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International Cooperation



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EDITORIAL

Perpetuating the EU's global leadership in the clean economy of the future

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The European Union has a long history of leading by example on environmental protection, the fight against climate change, and the clean energy transition. It was the first region in the world to set ambitious targets, to develop advanced standards and regulations and to build up international cooperation in these areas. There is no other actor in the world as committed to sustainability, climate action, and the clean energy transition in terms of public funding and investments as the EU.

Thanks to our first mover advantage in the clean economy transition, some 9 million Europeans are already working in the clean energy sector. This includes more than 1.17 million jobs¹ in the renewable energy sector, as well as jobs in energy efficiency and the construction sector. Many of these are local jobs that cannot be outsourced, and the European Commission expects this number to double by 2030².

The Paris Agreement – an unprecedented opportunity to modernise the European economy

The Paris Agreement on climate change marked a historic turning point in humanity's fight against climate change. As a clear result of the EU's persistent diplomatic efforts over decades and its willingness to lead by example in the transition to a low-carbon

economy, countries, cities, citizens, investors and businesses worldwide came to a robust agreement to act together against climate change. And despite the decision of President Donald Trump to seek to withdraw the United States from this agreement, the international community, led by European Commission President Jean-Claude Juncker has been unanimous in defending the Paris Agreement as irreversible, both politically and economically.

Now that the Agreement has entered into force, the transition to a low-carbon economy is an everyday reality that translates into an ever-more intense global competition for market shares, technology, and the brains that will come up with the innovations of the future. In this respect, the EU's leadership needs to be renewed. Our environmental targets and regulations must be transformed into investments, jobs, growth and innovation. Member States have embraced this view, with the European Council recognising the Paris Agreement as a 'key element for the modernisation of the European industry and economy' in its conclusions of 22–23 June 2017. France and Germany further committed to making the fight against climate change, energy and sustainable development their number one research and innovation priority at the Franco-German Ministerial Council in July.

“The EU is the largest contributor of climate finance worldwide”

¹IRENA (2016), Renewable Energy and Jobs – 2016

²European Commission.

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Putting our money where our mouth is

The transition to a clean economy requires major shifts in investments towards new infrastructures, technologies, business models and research areas. These investments will make our planet safer, our societies more resilient and the European economy more sustainable. The Juncker Commission has already tabled a number of legislative packages aimed at providing the necessary investment certainty for new business models to emerge in support of the clean energy, low-carbon and circular economy. The EU is not only taking measures to become a more attractive place for investments but also a more sustainable financial actor. 20% of the EU budget is dedicated to climate-related expenditure. The Juncker Plan, with its European Fund for Strategic Investments was set up to support sustainable investments in the real economy, and at least 40% of its investment is to be channelled towards clean-tech projects related to energy, transport, buildings and industries. Along with the mid-term review of the EU Capital Markets Union and the recent work undertaken to scale up sustainable finance at EU level, the next G20 presents a key opportunity to highlight Europe's position as the most attractive destination for clean economy investments and the role of Europe's financial sector as the global centre of gravity for capitals markets when it comes to the transition towards a low-carbon economy.

defending an open and rules-based economic system with a true level playing field.

Ensuring that no one is left behind

Finally, we must plan the transition carefully to minimise job losses and stranded assets as investors divest from carbon-intensive sectors towards clean-tech ones. At home, the European Commission intends to protect and accompany the most vulnerable people and workers – for instance those in coal mining – by reskilling workers, modernising infrastructures and investing in new business models.

But internationally, the EU also has a responsibility to help. Although Africa contributes less than 5% of global carbon emissions, the effects of climate change will be much more disruptive there than in other parts of the world, with droughts, famines and human suffering driving civil unrest, conflicts, migration and terrorism. The EU is the largest contributor of climate finance worldwide. Helping the developing world and in particular Africa to leapfrog into a sustainable energy future and extending access to renewable-generated electricity for all can be game changers for the development of Africa and the rest of the world. This will improve living conditions for Africans, providing a perspective for young people, reducing migratory pressures and stopping the brain drain from Africa. Complementary to Member States' instruments, the EU uses its External Investment Plan to support Africa's clean energy transition, while also offering an opportunity for European industry to deploy its know-how, technologies and business models on a large scale and contribute to furthering innovation. In Morocco for instance, the EU supports the construction of one of the world's biggest solar power complexes ('Ouarzazate Solar Complex') with Investment Grants. It will be finalised this year and power 350,000 homes.

A Europe that protects, empowers and defends

This and other examples show how EU action brings tangible added value in the fight against climate change. They stand as clear demonstrations of Europe's readiness to protect the environment, to empower its citizens and businesses and to defend the global multilateral order through its commitment to international cooperation. The December climate summit in Paris organised by French President Emmanuel Macron at the two year anniversary of the Paris Agreement is an occasion for the EU to again highlight its key economic achievements, social opportunities and international leadership together with all committed actors.

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Standing up for a global level playing field on climate economics

The transition to a clean economy is a social and economic long-term project that can increase costs for some economic actors in the short to medium term. This is why the Paris Agreement is so important: it creates a level playing field by ensuring that all global economies engage in the transition and cannot create unfair economic advantages for themselves in the short term. But, as protectionist measures become more prevalent on global scale, with some also engaging in unfair trade practices, European companies and regions need Europe to reinstate itself as a strong global actor ready to ensure fair trade practices. Examples such as the sharp decline in Europe's sizeable solar panel industry that was incurred after parts of Asia subsidised mass production and dumped these on the world market cannot be allowed to happen again.

Furthermore, there needs to be a level playing field when it comes to investing in foreign markets. Countries that want to invest in the EU also need to be open to European investments in their domestic markets. It is therefore essential to align the Paris Agreement with the EU's trade and investment agenda by promoting our values and



SET Plan Update

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The European Strategic Energy Technology Plan (SET Plan) aims at transforming the way we produce and use energy in the EU, with the goal of achieving EU leadership in the development of technological solutions capable of delivering 2020 and 2030 energy and climate goals. The SET Plan and its Strategic Energy Technologies Information System (SETIS) the key implementing instrument of the European Commission's Energy Union Research and Innovation (R&I) strategy.

