



Deputy Director-General Patrick Child

EU-U.S. Energy Technology Working Group

Brussels and Washington D.C. (by DVC)

(Brussels venue: CDMA -1/109)

Thursday, 7 December 2017

15h00-17h00 Brussels time

<p>Main contact person:</p> <p>[REDACTED], RTD.G.1, CDMA 03/[REDACTED]</p> <p>Contributor(s):</p> <p>[REDACTED], RTD-G3, CDMA 00/[REDACTED]</p> <p>[REDACTED], RTD-G2, CDMA 00/[REDACTED]</p> <p>[REDACTED], RTD-D.3, COV2 05/[REDACTED]</p> <p>[REDACTED], JRC.C.1 (Petten), P312 00/[REDACTED]</p> <p>[REDACTED], RTD.G.5, CDMA 00/[REDACTED]</p>	<p>RTD colleague at meeting:</p> <p>[REDACTED], RTD.G.1, CDMA 03/[REDACTED]</p> <p>[REDACTED], RTD-G3, CDMA 00/[REDACTED]</p> <p>[REDACTED], RTD-G2, CDMA 00/[REDACTED]</p> <p>[REDACTED], RTD-D.3, COV2 05/[REDACTED]</p> <p>[REDACTED], JRC.C.1 (Petten), P312 00/[REDACTED]</p> <p>[REDACTED], RTD.G.5, CDMA 00/[REDACTED]</p> <p>Back up (in case of absence):</p> <p>For [REDACTED], [REDACTED], CDMA 03/[REDACTED]</p> <p>For [REDACTED], [REDACTED], RTD.G3, CDMA 00/[REDACTED]</p>
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0. AGENDA OF THE MEETING

15:00 – 15:20: Introductions

- EU: Patrick Child, co-chair
- US: [REDACTED], co-chair

15:20 – 15:50: Wind Power: Advanced physics-based modelling, analysis, and simulation capabilities

- US: [REDACTED], DOE Atmosphere to electrons (A2e) Program
- EU: [REDACTED], EC-RTD.G.3 Renewable Energy Sources

15:50 – 16:20: Basic Research on Electrical Energy Storage

- US: Dr. [REDACTED], Materials Sciences and Engineering Division, Office of Basic Energy Sciences and Dr. [REDACTED], Materials Sciences and Engineering Division, Office of Basic Energy Sciences
- EU: [REDACTED], EC-RTD.G.2 Advanced Energy Production and [REDACTED], ED-JRC (and possibly other EC colleagues)

16:20 – 16:50: Nuclear fusion

- US: [REDACTED] DOE Office of Fusion Energy Sciences and [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] U.S. ITER Project and International Program
- EU: [REDACTED], EC-RTD.G.5 Fusion Energy

16:50 - 17:00: Conclusions

- EU: Patrick Child, co-chair
- US: [REDACTED], co-chair

1. STEERING BRIEF

Scene Setter

You will co-chair the next meeting of the EU-U.S. Energy Technology Working Group, together with [REDACTED] in the Office of International Affairs at the U.S. Department of Energy (DOE).

The Energy Technology Working Group is one of three working groups under the umbrella of the EU-U.S. Energy Council (the other two revolve around energy policy and energy security, respectively). Established in 2009 and reporting to the wider EU-U.S. summit, the EU-U.S. Energy Council is the principal political framework for the two parties to advance their energy-related collaboration.

With respect to energy *research*, the parties report back on this collaboration also in the context of the Joint Consultative Group (JCG) under the Science and Technology Agreement, usually without launching any new initiatives in this context. At the last JCG meeting in Washington D.C. on 23 October 2017, the U.S. side nonetheless suggested greater collaboration in neutrinos research (welcomed in principle by the EC), but didn't come back to this issue for the present meeting.

The last meeting of the EU-U.S. Energy Technology Working Group took place on 16 October 2015 (in Brussels and Washington via video link; see background for flash report). It followed a new format – welcomed by both sides – concentrating on a few key issues as opposed to reviewing all the ongoing cooperation activities, or even only those considered priorities under the Rolling Action Plan 2015-2017 (see background). The U.S. side used the occasion for a first formal presentation to the EU of what would later become Mission Innovation.

There are various reasons why the Energy Technology Working Group hasn't met since (the last meeting of the broader EU-U.S. Energy Council took place on 4 May 2016). On the one hand, persistent differences between the U.S. Congress and the White House that re-surfaced during the federal budget negotiations have prevented the U.S. from confirming its energy-research priorities, including vis-à-vis the EU. Furthermore, some senior-level positions at the U.S. DOE still need to be filled, although [REDACTED] (who will not participate in this Working Group meeting) was recently nominated [REDACTED]. These uncertainties alone are a major reason for holding today's meeting, to keep existing institutional links and communication channels open and functioning.

