

## *Chapter Six*

# **The Future of Renewable Energy**

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Transatlantic cooperation has considerable historical background: during the Cold War European and U.S. cooperation was based on shared security and military goals vis-a-vis a common adversary; common values; and similar approaches to democratic governance, political culture and ideology. With the change of global geopolitical relations and in a more multipolar world this traditionally close cooperation has relaxed in terms of attitudes, interests and goals in a growing number of situations. In this context transatlantic energy relations could actually become an example of ever-deepening cooperation. A number of factors point in this direction: energy has become by far one of the most important elements in international political and economic relations; volatility of energy resource prices makes energy-importing countries more vulnerable to various pressures from energy exporters; and global competition for energy resources has increased as economies in China, India and Brazil embark on an even faster pace of economic development. China has become the biggest energy consumer in the world, overtaking the United States. It has also become the biggest emitter of carbon dioxide. Thus it has also become the single most influential player in global energy relations that can affect global energy markets.

Global energy trends have affected both the U.S. and the EU, and the two players have also played key roles in setting energy trends globally. Only China has had equal or even greater impact on global processes. While the EU has taken the initiative among global actors in reducing greenhouse gas (GHG) emissions and becoming much more energy efficient, the U.S. leaves climate change and GHG issues more to the market, although it invests heavily in green technology development. The EU has set its ambitious 20-20-20 strategy as the cornerstone for the future development of its energy sector and econ-

omy in general.<sup>1</sup> Increasing the share of renewable energy has an essential role in this strategy.

There is a bigger framework for policies related to energy production and use—climate issues definitely play an important role in formulating policies, especially in long-term perspective. This is more obvious with the EU, but climate-related arguments also play a role in the U.S. energy debate.

Concerns about efficiency and the environment have been important overall drivers in global energy production and use. The motivations are not only ideological, but also economic—less efficiency and higher GHG emissions cost money. This trend characterises various levels of decision-making as well as a variety of situations in energy policy planning and energy industry, including production of primary energy resources as well as end use of energy. Natural gas power plants are replacing lignite and coal-fired power plants and smaller units are often replacing large centralized energy producing units in decentralized energy systems. For example, biomass combined heat and power plants (CHPs) of smaller capacity are replacing large centralized natural gas or coal CHPs.

Renewable energy accounted for 8% of total U.S. primary energy (TPE) consumption in 2010, the biggest proportion of which came from hydroelectric power, wood, biofuels and to a lesser extent from wind, waste, geothermal and solar/ PV.<sup>2</sup> For the EU the figure stood at 10.3% in 2008; the well-known target is 20% by 2020. The biggest contributors were hydropower, wind and wood.<sup>3</sup>

In terms of investment, the renewable energy sector is definitely a good market: the United Nations Environment Program (UNEP) reports that renewable energy investment worldwide rose to \$211 billion in 2010.<sup>4</sup> While the majority of this funding goes to finance

<sup>1</sup> EU's "20-20-20" strategy is set to achieve a 20% cut in emissions of greenhouse gases by 2020, compared with 1990 levels; a 20% increase in the share of renewables in the energy mix; and a 20% increase in the energy efficiency.

<sup>2</sup> Hydroelectric power 2,5 quadrillion btu, wood 2,0 qbtu, biofuels 1,9 qbtu. Source: U.S. Energy Information Agency, 2011.

<sup>3</sup> Energy, transport and environment indicators, Eurostat, 2010, pp. 70-73.

<sup>4</sup> *Global Investments in Green Energy Up Nearly a Third to US\$211 billion*, UNEP, July 7, 2011.

large-scale deployment projects rather than R&D or early commercialization activities, the level of financing indicates there is great interest in renewable and clean energy technologies as good financial investments. In 2010, venture investment in clean energy companies rose to \$5.1 billion in the United States—23% of all venture capital investment for the year.<sup>5</sup>

Another shift is also notable: with investments of \$72 billion in utility-scale renewable energy projects and companies, for the first time developing countries have spent more than developed economies on renewable energy. China has led this development; its nearly \$50 billion invested in renewable energy in 2010 makes it by far the largest source of, and destination for, clean energy investment globally.<sup>6</sup> This clearly shows where future competition in renewable energy production will be coming from. Europe and the U.S. have to bear this in mind and act.