International cooperation is, though, crucial in responding to energy challenges that are not exclusively European but global; such as climate change, environmental protection, and volatile prices. The EU works with its international partners to ensure secure supplies of energy at competitive prices for Europe. At the same time, the success of EU policies to tackle worldwide greenhouse gas emissions also hinges on the energy policies

of other countries and global energy trends. The following is a non-exhaustive overview of the most indicative international energy cooperation initiatives the EU is participating, demonstrating that the current global energy and climate challenges urging for a robust international cooperation; in addition, a selected summary of recent actions in support of the SET Plan is provided.

International Cooperation

The EU strives to maintain good relations with key energy suppliers and to enhance cooperation with the developed and emerging economies as energy markets in these countries may present lucrative opportunities for the EU energy business. Alongside, the EU and the EU member states participate actively in international energy organisations and initiatives shaping the agenda of the collective actions towards the acceleration of a global clean energy system.

“International cooperation is crucial in responding to energy challenges that are not exclusively European but global; such as climate change, environmental protection, and volatile prices”

The 2015 Paris Agreement is a historically significant landmark in the global fight against climate change. The EU has consistently supported this binding treaty that would pave the way towards a low carbon emissions future. The Paris Agreement chapter on technology transfer facilitates the creation of a global collaboration framework in the sectors of low-carbon technology and energy efficiency. The UN's Climate Technology Centre and Network (CTCN), launched in 2014 with the support of the EU, promotes the transfer of environmentally sound technologies for low carbon and climate resilient development at the request of developing countries. These countries present emerging markets for the EU clean technology companies providing a spur for new jobs in the EU and abroad.

Mission Innovation (MI) is a global initiative of 22 countries and the European Union to dramatically accelerate global clean energy innovation. Mission Innovation has been launched at the United Nations Climate Change Conference 2015 (COP21) that resulted also to Paris Agreement. The participating countries have committed to seek to double their government's clean energy research and development (R&D) investments over five years, while encouraging greater levels of private sector investment in transformative clean energy technologies.

The Clean Energy Ministerial (CEM) is a high-level global forum to promote policies and programs that advance clean energy technology, to share lessons learned and best practices, and to encourage the transition to a global clean energy economy. Together the 24 countries and the European Commission, that are members of CEM, account for about 90 percent of global clean energy investments and 75 percent of global greenhouse gas emissions. They also fund the vast majority of public research and development in clean energy technologies.

China co-hosted the second Mission Innovation Ministerial (MI-2) and the eighth Clean Energy Ministerial (CEM8) in Beijing, 6–8 June 2017. This annual meeting of energy ministers - from MI and CEM members - and other high-level delegates provided an opportunity to leverage high-level political will and private-sector leadership to drive ambitious, real-world clean energy policies and actions.

The International Renewable Energy Agency (IRENA), officially established in Bonn in January 2009, is an intergovernmental organisation that supports countries in their transition to a

“The 2015 Paris Agreement is a historically significant landmark in the global fight against climate change. The EU has consistently supported this binding treaty that would pave the way towards a low carbon emissions future”

sustainable energy future, and serves as the principal platform for international co-operation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. IRENA has released in June 2017 a report entitled Accelerating the Energy Transition through Innovation that examines the basic conditions required to nurture innovation and produce new technologies for a low-carbon future.

The International Energy Agency (IEA), established in November 1974 with a broad mandate on energy security and always at the heart of global dialogue on energy, released in June a study on Energy Technology Perspectives. This comprehensive publication on energy technology focuses on the opportunities and challenges of scaling and accelerating the deployment of clean energy technologies globally.

Sustainable Energy for All (SEforALL) is a global initiative led by the former Secretary-General of the United Nations, Ban Ki-Moon to achieve universal energy access, improve energy efficiency and increase the use of renewable energy. It was launched to coincide with the designation of 2012 as the International Year of Sustainable Energy for All by the UN General Assembly in December 2010. The partnership between the European Commission and the SEforALL started at 2013 and since then, the Commission provided political leadership that facilitates SEforALL to meet its goals. Additionally, the European Commission supported the organisation of the 2017 Sustainable Energy for All Forum which brought together about 1,000 energy access leaders from across the world under the theme ‘Going further, faster – together’

The 5th EU-Africa Summit is scheduled to take place in Abidjan, Ivory Coast, on 28-29 November 2017. The first Africa-EU Summit took place in Cairo in 2000, where the Africa-EU partnership framework was established. EU-Africa Summits of Heads of States and Governments take place every three years alternatively in Africa and Europe. Energy is one of the focus areas of the so-called EU-Africa Dialogue with priority given to increasing access to sustainable and affordable energy and tackling climate change. The JRC stands as the research partner of the Africa-EU energy partnership, having contributed in various means.

Heralded as the “world’s biggest urban climate and energy initiative” by Commissioner Miguel

Arias Cañete, the Covenant of Mayors for Climate & Energy brings together thousands of local and regional authorities voluntarily committed to implementing EU climate and energy objectives on their territory. New signatories now pledge to reduce CO2 emissions by at least 40% by 2030 and to adopt an integrated approach to tackling mitigation and adaptation to climate change.

The International Specialised Exhibition EXPO 2017- Future Energy took place from June 10 to September 10 2017 in Astana Kazakhstan marking a new and pioneering chapter in the story of global discussions on dealing with climate change and low-carbon energy technologies. The latest EU Energy Day took place during the same exhibition with focus on Clean Energy Solutions for the Buildings of the Future.

In July 2017, European Council President Donald Tusk and European Commission President Jean-Claude Juncker met with other Group of Twenty (G20) leaders for a summit in Hamburg, Germany. This was the first such global meeting following the announcement by the US Administration of its intention to withdraw from the Paris Agreement on climate change.