On the other hand, the EU side itself has found it difficult to articulate what it expects from its energy-research collaboration with the U.S., this despite considering the U.S. a strategic partner and a principal ally in Mission Innovation. In Horizon 2020 (SC3), the number of projects with U.S. participation has fallen to only three (down from 16 in FP7), with only one additional call planned for 2018-2020 (on biofuels).

The fact that both sides continue to reserve most of their research support for their own nationals also acts as a brake on expanding bilateral research collaboration (the EC under Horizon 2020, as well as the U.S. DOE and other U.S. funding agencies, explicitly encourage international participation in their programs but fund foreign nationals only in specific cases). A recent exchange of letters between Commissioner Moedas and U.S. Ambassador Gardner made it somewhat easier for *non-funded* U.S.

participants to participate in Horizon 2020-supported collaborative projects, waiving the legal requirement that they sign the grant and/or the consortium agreement. At the same time, insistence by other consortium members on some kind of written agreement outlining roles and responsibilities can still constitute a hurdle (as in the case of the CL-Windcon project mentioned below).

In practice and despite these hindrances, bilateral EU-U.S. energy-research cooperation (involving also the JRC) is alive and well, covering areas such as the energy-and-water nexus, smart grids and inter-operability of electrical vehicles, critical materials (also involving Japan), or hydrogen and fuel cells. Multilateral cooperation continues as well, for example, under the umbrella of the IEA Technology Collaboration Programmes (TCPs) and of course Mission Innovation. In addition, there is very active lab-to-lab collaboration, also and especially at the level of the Member States, involving visits and exchanges of researchers. In line with the new meeting format mentioned above, these activities will not be reviewed today.

Objective(s)

- Stress that the EU values its bilateral energy-research collaboration with the U.S., including and especially in the context of the EU-U.S. Energy Council and the Energy-Technology Working Group;
- Highlight that both sides should use their bilateral energy-research collaboration to advance clean-energy innovation also in multilateral contexts, particularly Mission Innovation;
- Insist that the full EU-U.S. Energy Council should meet soon;
- Have an exchange of views and come to operational conclusions on the three main agenda points (wind power, energy storage, nuclear fusion).

Line to Take

General:

- Something about H2020 and corresponding U.S. research support programs, how to be more proactive about encouraging research partnerships over and above the possibilities that already exist (mention support project); also using MI as a catalyst/booster

Wind power:

- The EC values its collaboration with the U.S. on wind energy;
- Currently, there are no targeted openings in Horizon 2020 for U.S. participation on wind energy but the program remains open to international participation in general;
- The EU and the EC should make greater use of the wind energy TCP under the umbrella of the IEA.

Energy storage:

- The EC values its collaboration with the U.S. on energy storage including batteries;

- The EC takes a comprehensive approach to energy storage, including batteries but also other energy vectors and their integration into the energy system, power-to-X technologies, as well as research on materials;
- Currently, there are no targeted openings in Horizon 2020 for U.S. participation on energy storage but the program remains open to international participation in general;
- Non-battery-based storage, batteries testing, batteries standardization, and batteries recycling and re-use may present opportunities for future collaboration.

Nuclear fusion:

- The EU values its cooperation on fusion energy research with the U.S. and wants to maintain or even expand it;
- Cooperation on the installation and exploitation of the shattered pellet injector in JET must yield the results needed for ITER.
- JET's future beyond 2020 is unclear. But direct funding from Euratom beyond Horizon 2020 will not be possible.

2. SPEAKING POINTS (for yourself and other EC colleagues)

2.0 Introduction

Patrick Child, RTD (following the U.S.'s [REDACTED]):

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2.1. Wind power

[Following the U.S. speaker(s), give the floor to [REDACTED], RTD.G.3]

[REDACTED], RTD.G.3:

- The EC supports collaboration between EU and US energy research organisations, including on renewables and particularly wind energy. There are many existing links between EU and US which are very valuable and should continue.
- Subsequent to the exchange of letters between Commissioner Moedas and Ambassador Gardner, U.S. partners now find it easier to participate in H2020. We should look for ways to facilitate the participation of EU partners in U.S. programmes as well.
- Currently, there are no wind energy topics in the Horizon 2020 Work Programme 2018-2020 calling for collaboration with U.S. partners in particular. But Horizon 2020 is of course open in principle to international partners, including and especially from the U.S.