## **The Energy Security Context**

It is inevitable that any debate on energy policy and development of energy infrastructure as well as on new technologies eventually involves discussions of energy security. The need for safe and economically viable supplies of energy resources and energy often sets the overall framework for any energy related debate. Volatility of oil and gas prices, political instability of suppliers of primary energy resources, and use of energy as a political tool make a grim set of factors affecting any energy importing country. The EU and the U.S. are big energy markets that produce energy on their own territories, yet each is significantly dependent on imports of primary energy resources, thus making security of supply a top priority. The EU has special relations with the Russian Federation, which is the biggest single natural gas supplier to the EU (approx. 40% of all natural gas imports) and the only natural gas supplier to a number of EU member states.<sup>7</sup> The U.S. is also among the biggest natural gas importers

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<sup>5</sup> U.S. Department of Energy and EIA data, 2011.

<sup>6</sup> *Global Trends in Renewable Energy Investment 2011*, UNEP, Bloomberg New Energy Finance, 2011.

<sup>7</sup> The three Baltic states of Estonia, Latvia and Lithuania; and Finland. A number of other EU members are also significantly dependent on Russian gas supplies.

(combined both pipeline gas and LNG) in the world with 74 bcm in 2009, which is slightly less than Japan, Germany and Italy with 99, 83 and 75 bcm of natural gas respectively. The U.S. was the biggest importer of crude oil with 510 million tonnes in 2009, well ahead of China, Japan and India with 199, 179 and 159 Mt respectively<sup>8</sup>.

The EU and the U.S. have established a fairly good framework for cooperation, including on energy issues. The EU–U.S. Energy Council (TEC) was created in November 2009 at the EU–U.S. summit, thus bringing the existing Strategic Energy Review to a higher level. The TEC's first meeting took place right after its establishment in November 2009, marking an important step in energy cooperation between the EU and the U.S. A common understanding was present at the meeting that energy security and climate change provide a broader context for energy policy on both sides of the Atlantic. Andris Piebalgs, EU Energy Commissioner at the time, pointed out that the Energy Council was a timely initiative in the context of growing global concerns on energy security and the important role that the energy sector has in climate change. The TEC's agenda covers such topics as energy security and energy markets, technology and R&D, and energy policy.

Other transatlantic forms of cooperation have also contributed to the EU–U.S. energy debate. The NATO Parliamentary Assembly noted in 2010 that energy and security are key variables in international security calculations.<sup>9</sup> Renewable energy sources can add comfortably to energy security in terms of a broader use of indigenous energy resources that many countries possess, but have not put to effective use so far. Energy security certainly requires consideration of a number of issues in a cross-disciplinary approach involving economic, social, technological, military, geological and environmental elements.

Another transatlantic forum for cooperation, the Transatlantic Business Dialogue (TABD), has provided a number of recommendations within the framework of the Transatlantic Innovation Dialogue, which

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<sup>8</sup> *Key World Energy Statistics*, International Energy Agency, 2011, pp. 11–13.

<sup>9</sup> Jos Van Gennip, rapporteur, NATO Parliamentary Assembly, Committee Reports, 170 ESC 06 E—Energy Security.

is a spin-off of the Transatlantic Economic Council. The U.S. and the EU are the two largest economic zones in the world and innovation, R&D play an enormous role in fostering development of these two zones, which form probably the best market for innovation globally. This market provides a place for a multitude of players—researchers, companies and entrepreneurs—to collaborate effectively along a broad spectrum of topics including energy. And it is easy to see the huge potential for cooperation here—seeing the serious amounts of financing that the EU sets aside for innovation and technology only enhances what is already significant potential for cooperation. The EU's Strategic Energy Technology Plan (SET-Plan) has been set up by the European Commission to accelerate the development and deployment of cost-effective low carbon technologies. It comprises measures relating to planning, implementation, resources and international cooperation in the field of energy technology. The forecast budget for the SET-Plan amounts to €71.5 billion to be spent by 2050.