General SET Plan related news and activities from JRC/SETIS

Following the State of the Union speech by President Jean-Claude Juncker on 13 September, a positive agenda was proposed to help create – as he said last year – a Europe that protects, a Europe that empowers, a Europe that defends. In this context and considering that Industry is at the heart of the Juncker Commission’s political priorities since the beginning of the mandate, the European Commission brings together all existing and new initiatives into a comprehensive Industrial Policy Strategy that aims at empowering European industries to continue delivering sustainable growth and jobs by investing in a smart, innovative and sustainable industry.

Vice-President Šefcovic is visiting European cities during a second Energy Union tour. The main focus of these discussions is the Energy Union and the Commission’s “Clean Energy for All Europeans” package, including preparation of National Energy and Climate Plan. Since the last SETIS Magazine release he has visited Belgium, Lithuania, Poland, Denmark, Portugal and Estonia.

Launched in 2006 by the European Commission, the European Union Sustainable

“3 Implementation Plans have been endorsed since last SET Plan Steering Group meeting: Concentrated Solar Power, Carbon Capture Storage and Use and Energy Efficiency in industry”

“By the end of the year, 3 more Implementation Plans are expected to be endorsed and the endorsement of the remaining 8 Implementation Plans is planned for 2018”

Energy Week (EUSEW) is organised by the Executive Agency for Small and Medium-sized Enterprises in close cooperation with Directorate-General for Energy. The most recent event took place in June 2017 in Brussels. It featured 64 sessions and more than 50 networking activities. EUSEW is organised to spread awareness of how to use energy more sustainably, build a low-carbon economy based on renewables and develop a strong, united approach to sustainable energy use.

Organized by Directorate-General for Clima and the Estonian Presidency, the event “Technology & the Paris Agreement” took place in Brussels on 5 July. The event aimed at providing an update on the climate negotiations, practical examples on collaborative action and trends in international innovation cooperation.

In September 2017, the European Commission has launched an online tool to help analyse the effectiveness of transport innovation in delivering the EU’s energy and transport strategy. The Transport Research and Innovation Monitoring and Information System (TRIMIS) maps and analyses research trends and innovation capacities across Europe’s transport sector.

The Joint Research Centre published a number of reports in 2017. In addition to the reports covered in the last SET Plan update, the JRC has published a report titled “EU energy technology trade: Import and export” on the international trade in the sector of low-carbon energy technologies (LCETs). It helps better assessing the European Union’s comparative advantage in each technology sector. It also allows the analysis at the level of individual Member States. The JRC has also published a report titled “Energy efficiency and GHG emissions: Prospective scenarios for the Chemical and Petrochemical Industry” that analyses the savings potential of energy consumption and GHG emissions from cost-effective technological improvements in these industry sector up to 2050. And “EMHIRES dataset Part II: Solar power generation”, which is the first publicly available European solar power generation dataset derived from meteorological sources at regional level.

The ‘digital transformation’ originally affected companies that mainly operated in ICT-related sectors, but it now touches all aspects of our economies and societies. This is reflected in a new JRC-OECD report: “World Corporate Top R&D Investors: Industrial Property Strategies in the Digital Economy”, which finds that the

largest industrial R&D investors play a leading role in the development of digital technologies.

In the context of the process towards a SET-Plan Integrated Roadmap and Action Plan, organisations (universities, research institutes, companies, public institutions and associations) involved in research and innovation activities in the energy field are invited to register in the [European energy R&I landscape database](#), which aims at facilitating partnerships and collaboration across Europe. Registration to the database is open to stakeholders from the EU and H2020 associated countries. Organisations are able to indicate their area of activity according to the energy system challenges and themes, as identified in the SET Plan process towards an [Integrated Roadmap and Action Plan](#). The database is [publicly available](#) on the SETIS website.

The last SET Plan Steering Group (SG) meeting took place on 27 September in Brussels. The main objectives of the meeting were namely endorsing the Implementation Plans (IP) presented under the leadership of the SET Plan countries that are linked with the delivery of results for the Acceleration of the Clean Energy Innovation. Along with starting the discussion on the development of a forward looking strategy allowing SET Plan to adapt to the evolving clean energy policy landscape, and explaining the importance – and relevance to SET Plan – of the ongoing negotiations on the Governance proposal, in particular how the 5th dimension will be reflected in the National Plans. [In summary](#), the IP on Concentrated solar power was already endorsed at the SG meeting in June 2017, two newly finished IPs were endorsed during the last SG meeting: Carbon Capture Storage and Use and Energy Efficiency in industry, 3 IPs are expected to be endorsed at the SG meeting of November 2017 and the remaining 8 IPs are planned to be endorsed in 2018.

In 2017 the SET Plan marks its 10th year anniversary. This year, the annual SET Plan conference will be held under the auspices of the Estonian Presidency of the Council of the EU and organised by the Slovak Ministry of Education, Science, Research and Sport in cooperation with the European Commission. [The information on the Conference's program is on-line.](#)



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| Energy Union <i>Research, Innovation and Competitiveness Priorities</i> | | SET-Plan 10 Key Actions |
|--|--|--|
| No1 in Renewables | | 1 Performant renewable technologies integrated in the system 2 Reduce costs of technologies |
| Consumers in the Energy System | | 3 New technologies & services for consumers 4 Resilience & security of energy system |
| Efficient Energy Systems | | 5 New materials & technologies for buildings 6 Energy efficiency for industry |
| Sustainable Transport | | 7 Competitive in global battery sector and e-mobility 8 Renewable fuels and bioenergy |
| Carbon Capture Utilisation and Storage | | 9 Carbon Capture Storage / Use |
| Nuclear Safety | | 10 Nuclear safety |



TALK TO SETIS

about Mission Innovation

A global initiative of 22 countries and the European Union to dramatically accelerate global clean energy innovation

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Could you give us your view on the outcomes of the second Mission Innovation (MI) Ministerial in Beijing? Did the gathering meet your expectations, were the meetings as productive as you would have liked and what in your view were they real cornerstone advancements made at this time?