- Besides bilateral cooperation between the EU and the U.S. we should continue coordinating our research via the IEA Technology Collaboration Programme (TCP) on wind energy. Some of the suggestions made by the U.S. side could be addressed in this way. Other suggestions will need to be discussed further; possibly, these could become new tasks under the TCP.

2.2 Energy storage

[Following the U.S. speaker(s), give the floor to ██████████, RTD.G.2; ██████████, RTD.D.3; and ██████████, JRC.C.1 (Petten)]

██████████, RTD.G.2:

- The EC has a comprehensive approach to energy storage (as explained in the *Accelerating Clean Energy Innovation* Communication). It includes electrical, mechanical, chemical, and heat vectors, and their integration into the energy system.
- The EC supports “Power-to-X” technologies to enable the storage of energy (involving heat, cold, hydrogen, methane or liquid fuels). Specifically, the Fuel Cells and Hydrogen Joint Undertaking develops opportunities around hydrogen (and, based on that, synthetic methane and other derivatives).
- The EC continues to support low-TRL research on materials and chemistries for next-generation batteries. We also support higher-TRL integration of storage in the energy system from technical, market and regulatory points of view.
- The EU and the U.S. already collaborate on energy storage, including batteries. Horizon 2020 remains open to U.S. participation. Work Programme 2018-2020 doesn't target U.S. partners in the field of energy storage but we should consider creating such opportunities in future.

██████████, RTD.D.3:

- The Horizon 2020 Work Program for 2018-2020 includes several calls in the field of Nanotechnologies, Advanced Materials, Biotechnology, and Advanced Manufacturing and Processing (NMBP). They address both battery storage and non-battery based energy storage.
- These calls are open to international partners, but not specifically targeted at U.S. participants.
- There are opportunities for EU-U.S. collaboration particularly in non-battery-based energy storage, for example regarding materials for chemical storage, power-to-chemicals, power-to-gas or similar fields.
- With respect to battery storage, there is a need for more global research and development around battery testing. Materials and chemistries are changing constantly and new ones are being invented all the time. Existing forms of collaboration, such as between the U.S. DOE and the JRC, could be strengthened.
- Battery standardisation is another important field where more global cooperation and collaboration would be useful.

██████████, JRC.C.1 (Petten):

- The JRC is collaborating with the U.S. DOE on the UNECE Global Technical Regulation (GTR), regarding battery-management system functionality and joint recommendations for the UNECE GTR on hydrogen vehicles.
- The JRC is carrying out an internal exploratory research project called ‘SASLAB’ (Sustainability Assessment of Second Life Application of Automotive Batteries). The goal is to evaluate the performance of batteries in first- and second-use applications.
- The JRC is exchanging information and knowledge directly with the DOE and especially the National Renewable Energy Laboratory (NREL) (such as on an NREL analysis to find suitable grid applications for second-use batteries, and certain differences in U.S. and European regulations and policies regarding second-use batteries and battery recycling).
- The JRC would welcome exploring further avenues for collaboration, in addition to those that exist already.

2.3 Nuclear fusion

[Following the U.S. speaker(s), give the floor to ██████████, RTD.G.5]
██████████, RTD.G.5:

- Research and innovation is a principal pillar of the Energy Union strategy. Nuclear fusion is an area where the EU wants to ensure continued technological leadership. Fusion has much promise as a low-carbon energy source.
- To guide the European fusion research programme, European stakeholders endorsed the European Fusion roadmap in late 2012. Currently, the roadmap is being revised to take into account the latest developments, e.g. the revised ITER baseline. A revised roadmap should be available by summer 2018.
- The EUROfusion consortium is in charge of implementing the European fusion research program. As an in-kind contribution to the program, Euratom is paying for the operation of the Joint European Torus (JET), while EUROfusion is responsible for its scientific exploitation.
- We cannot look ahead to what might happen to JET after 2020, but direct funding from Euratom beyond Horizon 2020 will not be possible.
- EU-U.S. cooperation is crucial for the development of fusion energy. At present there are two main angles:
 - JET: cooperation between Euratom, General Atomics (US) and ITER IO (e.g. pellet injector);
 - Wendelstein 7-X (W7-X): cooperation between the German Max-Planck-Institut für Plasmaphysik (IPP) and the U.S. Los Alamos National Laboratory, the Oak

Ridge National Laboratory, the Princeton Plasma Physics Laboratory, and the University of Wisconsin-Madison (e.g. trim coil system at the Stellarator).

- The EU values its cooperation on fusion energy research with the U.S. and wants to maintain or even expand it, in line with the revised European Fusion roadmap.