Energy efficiency and clean energy technologies are critical elements of the transatlantic economy and key aspects of strengthened transatlantic innovation on energy matters in ways that go beyond fossil energy supplies and physical security of energy infrastructure. TABD's recommendations point to a self-sustaining and climate-friendly global economy as a consequence of greater cooperation in innovation in the transatlantic market. TABD also notes that current export control regulations inhibit the flow of technology and technical information within the transatlantic economic area, subsequently creating barriers to coordinated transatlantic research and development.<sup>10</sup> Interestingly, while the U.S. Congress has not ratified such global climate documents as the Kyoto Protocol, TABD calls for the development and promotion of market-based common carbon accounting, which would facilitate more global trading of GHG emission credits than is currently done within the EU.

Regarding CO<sub>2</sub> emission credits, there are risks as well—for example, carbon prices might cast doubt on the sustainability of the carbon trading system in general. While several years ago it was predicted that carbon prices might rise as high as €60 per tonne of CO<sub>2</sub> emissions, the current price is around €10-15, which does not look very

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<sup>10</sup>*Building a Transatlantic Innovation Economy*, February 3, 2010, p. 3.

motivating to move towards less emitting technologies for many CO<sub>2</sub> intensive industries and sectors of the economy. The EU emission trading system (ETS) obliges over 11,000 enterprises in the EU to buy emission allowances once they exceed quotas that are granted by the EU. Some industries are affected more than others. For example, airlines that are among the biggest emitters will have to find extra €1.12 billion to cover carbon costs in 2013, which will be the first year in which airlines must operate under the EU ETS system.<sup>11</sup>

The UNEP study on energy security risks shows that the strengthening of policy measures and the mitigation of energy security risks would benefit significantly from a strengthened and more coordinated multilateral producer-consumer dialogue between governments, industry, the financial community and relevant international organizations on a number of issues: (a) data and information sharing and increased transparency; (b) infrastructure investment and financing; (c) legal, regulatory and policy framework; (d) harmonization of standards and practices; (e) research, development and deployment of new technologies; and (f) investment/transit safeguards and burden sharing.<sup>12</sup> Most of these issues are very relevant when it comes to examining the potential for transatlantic cooperation on renewable energy.

### **A Framework for Thinking About Renewable Energy**

There is general understanding in the EU and in the U.S. that more efficient use of resources and energy is a legitimate goal. There is also general understanding that adverse and inefficient use of energy resources does not facilitate sustainability of the energy industry and economic development, and can lead to depletion of the fossil energy resources that still form the backbone of the current global economic system. A shift towards a wider use of renewable energy resources is happening, even as fossil resources maintain a steady position through less polluting resources displacing more polluting fossil resources within total energy consumption.

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<sup>11</sup>Airline Carbon Costs Take Off As EU Emissions Regulations Reach For The Skies, Standard & Poor's, February 18, 2011.

<sup>12</sup>George Kowalski and Sead Vilogorac, *Energy Security Risks and Risk Mitigation: An Overview*, UNECE Annual Report 2008, p. 83.

Geography and availability are of key importance when looking at renewable energy (RES) potential. The five renewable sources used most often are biomass, water (hydropower), geothermal, wind, and solar. Utilization of each of the five varies significantly depending on the region in question. In both the EU and the U.S. there are diverse examples of RES use according to regional principles. The potential for renewable energy resources also varies across industry, households and transport sectors. The transport sector, however, is the biggest energy consumer and thus offers considerable potential for RES use whether through biodiesel, bioethanol or electricity.<sup>13</sup> The transport sector accounted for 61.7% of oil use and only 1.6% of electricity consumption in 2009.<sup>14</sup>

Both the EU and the U.S. have measures in place that facilitate development of renewable energy. In the U.S., investment in and use of renewable energy is both encouraged and required by a range of federal, state, and local government legislation and utility incentives. The EU has ambitious goals of achieving 20% higher efficiency, 20% reduction of GHG emissions and 20% renewable energy by 2020 vis-à-vis 1990.