The first MI Ministerial meeting held in San Francisco in 2016 was about giving figures regarding member countries' commitment of doubling public spending in clean energy R&D over 5 years: from approximately 12,75 billion Euros¹ a year to approximately 25.3 billion Euros², by 2021, with a technological focus specific to each member.

The second MI Ministerial that took place in Beijing last June enabled MI to enter a more operational phase: a detailed work program was endorsed by Ministers and published with action plans for seven innovation challenges, including the one on off grid access to electricity jointly led by France and India.

Now we have to deliver concrete results for the next ministerial meetings (that will be hosted by the European Nordic countries in 2018, and by Canada in 2019): shared scientific

and technological roadmaps, new research or demonstration projects, and eventually costs and performance improvements.

When looking at the role of the private sector (and business) in relation to the commercialisation of clean energy technologies worldwide, what obstacles to progress would you most like to see tackled first?

There is a crucial need that companies and investors adopt a long term view. Some technologies for renewable energy or energy efficiency have return on investment periods of 10 years or more but in the end they are more competitive than fossil fuels based alternatives. Some risks need to be taken to experiment new solutions. In France, the state sometimes invest in equity in first-of-a-kind projects together with private actors, so as to share this risk and give a chance to these new solutions (see our "investment for the future program"). And it is also the role of governments to set a stable and predictable regulatory framework combined with the right economic signal, such as a carbon price at a sufficient level.

Interviewee



GUILLAUME MEHEUT

Guillaume Meheut is Director of Cabinet at the General Directorate for Energy and Climate Change of the French Ministry of ecological and inclusive transition. In this role, he helps coordinate and implement the ministry's research and innovation strategy, in particular in the field of clean energy. He participates in the steering committee of actions supporting clean energy RD&D within the French "investments for the future programme", operated by ADEME and ANR. Previously, He worked for the French telecommunications regulation authority ARCEP, on the development of high-speed broadband networks and services.

¹USD 15 billion

²USD 30 billion

“It is not only about technology, it is also a question of collective engagement and mobilisation. We all need to understand that we have an active role to play”

You have explained that France is co-leading (with India) the innovation challenge on off-grid access to electricity. Which world territories are you targeting first and where could progress be made most rapidly in your view?

I would like to re-emphasize that the challenge is about research and innovation, so we do not really target specific territories for deployment plans, even if we cannot ignore the huge challenge faced by Africa in particular. Our Indian colleagues are also very committed to this challenge for their own needs and there are specific problems in islands in many regions of the world.

The goal is rather to accelerate the development of off grid access solutions that are affordable, sustainable and reliable and that bring new services, beyond basic needs of lighting and communications, such as productive uses. However, we want to take local implementing conditions into account: how can we design an off grid system that is easy to install, operate and repair with locally available materials and skills? How can we make sure that the technologies are best fitted to local climate conditions?

Please explain the work of the MI steering committee. What are its core objectives and how does it operate on a week-by-week basis?

The steering committee, currently chaired by the European Commission, is composed of 8 to 10 among the most active countries in Mission Innovation. We unfortunately cannot have in person meetings very often so we have calls, on a roughly monthly basis, to provide strategic guidance for the various workstreams of MI work program: innovation challenges, business and investors engagement, information sharing and communication, preparation of the next high level events, especially the Ministerial meetings (choice of the main focus, outreach strategy etc.).

What are your personal aspirations for the growth and development of sustainable energy resources over the next decade?

The development of clean energy relies on competitive and reliable technologies and we have reached that stage, for example with impressive price evolutions for photovoltaics or batteries in the past and coming years. But it is not only about technology, it is also a question of collective engagement and mobilisation. We all need to understand that we have an active role to play: when we buy a new electric appliance, when we choose our mode of transport to go to work or on holidays, when we dispose of our garbage, etc. There is still a big communication effort to make so that everyone is aware of their capability to make a small but important difference.



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Africa Energy Snapshot in the foresight of the 5th EU-Africa Summit

In the vast continent of Africa with abundant indigenous energy sources and rapidly growing population, access to sustainable and affordable energy remains a challenge. Nearly 70% of the population in sub-Saharan Africa (SSA) does not have access to electricity – approximately 621 million people. As far as clean technologies for cooking are concerned, the World Bank data show only a modest increase from 12.9% in 2000 to just 14.6% in 2014. Access rates vary geographically: While almost 100% of the citizens in North African countries enjoy access to electricity, the rate is only 23% in East Africa and 25% in Central Africa. Even where access to electrical grid is available, the service is often poor and unreliable. In the rural-urban division the figures are even more striking: 71% of the urban population have access compared to 28% of the rural population in SSA.

While 30% of global gas and oil discoveries in the past five years were in Africa the International Energy Agency projects that it will be just enough to cover the continent's growing needs. Future projections are uncertain due to aged infrastructure, data limitations, social and environmental reasons. However, estimations reveal that gas production and coal use will continue to rise in the continent. Therefore indigenous sustainable energy sources have a great niche market potential in meeting the energy needs of the growing African population. The challenges to meet this need lie in attracting the private sector to complement public investments. Africa's energy sector presents vast business and investment opportunities, able to boost growth and create jobs, particularly in the field of sustainable

energy technologies.

The new European Consensus on Development and a renewed partnership with the African, Caribbean and Pacific Group of States (ACP) focuses on the close coordination of two priorities: increasing access to sustainable and affordable energy and tackling climate change. The European Union and its Member States play a major role in the provision of aid for energy projects in the continent. For project investment, the former EU programmes for grant-based support have evolved into financing approaches based on loans, guarantees and equity and innovative financial blending that have the potential to multiple upscale the available investments.

All the three cooperating stakeholder groups (policy makers, business and science) have a specific role to play in the development of the continent to reach the above challenges. Between them the key function of the science stakeholders is collecting, structuring and providing relevant and up-to-date information to the other decision making groups. As a European research partner in the Africa-EU energy partnership, the European Commission's science and knowledge service, the Joint Research Centre (JRC) has contributed with structured information, tools, setting up platforms and capacity building.