2.4 Conclusions

[page break]

3. DEFENSIVE POINTS [Times new roman 12, line spacing 1]

General

Why isn't neutrinos research on the agenda, given that it was raised at the last Joint Consultative Group meeting in Washington D.C.?

Both sides agreed at the JCG meeting that this issue should be discussed further, but neither one raised it for today's meeting. Let's come back to it at a later date.

Do we really need the Energy Technology WG (or EU-U.S. Energy Council) now that we have Mission Innovation?

We absolutely do. Mission Innovation helps us to advance our multilateral collaboration, together with others. The Energy Technology WG – and the EU-U.S. Energy Council more generally speaking – is the main arena for our bilateral energy collaboration.

We don't seem to be using the Energy Technology Working Group as much as we should. What can we do to change this?

First of all, the EU-U.S. Energy Council should meet as soon as possible. This will give new vigour also to its working groups.

What is the state of play on the main collaboration files? Why isn't this on the agenda and when will we take stock of all that?

Given that time is at a premium in our working group meetings, we agreed in October 2015 not to review all our collaboration activities on those occasions but instead focus on a few key issues. This worked very well but we would be ready to re-examine the format if the U.S. wishes to do so.

Wind energy

Would it be possible for NREL to join the H2020 CL-Windcon project?

They could have been part of the project consortium if they had agreed to sign the grant agreement, or any consortium agreement or non-disclosure agreement (NDA). Apparently, some consortium members insist on some kind of written agreement outlining roles and responsibilities. It is up to the consortium and NREL to discuss how they would like to cooperate.

Some USA organisations have been part of the H2020 Windfusion project. Will this project get support via H2020?

In the topic LCE-06-2017 a subtopic 'improved understanding of the physics of wind as a primary resource and wind energy technology' was included and this subtopic was well aligned with the American research programme 'Atmosphere to Electricity.' Indeed a proposal (Windfusion) was submitted by EU and US research institutes but this proposal was not selected for funding and ended up in the reserve list. It is rather unlikely, due to limited funds, that this project will be supported.

4. BACKGROUND NOTES

4.1. Flash Report from the latest EU-U.S. Energy Technology Working Group meeting on 16 October 2015 (prepared by [REDACTED])

The EU-U.S. Energy Technology Working Group held its sixth meeting on 16 October 2015, by DVC in Washington D.C. and Brussels. The meeting was chaired by [REDACTED] for the U.S. and András Siegler for the E.U. Participants noted that the meeting of the Energy Council in Washington D.C., planned for 23 October 2015, had to be postponed due to urgent conflicting commitments by U.S. Secretary of State John Kerry.

Instead of the customary review of ongoing work under rolling action plan, the meeting adopted a new format, concentrating on two key issues: (1) The Role of Innovation Post-COP21 and (2) Energy-Water in Grid Modelling Analysis.

Participants noted that an updated and expanded version of the rolling action plan had been prepared. The U.S. side will react to comments and suggestions made by the EU, after which the revised rolling action plan can be adopted by the two sides.

The Role of Innovation Post-COP21: The U.S. side put forward an ambitious proposal to double its funding for low-carbon energy R&I over the course of the next five years (from roughly USD 5 to 10 billion per year). This was in response to the flat-lining – perhaps even a decrease – of global R&I efforts in recent years to promote innovative low-carbon technologies. The U.S. goal is a high-level announcement on the first day of COP21 in Paris. It is currently working with France and India but wants to rally the fifteen most important energy innovators in the world around a common goal and agenda.

[REDACTED] explained that the proposal had three principal components, focusing on an increase in public and private-sector funding, respectively, as well as a qualitative leap in global coordination efforts. A particular focus will lie on bridging the valley of death from demonstration to commercialization, and on raising the profile and contribution of the private sector throughout.

The U.S. explicitly asked the EU to join its initiative. We responded that we shared the U.S. concerns but that at present, we saw our added value mainly in rallying the European side – using the SET Plan and the Energy Union framework – and in contributing to global coordination efforts (given that EU Member States were still considering whether to increase their financial contribution to low-carbon energy R&I). (P.m.: Commissioner Moedas, at the latest G7 Science Ministers' meeting in Berlin on 8 and 9 October, already offered the Commission's help in rallying and coordinating global efforts to provide greater support for low-carbon energy R&I).

Given the high profile and expected visibility of the U.S. initiative this initial answer might not be sufficient. The EC should consider engaging the U.S. – at appropriate levels – and help shape the initiative together. The planned visit by VP Sefcovic to Washington DC next week (where he will meet, among others, U.S. Vice-President Joseph Biden and Energy Secretary Edward Moniz) might be a first opportunity for doing so.