### **Signals for Energy and Energy Technology Markets**

Long-term policy measures provide clear signals to a number of segments in the energy sector: technology production, primary energy production, as well as industrial and household consumption and everything related to this. All of these industries adjust their strategies and plans to such policy trends and decisions. If the policy emphasis is on improving energy efficiency, then technology producers are going to invest in improving the efficiency of technological processes of energy producing systems. If the policy emphasis is on developing wind power capacity, then producers can forecast the demand for new and more effective wind turbines and wind park management systems.

Going green demands investment, clear market stimulus and long-term policy vision. Even having all of the afore-mentioned does not

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<sup>13</sup>*Key World Energy Statistics*, International Energy Agency, 2011, p. 33 and p. 37.

<sup>14</sup>*Ibid.*, pp. 33-35.

guarantee an overnight switchover from fossil to renewable energy. There is no doubt that renewables will increase their market share of total energy consumption over the coming years, but they are not likely to displace the use of fossil fuels any time soon. This is because of much higher supply costs and requirement for vast tracts of land and water surfaces. Just to give an example: between 1990 and 2004, the contribution of renewables in meeting the total primary energy requirements of EU countries rose from 4.5% to 6.5%, from 12.0% to 14.5% for electricity generation, including hydro, and from 0.8% to 5.0% for electricity generation, excluding hydro. The corresponding numbers for North America show a decrease from 6.5% to 5.9% per cent for total primary energy, 18.6% to 15.3% for electricity generation, including hydro, and from 3.0% to 2.4% for electricity generation, excluding hydro.<sup>15</sup>

Infrastructure is one of the great challenges for the energy sector in terms of the scale of necessary action stemming from policies; the investment required to develop new infrastructure and renovate or replace the existing infrastructure (energy production, transmission and distribution/upstream and downstream); and the ever closer cooperation and synergies between a multitude of sectors of economy that are in one or another way related to energy, including energy consumption for industrial production.

## Funding and Institutional Support

Both the EU and the U.S. have support measures in place for various energy types. Similarly both markets provide huge amounts of financing for research and development (U.S. Department of Energy (DoE) programs and EU Seventh Framework Programme (FP7)).

In the U.S. the Renewable Energy and Energy Efficiency (RE&EE) Advisory Committee was established by Secretary of Commerce Gary Locke in November 2010 as part of the Renewable Energy and Energy Efficiency Export Initiative, which has set a goal of doubling renewable energy exports in the next five years, targeting \$10 billion or more in annual export benefits. In September 2011 RE&EE Advi-

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<sup>15</sup>George Kowalski and Sead Vilogorac, *Energy Security Risks and Risk Mitigation: An Overview*, UNECE Annual Report 2008, p. 81.

sory Committee presented 11 recommendations to promote U.S. exports of renewable and efficiency technologies to federal officials.<sup>16</sup> The recommendations are the first set of actions the Committee was able to recommend to ensure robust growth in the renewable energy and energy efficiency exports by U.S. companies.<sup>17</sup>

In 2012 the total proposed budget for the U.S. DoE, which is the lead financial supporter of energy R&D in the United States, is \$29.5 billion<sup>18</sup>, with \$3.2 billion going to the Office of Energy Efficiency and Renewable Energy (EERE) and \$550 million to the Advanced Research Projects Agency–Energy (ARPA-E). This would represent an 11.8% increase over 2010. Critics point out, however, that compared to global investment in renewable energy research and development in 2010, when governments invested in renewable R&D alone more than \$5 billion, the United States invested the same amount for all energy R&D during the same period.<sup>19</sup>

Additional energy R&D and early commercialization funding is also provided through tax benefits, grants, loans and contracts created by the American Recovery and Reinvestment Act (ARRA) of 2009. This stimulus legislation created \$260 billion in energy tax credits for companies and consumers with the goal of improving the market penetration and share of efficient and clean energy technologies.