The development of electricity access in Africa has a very strong spatial dimension; due to the vast land areas and the distributed nature of renewable resources which already play a key role in analyses using geographic information systems (GIS) are particularly useful for evaluating the availability and

Co-Author



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Sándor Szabó has a degree in finance, economics and a PhD. in public policy. After working in the Ministry of Environment and in a private consultancy in Hungary, he joined the DG JRC, European Commission. He has specialized on risk finance and incentive mechanisms of power systems with high renewable penetration. He coordinates the African Renewable Energy Technology Platform, transforming geo-economic models to policy and business applications.

Co-Author



**MAGDA
MONER-GIRONA**

During the last 15 years, Dr Moner-Girona's research has focused on techno-economic studies to analyze policies enhancing the deployment of renewable energy in developing countries. This includes experience at United Nation Environment Programme (UNEP), DG JRC-European Commission, and UC Berkeley.

economic feasibility of modern renewable energy sources.

JRC activities in the partnership

The JRC has systematically collaborated with partners such as the International Renewable Energy Agency (IRENA) and the Centre for Renewable Energy and Energy Efficiency of the Economic Community of West African States (ECREEE - ECOWAS) gathering high quality renewable energy information about solar, wind, hydro, biomass and geothermal resources from Africa. In terms of JRC activities a consolidated technical and socio-economic base for assessing rural electrification projects was developed, defining the criteria to be used in the evaluation of grid extension versus off-grid solutions. REN2AF is a JRC-developed tool on sustainable energy planning for rural electrification. It analyses scenarios and compares off-grid photovoltaics (PV) and diesel generation options for the electrification of rural Africa.

The JRC and the Commission's Directorate-General for International Cooperation and Development (DG DEVCO) have created and maintain a web-based platform, the African and Renewable Energy Platform (AFRETEP) with the aim to assist the set-up of a network of 800+ members dealing with renewable energy, mainly from African research institutions. The AFRETEP platform has been migrated to the the European Commission's knowledge sharing platform for development cooperation managed by DEVCO, where users from both continents can download datasets used in off-grid spatial analyses by the partner organisations.

The JRC also has organised three Capacity building workshops for African researchers and students. The workshops were realised in cooperation with African Universities in Uganda, Burkina Faso and South Africa. The aim was to enhance the multiplying effect by

training trainers: the workshops have reached near 100 University teachers, practitioners having expertise in renewable energies, technologies, tools and rural electrification with specialised training.

Tool application

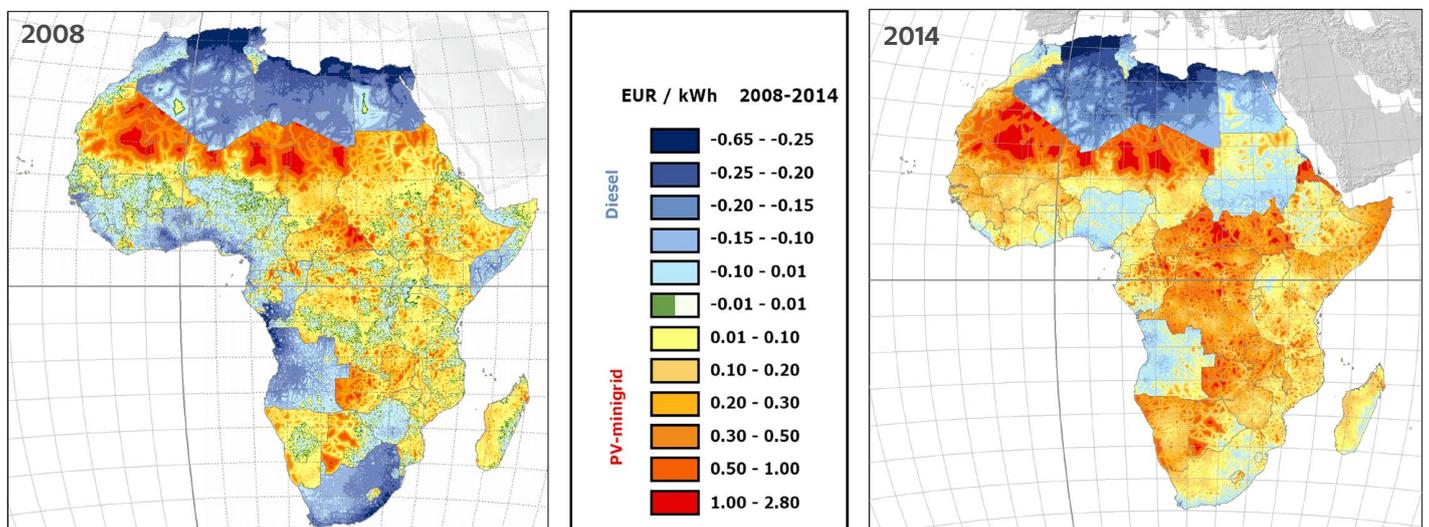
In this context to test the tool applicability, the JRC team focused on practical applications to case countries (Burkina Faso, Tanzania) and identified low-hanging-fruit investment opportunities in Africa by assessing the energy use potential of existing infrastructure. In this the JRC worked in collaboration with the Renewables Directorate of Burkina Faso Energy Ministry and the EU delegation in Ouagadougou and the Centre for Renewable Energy and Energy Efficiency of the Economic Community of West African States (ECREEE - ECOWAS).

Burkina Faso case study

In Burkina Faso, access to modern energy sources remains very low (18.3%), especially in rural areas (3.06%). To tackle this situation pioneering approaches are needed to accelerate universal access to electricity, while simultaneously transitioning to reliable, sustainable and affordable energy systems. In Burkina Faso, the European Union actively contributes to the energy sector with investments in large infrastructure, promotes rural electrification and supports the design of policies and regulatory frameworks that promote healthy business environment and boost private and public investments.