Energy-Water in Grid Modelling Analysis: The meeting heard a first exchange of views based on a proposal tabled earlier by the U.S., led by the DoE's [REDACTED] for the U.S. and [REDACTED] for the E.U. A consensus emerged to hold a workshop on the energy and water nexus sometime next year at JRC-Ispra (possibly including an additional linkage to food). The U.S. DoE had announced earlier that it could provide some financial support for such a workshop. The agenda and participants still need to be defined among the U.S. DoE, the JRC and the relevant Commission DGs.

4.2. Joint Statement from the seventh EU-U.S. Energy Council, held in Washington D.C., 4 May 2016 (insert [http:// link or attach .pdf document?](#))

1. The seventh United States-European Union Energy Council met today in Washington, D.C., chaired by U.S. Secretary of State John Kerry, U.S. Secretary of Energy Ernest Moniz, EU High Representative/Vice President Federica Mogherini, European Commission Vice President Maroš Šefčovič and European Commissioner Miguel Arias Cañete. Minister for the Environment of the Netherlands Sharon Dijksma represented the Presidency of the Council of the European Union. The Energy Council, a forum on U.S.-EU energy priorities, promotes transparent, open and secure global energy markets; fosters policy and regulatory cooperation on efficient and sustainable energy use; and pursues joint research and development on clean energy and energy efficiency technologies. Following the adoption of the Paris Agreement in December 2015, the Energy Council also constitutes a platform for transatlantic dialogue on how to accelerate the clean energy transition in line with the ambition to hold the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels.

Bolstering Energy Security and Markets and Combatting Energy Vulnerabilities

2. The Council reaffirmed that energy security, through access to reliable, affordable, diversified, efficient and sustainable energy in the United States and Europe, remains a fundamental objective. The Council emphasized it is unacceptable to use energy as a political weapon and underscored its commitment to work together to improve energy diversification in the EU and its neighboring countries, including ensuring adequate market-based alternatives in terms of energy sources, suppliers, transportation routes, and demand-side management. The Council also underlined the importance of ensuring that global energy markets are open, transparent and liquid, and affirmed that enhancing transatlantic regulatory cooperation would help progress towards this goal.

3. The Council recognized that new supplies and suppliers, combined with diversified supply routes and sources, greater levels of interconnection, increased indigenous energy production, third-party access to gas transmission and storage facilities, access to LNG, as well as energy efficiency measures, will be critical to meeting the EU's energy security objectives. In this respect, the development and better use of interconnections (including bi-directional), regasification and storage infrastructure is essential. It noted the importance of continuing efforts to swiftly implement EU Projects of Common Interest, particularly in Southeast and Central Eastern Europe, the Iberian Peninsula and the Baltic and Mediterranean regions, including interconnections to peripheral and vulnerable regions, and to complete internal market reforms. The Council also recognized the importance of respecting market needs when designing infrastructure and of open and predictable procedures to facilitate private sector investment and other participation in these projects, including by EU and U.S. companies. With a view to contributing to energy security in the gas market in the EU, the Council concurred that

any new infrastructure should entirely comply with the Third Energy Package and other applicable EU legislation as well as with the objectives of the Energy Union. The Council reiterated its strong support for the opening of the Southern Gas Corridor, including the construction of the Trans-Adriatic Pipeline (TAP) and underscored the importance of the Greece-Bulgaria Interconnector and the construction of liquefied natural gas (LNG) terminals, in Croatia (with evacuation pipelines), as well as in Greece if there is market demand. The Council recognized that the abovementioned infrastructure improvements would play a critical role in bringing alternative gas supplies into the Southeast and Central European region. The Council also acknowledged the potential of the Iberian Peninsula as an important gas entry point for the EU, as well as the Baltic connector and the Poland-Lithuania gas interconnector, which would bring essential alternative gas supplies to Finland and the Baltic States. In the electricity sector, the Council recognized the importance of fully integrating the Baltic States into the EU's internal energy market and welcomed the completion of the Lithuania-Poland and Lithuania-Sweden power interconnections in December 2015.