The EU's funding for research is channeled through its Framework Programme 7 (FP7), the total budget of which is approximately €50 billion from 2007 until 2013. Funding for energy research in 2011 was €216.9 million and will reach EUR €314 million in 2012 and an additional EUR €413 million during the last year of the current FP7. The total volume for energy research over the complete course of FP7 will amount to EUR €2.197 billion.

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<sup>16</sup>See the full list of recommendations at [http://export.gov/reec/eg\\_main\\_023040.asp](http://export.gov/reec/eg_main_023040.asp).

<sup>17</sup>*Renewable Advisory Committee Delivers Recommendations to Under Secretary of Commerce and other Federal Officials*, [Renewableenergyworld.com](http://Renewableenergyworld.com), September 14, 2011.

<sup>18</sup>See U.S. DoE “FY 2012 Statistical Table by Appropriation”, <http://www.cfo.doe.gov/budget/12budget/Content/Appprostat.pdf>.

<sup>19</sup>*Global Trends in Renewable Energy Investment 2011*, UNEP, Bloomberg New Energy Finance, 2011.

More than 30 states in the U.S. have financial incentives that subsidize the installation of renewable energy equipment. Net metering programs are in place in over 40 states allowing to pay for the net amount of electricity consumed, thus facilitating installation of micro-generating equipment for private use. Feed-in tariffs are widely used in the EU and also in a number of states in the U.S. specifically to support development and installation of certain types of renewable energy technologies.

Most of EU member states have legislation that sets framework and specific conditions for energy production from renewable sources along with energy efficiency measures. Priority issues in the EU are quite definitively related to the set 20-20-20 targets: energy efficiency, decrease of GHG emissions and a significant increase of renewable energy share in energy consumption. A very recent initiative of the European Commission foresees introduction of a new energy efficiency and savings directive. It has been put on the table because the Commission thinks that the current legislation does not provide the desired results and more stringent and compulsory measures have to be introduced to be able to achieve 20% higher energy efficiency by the target date. The new legislation, when adopted, would set binding energy efficiency measures for state and municipal institutions and large energy consumers. State and municipal institutions would be obliged to renovate 3% of their building stock annually and industrial consumers would have to undergo energy efficiency audits every three years. The Commission believes that these and other binding measures would help achieve the 20% energy efficiency and CO<sub>2</sub> emission reduction targets for 2020.

### **Climate and Economic Growth Dichotomy**

Climate change and economic growth are two notions that are often interrelated in public rhetoric. Typically there are two schools with opposite views on the relationship between the two issues: one says that green energy imposes too much of a socio-economic burden (because green energy has to be subsidized in one or another way, but often through tariffs) and hampers economic growth (because green technologies cost more, demand higher investment and pay back over a longer time than fossil energy technologies); the other view propa-

gates climate-friendly development of energy industry, the essence of which can be summarized under the green growth slogan. The EU pursues the rhetoric of climate change with generally higher enthusiasm than the U.S., where the “change” and “no change” dichotomy is more pronounced and controversial. However, regardless of ideologically motivated positions or the interests of industrial lobby groups on climate change, there is a general consensus that the least that can be done is being more effective in energy use.

There are energy industry sectors that do not exactly represent renewable energy as we understand it, but are very much in favor of achieving climate targets. The nuclear power industry is often mentioned as one potential solution to climate change processes. It is indeed true that nuclear power does not produce CO<sub>2</sub> emissions and thus can contribute to the reduction of CO<sub>2</sub> emissions. However, nuclear is not renewable, at least in traditional terms and it also has issues that do not have a solution currently—nuclear waste has to be buried somewhere and there is no guarantee that the depositories will remain intact for thousands of years to come. Finally, renewable energy is definitely a priority choice for the reduction of GHG and mitigation of the impact of energy production on climate.