The JRC Science for Policy report titled 'Mapping the least-cost option for rural electrification in Burkina Faso' shows the commitment of the European Union in supporting Africa and in this case more concretely Burkina Faso in the energy sector at scientific level. The report developed a new methodology based on spatial analysis in order to provide a possible

Comparison between off-grid PV and diesel generation options for the electrification of rural Africa (2008-2014)



Source: European Commission, JRC

pathway for universal electricity access through a sustainable energy mix. The report compares electricity technology options based on the available local resources (small hydropower and solar PV) to imported fossil fuel resources by means of least-cost optimization. The results strongly suggest that an increase in the integration of renewable energy in the overall electricity supply and a decrease in the current dominance of fossil fuels is the most cost-effective strategy, including the elimination of fossil fuel subsidies. The main findings indicate that in the long term, smaller decentralised electrification projects based on indigenous resources will be a more feasible and sustainable solution than the centralised ones which rely on imported fossil fuels. The results suggest that up to 65 % of the non-electrified settlements can be served by decentralised technologies.

Furthermore, the report highlights the substantial PV potential in Burkina Faso, encouraging the deployment of renewable energy by the government and investors. The results also suggest that integrating more renewable energy in the electricity supply and reducing the use of fossil fuels would lead to more cost-effective energy systems. The findings of the JRC report will support the Burkina Faso government and development partners in defining the least-expensive rural electrification options within the framework of the national action plans for the United Nations Sustainable Energy for All (SEforALL) initiative (see page 20), which empowers leaders to create partnerships and unlock finance to achieve universal access to sustainable energy.

Low-hanging-fruit application

A transformation of existing under-exploited energy infrastructure in sub-Saharan Africa represents low-cost and low-risk opportunities for investors and boost access to sustainably generated electricity. The JRC lead paper presents an integrated 'low-hanging-fruit' approach, analysing the potential of existing infrastructure to be transformed to energy producing facilities. In existing infrastructure (e.g. irrigation dams) a significant upfront investment has already been made, that can be then further exploited for electricity generation.

The work resulted in a map containing direct site identification data of three categories of infrastructure: non-powered dams that can be converted to hydroelectric power facilities; rural mini-grids that can integrate solar PV systems; and coal power plants that could burn biomass (bagasse, a sugarcane residue), either co-fired with coal or separately. Integrating PV into existing rural mini-grids can reduce in half the electricity cost of new investments.

The work also builds on already available human capacities as technicians and managers keep on operating and maintaining the infrastructure. The authors developed a tailor-made multi-layer spatial analysis and processed satellite night images to identify existing rural mini-grids. The comprehensive methodology identified and selected suitable locations in SSA and estimated their potential for exploitation. This strategy to attract additional finance can easily be reproduced, engaging private investors while simultaneously helping to achieve the United Nations Sustainable Development Goals on energy.

Co-Authors



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Ioannis Kougias is a Civil Engineer with a PhD in water resources' engineering and management. Since 2013 he has worked as a renewable energy analyst and a hydropower specialist at the DG JRC, European Commission. He is involved in water and energy interactions, hydropower research, and energy market modelling.



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Katalin Bódis is a senior GIS analyst and research consultant with degree in mathematics and geography and a PhD in earth sciences, geoinformatics. After research and teaching at the University of Szeged in Hungary, she joined the DG JRC, European Commission in 2003. Activities include multi-disciplinary research and policy support on flood risk management, climate change, soil ecosystem services and renewable energy source. Main competences: GIS modelling, decision support by combining spatial, technical and economic models, data-mining, data harmonization and integration.

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Clean energy transition. Time for Europe's leadership in the Clean Energy Ministerial (CEM)

Clean energy deployment is gathering pace. China added a record 24.4 Gigawatts of new solar power capacity in the first half of 2017 while almost 90% of new power added to Europe's electricity grids in 2016 came from renewable sources. The energy mix as we know it is being redefined.

There is a good reason for this redefinition. Achieving the objective to limit global temperature rise to well below two 2°C¹ above pre-industrial levels requires an unprecedented transition towards a global clean energy system. But clean energy is not just about emissions abatement. It is

also transforming the way we live – helping reduce air pollution, transforming the electricity grid, creating employment and fostering innovation.

Emerging economies take centre stage

As this expansion of clean energy technologies is happening, the dynamic within the energy landscape is also evolving. In the next 25 years, energy demand growth will be mostly coming from emerging economies and developing countries such as China, India, Mexico, Brazil, Indonesia and South Africa.

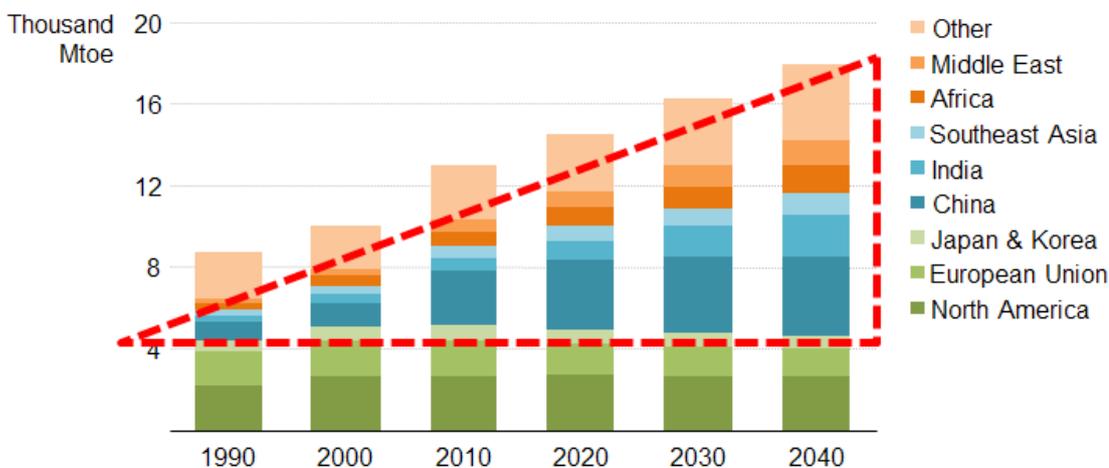
Author



CHRISTIAN ZINGLERSEN

Christian Zingleresen is the first Head of the CEM Secretariat hosted at the IEA. He previously served as Deputy Permanent Secretary at the Danish Ministry of Energy, Utilities and Climate, where he was a member of the Ministry's Executive Board and was responsible for the energy policy portfolio. He also served as the Danish government's representative and Vice-Chair of the IEA's Governing Board; the Danish participant in the Director-General meetings on energy policy within the European Union; and Denmark's senior-level representative, or "Sherpa" to the CEM.