4. The Council welcomed the lifting of U.S. crude oil export restrictions in 2015 and the commencement of U.S. LNG exports from the Gulf Coast in 2016, as they are important milestones for global energy markets that can also help improve security of supply globally and in Europe. The Council noted that the United States has already approved significant volumes of LNG exports to non-FTA countries and has applications for additional volumes currently under review. The United States is expected to become a significant natural gas exporter before the end of the current decade. The Council recognized the potential of the new gas resources in the Black Sea, the Caspian Basin, North Africa, and the Eastern Mediterranean for the energy security of the EU and the wider region. The Council stressed the need to respect the sovereignty and sovereign rights of EU Member States to explore and exploit their natural resources and stands ready to facilitate the development of these resources and corresponding infrastructure, underlining the need to respect international law.

5. The Council reaffirmed its commitment to the G-7 Principles of Energy Security endorsed by G-7 leaders at the Brussels and Elmau Summits in 2014 and 2015 as well as the commitment to provide energy sector support to Ukraine and other vulnerable countries. The Council stressed the role of Ukraine as an important natural gas transit country to the EU. Ensuring sufficient and diversified fuel supplies, including in the electricity sector, for Ukraine, the Republic of Moldova and other vulnerable countries, remains a key priority for the United States and the European Union, and the Council welcomed their efforts to this end. The Council welcomed the close cooperation among the United States, the European Union and Canada to support Ukraine in developing a winter contingency plan, as well as the medium- and long-term efforts to improve Ukraine's energy security. The Council underlined its support for the continuing reform of Ukraine's energy sector, and for enhancing and making more transparent the legal, fiscal and policy framework and improving transparency in the context of the progressive integration of Ukraine into the European energy market. The Council noted the importance of Ukraine's maintaining reform momentum and strengthening the implementation of energy sector reforms in line with its commitments under the EU-Ukraine Association Agreement and the Energy Community, including those as established with the concurrence of the IMF, World Bank, EBRD and EIB. In particular, the Council supported adjustments in energy prices to move closer to reflecting costs, adoption of legislation creating an independent regulator, an electricity market law, and progress in unbundling its state oil and gas company, Naftogaz, in particular by establishing co-operation between Naftogaz and the European TSOs to develop common standards for the operation of the Ukrainian gas network. These

efforts can help encourage the necessary investments that will increase domestic production of both natural gas and renewable energy, enhance Ukraine's gas storage capacity and address the significant potential for energy efficiency. The Council also acknowledges the EU and U.S. contributions to Ukraine's energy security by enabling reverse flows of natural gas to Ukraine and welcomes the progress made in the construction of the gas interconnector between Romania and the Republic of Moldova.

6. The Council recognized the importance of regulatory cooperation to ensure effective market functioning and to realize key infrastructure projects. The Council welcomed the existing regulatory cooperation between the U.S. Federal Energy Regulatory Commission (FERC) and the Agency for the Cooperation of Energy Regulators (ACER) concerning the supervision and oversight of the wholesale energy markets. The Council looks forward to further strengthening of regulatory co-operation in areas of mutual interest and the signing of the Administrative Arrangement between the FERC and the Directorate-General for Energy of the European Commission concerning cooperation and the exchange of information related to the field of wholesale energy market regulation.

7. The Council took note of the ongoing work to complete the Transatlantic Trade and Investment Partnership (T-TIP) and the opportunity it presents to promote high standards for liberalized global trade and investment. In this context, the Council recognized T-TIP's potential to foster free trade in energy and low carbon technologies by diminishing trade and investment restrictions, promoting cooperation and regulatory coherence, and enhancing transparency. The Council also recognized the potential for T-TIP to improve cooperation on technical regulations, standards, and conformity assessment, while protecting the rights of our respective governments to regulate to ensure secure, viable, efficient, open, and competitive energy markets, and high levels of health, safety and environmental protection.

8. The Council underlined the importance of nuclear safety and related research around the world, including U.S.-EU cooperation under the existing U.S. DOE-Euratom nuclear research cooperation agreements. The Council commends the close coordination of U.S. and EU authorities on the global promotion of nuclear safety including the recent Nuclear Security Summit and through the G7 initiatives on Chornobyl and Ukraine, among others. The 30-year commemoration of the accident at Chornobyl on April 26 and the upcoming EU activities on nuclear legacies in Central Asia highlight the dedication of the parties to ensuring continuing advances in nuclear safety. In this context, the Council reaffirmed its commitment to the promotion and implementation of the highest levels of standards of nuclear safety as well as independent and effective regulatory practices in third countries with civil nuclear programs and emphasized the role of the IAEA in strengthening international cooperation and information exchange.

9. The Council recognized the increasing cyber security risks and vulnerabilities to energy infrastructure in the United States and Europe. The Council highlighted U.S.-EU efforts under the G-7 Energy Ministerial to advance cooperation with universities, research institutions and the private sector to promote the development of resilient energy systems capable of effective responses to emerging cyber threats.