### **Keywords: Competition and Cooperation**

Global economic processes have contributed to both competition and cooperation between the EU and the U.S. Close economic and financial ties produce both opportunities and risks. This is true also about the EU–U.S. energy relations: competition and cooperation, opportunities and risks go hand in hand. On the one hand there has not been much discussion of European energy security in the United States, and thus the energy security debate centers around the possibility that the U.S. could be more self-sufficient in terms of energy supplies. On the other hand the recent eurozone crisis, with its risk of contagion to the United States, exposes the level of linkage between the two economies. For example, if a large-scale gas crisis were to occur in Europe partially shutting down production in Europe, then the U.S. also would be vulnerable to economic instability. Increasing transatlantic cooperation and ensuring European energy security would help to minimize the economic impact that such an adverse

event would have on the U.S. Thus, in order to ensure its own economic security, the United States needs to bolster these efforts by strengthening energy cooperation with the European Union.

Both the EU and the U.S. invest heavily in energy-related research and development. The reason is quite clear: investment today in the development of better ways to handle extraction of energy resources, energy production or energy use is almost certain to lead to mid- and long-term gains. As commercially available fossil resources become scarce and renewables are growing in terms of sources and means of application, the efficient use of technologies used and organization of energy systems become not only more complex but more clearly geared to being sustainable. Some EU countries are keen to develop the ideology and principles of green growth, in essence emphasizing that economic growth does not have to come with depletion and or inefficient use of resources and or environmental pollution, e.g. greenhouse gas emissions, degradation of biodiversity, etc.

Energy security provides a dominating context for any further energy policy debate on both sides of the Atlantic. A good deal of discussion is centered around decreasing the dependence on imported fossil energy resources as well as more efficient use of energy resources. Nevertheless, it is clear that renewable energy will stay high on the policy agenda as an important means to increase energy independence from foreign supplies in a world of energy price volatility, particularly with regard to fossil resources.

The remaining question on the agenda is which renewables have the best effect on energy production in particular circumstances and how effective different kind of renewables can be. Natural gas is still better than biomass in terms of effectiveness and environmental impact.<sup>20</sup> In the U.S. the effectiveness of natural gas has facilitated use of shale gas in energy production, leaving questions only about the

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<sup>20</sup>According to the U.S. Energy Information Agency CO<sub>2</sub> emissions in combustion for coal, natural gas and biomass are 960 kg/MWh, 596kg/MWh and 1509 kg/MWh respectively. "Carbon Dioxide Emissions from the Generation of Electric Power in the United States", US Department of Energy, Environmental Protection Agency, 2000, Table 1, [http://www.eia.gov/cneaf/electricity/page/co2\\_report/co2emiss.pdf](http://www.eia.gov/cneaf/electricity/page/co2_report/co2emiss.pdf) See also "Wood-Fueled Biomass Power Plants and CO<sub>2</sub> Emissions", Massachusetts Forest Watch, 2010, <http://www.maforests.org/MFWCarb.pdf>.

technology of extraction. On paper biomass has no CO<sub>2</sub> emissions, but in reality natural gas is 3-5 times more effective and produces 3 times less CO<sub>2</sub> emissions than biomass.<sup>21</sup> On the other hand, biomass is a resource that can be produced locally and is renewable: there is abundance of biomass available from a number of sectors like forestry and agriculture, to name but a few; and biomass CHPs can contribute to local economy through distributed power generation.

Expansion of the renewable segment goes hand in hand with improvement in production management systems and transmission of electricity. This is where modern power management comes into play in the form of deployment of smart grids, smart metering and good interconnections that are essential for managing an energy system with a multitude of various energy sources feeding energy into the grid. Distributed power generation and also microgeneration add to the complexity of tackling unstable wind power capacity and hydropower, which depend on the hydrological situation in their natural or artificial water reservoirs.

Further development of RES also depends on continued support, starting with R&D in the field of renewable energy and ending with managing grids with big renewable capacities connected. It is quite clear that deployment of smart grids in big and complex energy systems will take a lot of time and the existing power management and transmission systems need a lot of investment for being up-to-date anyway. With an increasing number of RES energy producing units connected to the grids, both the U.S. and EU member states are going to need massive investment in national transmission systems just to keep them up-to-date and able to handle varying power capacity. Technology producers in the EU and the U.S. have opportunities for competition and also for cooperation in this regard.