Energy demand by region in the New Policies Scenario



The geography of global energy demand continues to shift

Source: International Energy Agency (IEA), WEO-2016

¹At the Paris climate conference (COP21) in December 2015, 195 countries adopted the first-ever universal, legally binding global climate deal. The agreement sets out a global action plan to put the world on track to avoid dangerous climate change by limiting global warming to well below 2°C.

“Now is the time [...] to keep the wheels turning for ambitious global climate action. In these turbulent times, shared climate leadership is needed more than ever”

These countries are increasingly taking the centre stage in the energy transition. Low-carbon fuels & technologies, mostly renewables, will supply nearly half of the increase in energy demand to 2040, according to the International Energy Agency's (IEA) latest scenarios.

Bridging the climate and energy gap

As the geography of the energy demand starts to shift, the need for a truly global leadership to advance deployment of clean energy emerges so does the need to strengthen the synergies between clean energy and climate action.

“Now is the time [...] to keep the wheels turning for ambitious global climate action. In these turbulent times, shared climate leadership is needed more than ever,” said EU Commissioner for Climate Action and Energy Miguel Arias Cañete ahead of his visit to China earlier this year. The visit was an opportunity to discuss Europe's and China's strong commitment to implementing the Paris agreement and both parties' strong desire to accelerate deployment of clean energy.

China, EU and Canada push the agenda forward

China and the European Union have been

increasingly stepping up their cooperation in clean energy transition and climate change mitigation, recognising that the common challenge of carbon emission abatement needs to be tackled by a number of partners and requires a joined up approach. The European Union, Canada and China joined forces to further advance the implementation of the Paris Agreement and to cement the states' commitments to driving the clean energy agenda and further bridging the gap between energy and climate action by co-convening a ministerial meeting, similar to the Major Economies Forum (MEF) on climate action last September in Montreal, Canada.

The Clean Energy Ministerial (CEM) – a unique partnership

It is these three partners who are also the key actors in another forum – the Clean Energy Ministerial (CEM) – a unique global partnership of key developed and emerging economies working together to accelerate deployment of clean energy. All three stepped forward to drive efforts and host the CEM with China in 2017, the EU (jointly with the Nordics) in 2018 and Canada in 2019.



China hosted this year’s CEM in Beijing – for the first time ever hosting the event and heralding the new era of emerging economies’ leading the acceleration of clean energy and the commitment to shared leadership. The CEM couples a high level ministerial meeting with technical impactful work throughout the year in the areas of energy demand, supply and energy systems and integration.

The CEM concept emerged at the United Nations Framework Convention on Climate Change (UNFCCC) conference of parties in Copenhagen in December 2009 when the then Secretary of Energy for the US Steven Chu announced the intention to host a Clean Energy Ministerial with the world’s major economies and a select number of smaller countries leading in clean energy. Since then, the CEM expanded, and is now bringing 24 countries and the European Commission together to promote, accelerate and foster clean energy across the globe. These countries account for 90% of clean energy investment but also for 75% of global CO₂ emissions.

Under the auspices of CEM, India set quality

and performance standards for LEDs, saving electricity equivalent to avoiding 90 coal-fired power plants between 2015 and 2030. The CEM also facilitated work in grid-integration, providing a toolkit and pathways to integrate 175 Gigawatts of renewable energy into its Electric Grid. Globally, the CEM’s work also mobilised efforts in the lighting sector, with a campaign to deploy ten billion high efficiency LED bulbs. The cumulative effect of the initiative would avoid 801 million tons of CO₂ emissions, equivalent to displacing 684 coal-fired power plants around the world. It is also advancing the electric vehicle deployment, with its latest campaign setting the objective to reach a 30% sales share for electric vehicles by 2030.

This year’s CEM ministerial meeting resulted in 58 new commitments related to the CEM Members’ leadership and participation in the current and newly proposed initiatives and campaigns, demonstrating not just the commitment to accelerating clean energy innovation and scaling up deployment of clean energy technologies but also commitment to the vision of ‘shared global leadership’.

“In the next 25 years, energy demand growth will be mostly coming from emerging economies and developing countries”