10. The Council noted that the Joint Caribbean-EU Partnership Strategy and the U.S. Caribbean Energy Security Initiative (CESI), and the Caribbean and Central American Energy Security Task Force, as well as work under the Africa-EU Energy Partnership, the Power Africa initiative and Sustainable Energy for All (SE4All), could serve as productive vehicles for collaboration in support of energy vulnerable regions. This

includes meeting Sustainable Development Goal 7 (ensuring access to affordable, reliable, sustainable and modern energy for all). In this context, the Council committed to cooperate in accelerating access to renewable energy in Africa and developing countries in other regions, building on existing work and initiatives with a view to reducing energy poverty, increasing electricity access and mobilizing substantial financial resources from private investors, development finance institutions, and multilateral development banks.

Transformation to a Clean Energy Economy and Achieving Climate Change Objectives

11. The Council welcomed as a vital breakthrough the adoption of the Paris Agreement at the 21st Conference of the Parties (COP 21) under the United Nations Framework Convention on Climate Change (UNFCCC) in December 2015 in Paris, and its signature by more than 170 parties on April 22, 2016 in New York. Recognizing that urgent and effective action is needed to address the threat of climate change, the Council committed to work towards addressing climate change.

12. The Council underlined the importance of the early entry into force of the Paris Agreement and urged all Parties to the UNFCCC to begin their domestic processes in order to ratify, accept or approve the Paris agreement as soon as possible, stressing the need for inclusiveness in decision-making and the importance for countries to transparently implement their nationally determined contributions.

13. Acknowledging the role of the High Ambition Coalition in the achievement of the Paris Agreement, the Council determined to continue cooperation commitment and momentum for climate action within this grouping of nations, while also seeking closer cooperation with Parties willing to raise the level of ambition of global climate action. The Council recognized the importance of the ongoing provision and mobilization of finance and technical assistance to those countries most in need, such as that under the Power Africa Initiative and Africa Renewable Energy Initiative, and strongly supports the Lima-Paris Action Agenda, including its focus on mobilizing all stakeholders.

14. The Council underscored the necessity of close U.S.-EU coordination to implement the commitments made at COP 21 in Paris, and acknowledged the essential role of clean and sustainable energy policies and technologies to meet these commitments. Furthermore, the Council committed to working towards addressing climate change, including by developing and deploying innovative technologies for the transformation of the energy sector by 2050, and to moving toward long-term national low-emission development.

15. The Council emphasized that the United States and the European Union can learn from each other's best practices as well as work together to assist other countries in meeting their clean energy and climate targets. The Council recognizes the Clean Energy Ministerial as an important mechanism to facilitate implementation of COP21 commitments through sharing of best practices and coordination between the United States, the European Union and other major economies with forward-leaning clean energy strategies. The Council noted the importance of the second installment of the U.S. Quadrennial Energy Review, which is expected to assess the state of, and consider prospects for, the further development of the U.S. electricity sector in its totality.

16. The Council stressed that addressing climate change through scaling up clean, safe, secure and sustainable energy and energy efficiency is a critical component of a country's security and economic development. In this respect, the Council specifically

recognized that the creation of the appropriate enabling environment is a priority in both developed and emerging economies. In addition, by helping countries create enabling environments and establish trajectories to meet their clean energy goals, the United States and the European Union are working to generate momentum for the full implementation of the Paris Agreement, and to build confidence that Nationally Determined Contributions can be met and over time, be made more ambitious, in order to make progress toward the long-term goal agreed in Paris. The Council intends to explore the possibilities of cooperation between the DOE's Grid Modernization Initiative and European Commission programs designed to manage the increasing share of renewable energy into the electricity grid.

17. The Council also emphasized the need for a substantial increase in public-private investment in research, development and demonstration (RD&D) projects to accelerate the implementation of low-carbon energy and energy efficiency technologies and clean energy commitments. Recognizing the long-standing energy-research collaboration between the United States and the European Union, the Council welcomed efforts under Mission Innovation and the independent Breakthrough Energy Coalition to accelerate research and innovation in clean energy technology development as a significant outcome of COP21 and a critical enabler of increasing climate ambition over time. The Council committed to the long-term objective of encouraging effective energy policies and actions throughout the global economy, including facilitation of investments and contributions from the private sector. It also welcomed the upcoming signing of a Collaboration Arrangement between the U.S. Department of Energy and the Joint Research Centre of the European Commission regarding Research and Development in Energy-Related Fields.