Renewable energy technologies similarly to some of the fossil technologies need relatively high upfront investment, therefore predictable and clear financial incentives have to be in place to make

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<sup>21</sup>Figures may vary depending on technology and if life-cycle analysis of carbon intensity is applied. See, for example, "Findings from a time-dependent carbon footprint analysis of a biomass renewable energy plan", The Scottish Institute of Sustainable Technology, 2011, p.4, <http://www.forthenergy.co.uk/pdf/Carbon%20Footprint%20Analysis.pdf>.

renewable energy attractive to the investors. In addition to contributing to diversification of energy mix and tackling the climate issues, investments in RES have to produce payout. Furthermore, newer RES technologies have to become commercially available and viable. For example, estimates by the U.S. Department of Energy state that wind power has the potential to cover at least 20% of electricity production in the U.S. by year 2030, reaching 300GW.<sup>22</sup> Concentrated solar power, as well as photovoltaic electricity production, also has a very good potential to become an essential part of the national electricity production mix already by 2020 both in the U.S. and the European Union. Most renewable sources that are currently commercially available also contribute to reducing climate change stemming from energy production from fossil resources. At the same time, energy efficiency has to become a household phrase, because it makes little sense to produce energy from renewables if such energy is simply wasted.

Renewables are very much seen as part of the solution of energy security risks, along with clean coal and nuclear power. Oil and natural gas are certainly not to disappear from the energy menu, but might gradually give up part of their share. The U.S. and the EU are far from switching over from oil to renewable petrol in the transport sector, however, the share of biofuels is growing because of both market-driven choices and legislation requirements demanding an increase in biofuels in transport fuel mix. The role of electricity in transport is growing, also thus giving way to energy produced from renewable sources, be those wind, solar or hydro. Better commercial availability of microgeneration technologies combined with net metering and smart grids may well do the trick of more widespread use of electricity-powered vehicles.

Given the amount of funding for energy R&D and specifically renewable energy R&D on both sides of the Atlantic optimistic forecasts can be made about the potential for both competition and cooperation. While more competition can be expected on the commercial side, the regulatory and legislative framework set by decision makers

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<sup>22</sup>Franklin Kramer and John Lyman, *Transatlantic Cooperation for Sustainable Energy Security*, The Atlantic Council and Center for Strategic and International Studies, February 2009, p. 31.

can contribute to ever closer cooperation between the two key players on the global energy stage.

### **Recommendations for Policymakers**

Given both the competitive and cooperative potential of the Transatlantic relations and the increasing global competition for energy a number of conclusions and recommendations for policymakers in Europe and the United States can be drawn.

Global consumption of fossil fuels is growing and prices tend to get higher opening up opportunities for better use of domestic energy sources an important part of which is renewable energy. Clear policy goals and set targets give signals to the energy and related industries about the potential for investment and revenue down a foreseeable time-line.

Growing energy consumption in some of the biggest energy markets means an ever increasing competition for all kinds of energy that can be imported. In this light ability to be more energy efficient is essential opening up opportunity for development of energy efficient technologies both on the production and consumption side. Set targets in this respect allow economically based calculations on savings against investment.

While competition does not have to disappear there is most certainly a place for cooperation in research and development on renewable energy. Efficiency of renewable technologies is increasing rapidly thus facilitating proliferation of renewables in energy production. Creating more favorable conditions (legislation and infrastructure) for the use of renewables in micro-generation would definitely add to the overall capacity of non-industrial energy production.

Convergence of rules is probably not possible and not necessary, however, the positive potential of harmonization of certain export regulations related to technology export or exchange from both the U.S. as well as the EU should be welcome.

Intensified political dialogue on energy and energy technology cooperation will send a clear message to the market about the eco-

conomic potential of cooperation and will add to the stability of forecasts on the future development of transatlantic energy and energy technology market that will also increase ability of the two players to compete with other regions and players worldwide.