japanese economy and energy is one of the key sectors. I know there are many individuals in the Japanese bureaucracy who understand very well what needs to be done but I also see what I interpret as the continuing influence of the electric power companies. I hope that the government and civil service will manage to further the public interest an disregard the attempts by the utilities to protect their historical privileges. The conditions to break their influence are better than ever."

> *"So investors have rushed to build renewables capacity in Japan last year"*

The restart of more nuclear power plants is highly likely. What will that do to renewables?

"Reopening more nuclear power plants is an extremely difficult decision for the Japanese government and society. From an economic point of view, the long term costs of the Fukushima accident will be an extremely heavy burden on the already restrained Japanese government financial situation. I believe that the Japanese government would try to ensure that there was more private financial insurance or pay capacity guaranteed before they allow more nuclear power stations to be reopened. The costs of new accidents should not be put on the Japanese government budget. The Japanese power companies must arrange for other ways of covering these costs if they are allowed to reopen more reactors." ■

No transition without conflict

By Rick Bosman

The energy system is changing. But what exactly changes, what its drivers are, in what direction the transition is (or should) be heading and at what speed, are matters of constant dispute.

For some the energy transition is mainly about tackling climate change by reducing CO_2 emissions, for others it presents the solution to a plethora of problems including security, environmental pollution, excessive water use and dependency. Some even see decentralized renewable energy as the fuel for a more democratic energy system. Rex Tillerson, CEO of Exxon Mobil thinks that 'rather than a wholesale shift in energy sources, this latest transition will be in how the world's abundant supplies of oil and natural gas are developed, produced and consumed.' So, if one were to believe Mr. Tillerson, nothing will really change at all.

A good example of this polemic relationship can be found in Germany, where two competing visions of the energy future are emerging ever more clearly and clashing repeatedly. On the one hand there is a strong push for a centralized structure involving CCS, nuclear power, offshore wind and even huge solar parks in the Sahara from which energy is imported. On the other hand advocates of a decentralized energy supply are growing in number and (political) clout. Whilst conventional energy production capacity used to be predominantly owned by a small number of large utilities, over half of newly installed renewables are now owned by citizens, farmers and energy cooperatives. Such cooperatives, also on the rise outside Germany, present an interesting form of social innovation in which citizens together develop completely new ways to organize the energy system driven by a sense of community and local ownership. Furthermore, local governments start to line up behind such a decentralized energy future, thereby increasing its clout. The cumulative ambitions at the State level, for example, far outstrip the national ambitions. Collectively, the German States aim to provide 50% renewable electricity in 2020 and 70% in 2030 compared to the national ambitions of 35% in 2020 and 50% in 2030.

Sometimes these clashes between alternative energy futures are even taken to court. An intriguing example is that of Solarworld, a solar energy company, who was sued by RWE, one of the four largest utilities, for (ab)using the company's slogan in an advertisement campaign that clearly positioned the centralized and decentralized energy futures as mutually excluding opposites. In the end, Solarworld was forced to withdraw the advertisement, but the media attention that resulted from RWE going to court over this issue broad public attention was drawn to Solarworld's alternative solution of locally produced solar energy. Thanks to RWE's response, overnight Solarworld went from relatively small and unknown to a key player in the energy transition.

What the German example shows is that traditional players are struggling to adapt to concerns over resource scarcity, climate change and dependency on shady suppliers. In the pre-development phase of a transition, these traditional players still have the clout and resources to push their preferred solutions; often incremental innovations such as CCS and improving energy efficiency that leave the overall structure of the current energy system intact. However, when the transition starts to accelerate, these solutions are increasingly challenged by alternatives, often coming from completely different domains, such as the IT-sector or civil society that are better equipped to swiftly adapt to changing circumstances.

Interestingly, such emerging tensions and conflict are often used by observers to illustrate that the transition is going nowhere. However, analysis of past transitions shows that the emerging chaos and conflict are actually signs that the transition is accelerating and really starts to bite. Conflict is one of the main drivers of transitions, because it creates broad public attention, shows that there are different (conflicting) options to choose from and it forces public and politicians to pick sides. When forced to choose sides, decentralized energy often wins as the public has a clear stake in such a future.

Contrary to what Mr. Tillerson wants us to believe, it is clear that the energy transition increasingly resembles an accelerating train that has become virtually impossible to stop. However, this doesn't stop people from trying to slow it down.

Rick Bosman is researcher at the Dutch Research Institute for Transitions, Erasmus University Rotterdam.

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Special Report

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There are major differences of opinion as to the speed with which the transition in energy use should be implemented and the reasons why such a transition is desirable. There are those who cite the increased incidence of extreme weather, melting icecaps or the undermining of the balance of nature as justifying their call for a swift pace of transition. Global warming is already underway, they warn, and man's dominance over the lived environment, below ground and the atmosphere is catastrophic. Ranged against this point of view are those who say that these assumed threats have not all been proven, that global warming is far from advanced and climate change a phenomenon that has existed down the millennia. We are already in the process of producing more cleanly and efficiently, they argue. There is still plenty of time, while accessible reserves of existing fossil fuels have recently increased, or at least the prospect of additional sources for them. Research and data submitted by parties on different sides of the table are contradictory. Experts are well versed in the finer points of all these pro's and cons and lock intellectual swords in a ceaseless stream of information that smacks less of the global village than of a cosmopolis. Meanwhile the average citizen feels like he's on board a rollercoaster, while politicians have been wrenched out of the driver's seat by so many contradictory forecasts and analytical results. It's tempting to see Heissenberg's uncertainty principle as a metaphor: those seeking to determine the position of the facts quickly lose sight of the direction and speed of travel. But those seeking to determine how fast things are developing lose sight of the actual position. European Energy Review strives for being your travel companion.

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