18. The Council underscored that in order to achieve a sustainable, secure and affordable supply of energy globally, it is necessary to be ambitious in promoting safe and environmentally sound low-carbon technologies. The Council welcomed the energy goal within the catalogue of the United Nations' Agenda 2030 Sustainable Development Goals. The United States and the European Union strongly support universal access to affordable, reliable and modern energy services, and improvements in energy efficiency within the framework of the Agenda 2030 Sustainable Development Goal 7. The Council noted the importance of market designs and infrastructure adaptations for electricity that are conducive to further integration of renewable energy resources into the grid.

19. The Council also welcomed the continued sharing of information in the following policy areas: LNG markets, smart grids, indigenous resources and Carbon Capture Utilization and Storage (CCS), and noted the success of the joint U.S.-EU Electric Vehicle and Smart Grid Interoperability Centers.

20. The Council sees particular benefits in increased cooperation on energy efficiency, especially for globally traded products with a high energy savings potential. Where appropriate and allowed by law, this could involve alignment of test and measurement procedures, the convergence of minimum energy performance standards (MEPS), and joint outreach to other jurisdictions on the benefits and best practices of MEPS and energy labels, making use of relevant existing multilateral cooperation initiatives. This approach has been successfully implemented in the area of e-vehicles and smart grids, aligning priorities of public and private stakeholders to produce an agreed set of test procedures and standards on vehicle to grid communications, for example. The Council recognized the importance of exchanging best practices on energy efficiency in the

buildings and transport sectors and intends to promote global commitment and cooperation on these issues in international fora.

21. Additionally, the Council underlined the importance of G20 countries phasing out inefficient fossil fuel subsidies over the medium term.

22. Acknowledging the contributions of transport in the generation of harmful greenhouse gas emissions, the Council welcomed the new 21st Century Clean Transportation System initiative of the United States. The Council also underlined its support for efforts to address greenhouse gas emissions from the aviation and international shipping sectors, in the context of the discussions within the International Civil Aviation Organization (ICAO), including for the adoption of a global market based measure to enable carbon neutral growth in international aviation from 2020 at the International Civil Aviation Organization (ICAO) Assembly meeting in September and the adoption of a global data collection system and continuation of discussions on further action at the International Maritime Organization's Marine Environmental Protection Committee meeting in October. Highlighting the continued need for action on hydrofluorocarbons (HFCs), the Council also underlined the importance of adopting a Montreal Protocol phasedown amendment in 2016 that will contribute to improved appliance energy efficiency. Given the central role of the transport sector, common standards should be adopted in the medium term order to improve fuel quality, energy efficiency and emissions performance of heavy-duty vehicles, considering also the contribution of alternative fuels (such as natural gas, biomethane and sustainable biofuels).

23. The Council reiterated the importance of utilizing multilateral institutions to foster international energy cooperation, including the G-7, the G-20, the International Energy Agency (IEA), the International Atomic Energy Agency, the Energy Charter Treaty, Sustainable Energy for All (SE4ALL), the International Renewable Energy Agency (IRENA), the OECD Nuclear Energy Agency, the Renewable Energy Policy Network for the 21st century and the Clean Energy Ministerial. The Council affirmed the importance of concluding an ambitious WTO Environmental Goods Agreement (EGA) by the G-20 Leaders meeting in September in Hangzhou that eliminates tariffs on a broad range of clean energy and environmental technologies. In addition, the Council discussed opportunities for cooperation in promoting clean and sustainable energy in other parts of the world, including mobilizing the long-term investments needed to transition to low-carbon economies. In this context, the Council took note of the work being carried out in the framework of the Clean Energy Ministerial and the Major Economies Forum, and the outcomes of the G-7 Energy Ministerial meeting in Japan on May 1-2, 2016.

24. The Council acknowledged the importance of research in the energy sector as agreed in the Joint Statement of the Energy Council of December 2014. The Council also acknowledged the importance of research in systems and technologies in the transport sector, as well as in fusion where ITER is a significant multilateral long-term research project. The Council noted the outcome of the Extraordinary ITER Council held in Paris on 27 April 2016.

25. The Council decided to establish a Climate Change Working Group, alongside the existing working groups on energy security, technology and policy. This working group will seek to increase and improve transatlantic cooperation bilaterally, as well as within multilateral and global settings, with a view to catalyzing and accelerating international

efforts for the attainment of climate-related goals, and is mandated by the Council to hold its first meeting before the end of 2016.

4.3 Rolling Action Plan (attach .pdf document)

4.4 FP7/H2020 projects with U.S. participation (attach extract from CORDIS)

4.5 Fiche on collaboration between the JRC and the U.S. (attach .pdf document)

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