Participation in Clean Energy Ministerial Initiatives and Campaigns
30 June 2017

| | | Australia | Brazil | Canada | Chile | China | Denmark | European Commission | Finland | France | Germany | India | Indonesia | Italy | Japan | Korea | Mexico | Netherlands (Observer) | Norway | Russia | Saudi Arabia | South Africa | Spain | Sweden | United Arab Emirates | United Kingdom | United States* | |
|------------------------------|---|-----------|--------|--------|-------|-------|---------|---------------------|---------|--------|---------|-------|-----------|-------|-------|-------|--------|------------------------|--------|--------|--------------|--------------|-------|--------|----------------------|----------------|----------------|---|
| INITIATIVES | Appliances (SEAD) | ● | ● | ● | ● | ● | ● | ■ | | | ● | ■ | ● | | | ● | ● | | | ● | ● | ● | ● | ● | ● | ● | ● | ■ |
| | Electric Vehicles (EVI) | | | ● | | ■ | | | ● | ● | ● | ● | | | ● | ● | ● | ● | ● | | | ● | | ● | | ● | ● | ■ |
| | Energy Management (EMWG) | ● | | ■ | ● | ● | ● | ● | ● | | ● | ● | ● | | ● | ● | ● | | | | | ● | ● | ● | ● | ● | | ■ |
| | 21st Century Power (21 CPP) | | ● | | | ● | ● | | ● | | | ■ | | | | | | ■ | | | | | ● | ● | | | | ■ |
| | Energy Access (Global LEAP) | | | | | | | | | | | | ● | ● | | | | | | | | ● | ● | | | | ● | ■ |
| | Smart Grids (ISGAN) | ● | | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ■ | ● | ■ | ● | | | ● | ● | | ● | ● | ■ | ● | | ■ |
| | Solar and Wind | | ● | | | ● | ■ | | | ● | ■ | ● | ● | | ● | ● | ● | ● | ● | | ● | ● | ● | ■ | | | ● | ● |
| | Clean Energy Policy (Solutions Centre) | ■ | | ● | | ● | | | | ● | | ● | ● | ● | | | | ● | | | | | | ● | ● | | ■ | ■ |
| | Women in Energy (C3E) | | | ■ | ● | | | | ● | | | ● | ● | ● | ● | ● | ● | | | | | ● | | ■ | ■ | ■ | ■ | ■ |
| CAMPAIGNS | Advanced Cooling Challenge | | | ● | ● | ● | | | | | ■ | | | | | | ● | | | | ● | | | | | | ● | ● |
| | Corporate Sourcing of Renewables | | ● | | | ■ | ■ | ● | | | ■ | | | | | | ● | | | | | | | ● | | ● | ● | ● |
| | Energy Management | | ● | ● | ● | ● | ● | ● | ● | | ● | | ● | ● | ● | ● | ● | | | ● | | ● | | ● | ● | ● | ● | ● |
| | Global Lighting Challenge | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ■ | ● | | | ● | ● | ● | | ● | | ● | | ● | ● | ● | ● | ● |
| NEW | EV 30€30 | | ● | | ■ | | | ● | ● | | ● | | | ● | ● | ● | ● | ● | ● | | | | | ● | | | | |
| | Advanced Power Plant Flexibility | ● | ● | | ■ | ■ | ● | | | ■ | ● | ● | | | ● | | ● | | | | ● | ● | ● | † | | ● | ● | ● |
| | Sustainable City/Eco-Energy Town initiative | | | | | ● | | | | | | | | | | ■ | ● | | | ■ | | | | | | ● | | |
| Nearly Zero Energy Buildings | | ● | | | | | ■ | | ■ | ● | | | | | | | | | | | | | | | | | | |

■ Lead ● Participant
† to be confirmed
* US participation and leadership review

Non-CEM countries, non-governmental organisations, and private businesses also participate in selected activities and campaigns

Source: Clean Energy Ministerial

“The Paris Agreement was a huge achievement for international collaboration but now is the time for action”

Shared leadership and international collaboration

“EU-China cooperation is strong. Fighting Climate Change is our common challenge”, tweeted Maroš Šefčovič, Vice-President of the European Commission in charge of the EU’s Energy Union, after the opening of the eighth’s CEM meeting in Beijing.

The concept of shared leadership sits at the core of the European Union – the EU is after all one of the most unique economic and political partnerships in the world.

As Commissioner Cañete was clear that shared climate leadership is needed more than ever, so is the fact that the European Commission is uniquely positioned to drive real change, to corral and foster global

partnerships and to strengthen its role as the lead supporter of clean energy transition and climate mitigation.

The Paris Agreement was a huge achievement for international collaboration but now is the time for action. This is fully recognised by the Council of the EU¹ which during its March meeting on strengthening the EU climate and energy dialogue called for reinvigorating a joint EU climate and energy diplomacy, taking into account the changing geopolitical landscape. Recognising the positive impact of the transition to low carbon economy, the Council urged the EU to become the chief advocate and ambassador of renewable energy, including research, innovation and technologies.

¹Council of the European Union. 7019/17

“the EU has an unparalleled convening power of bringing key stakeholders to the table.”



Maroš Šefčovič, European Commission’s Vice-President for Energy Union at the Clean Energy Ministerial meeting in Beijing
Source: Clean Energy Ministerial

copyright: Clean Energy Ministerial

Europe's top assets

The EU is perfectly equipped for this role, with a toolkit of assets and instruments at its disposal:

- ★ The bloc's climate and energy direction is underpinned by a robust and sound policy and regulatory framework. The framework includes EU-wide targets and policy objectives which aim to help the EU achieve a more competitive, secure and sustainable energy system and to meet its long-term 2050 carbon abatement target. The EU has an unmatched policy mandate to strengthen the synergies between climate and energy and to send strong policy signals to drive the clean energy agenda forward.
- ★ The EU is a strong leader, with a solid track record in driving policy agenda and its implementation. The EU's leadership in climate mitigation is particularly impressive; having played a pivotal role in climate negotiations and the UNFCCC agenda but it has similar achievements in energy security and resilience.
- ★ The Commission has the right financial tools at its disposal to incentivise clean energy transition and climate change mitigation advocacy. The financial aid and research and development funding can unleash innovation and bring transformational change to the clean energy sector.
- ★ Finally, the EU has an unparalleled convening power of bringing key stakeholders to the table. This includes key governments from developed and emerging economies, but also the private sector. In this new changing geopolitical landscape, the Commission has an

exceptional opportunity to reinvigorate EU Climate Diplomacy and to maintain climate change as a strategic priority in diplomatic dialogues.

These assets provide a comprehensive toolkit for global impact. As the global context for clean energy is changing, now is the right time to deploy them at scale as indeed witnessed by the Council's clear mandate earlier this year.

Future of the CEM

This is a very special time for the CEM, which is entering a new phase of international collaboration. The CEM's Secretariat has now moved to the International Energy Agency in Paris. Under its auspices, and benefitting from a comprehensive analytical base, the CEM platform can reap synergies from the IEA's increased engagement with the key emerging economies.

Global political leadership in advancing clean energy is increasingly shared. Both Europe and the emerging economies recognise how the clean energy transition fosters economic opportunities, energy security, climate security as well as state resilience. With just over nine months to the next CEM meeting jointly hosted in Malmo and Copenhagen, there is a wealth of opportunity ahead.

Commissioner Cañete and Vice-President Sefcovic both reiterate that the clean energy transition is irreversible. The Clean Energy Ministerial is arguably the most impactful policy platform for EU's global leadership in this transition to clean energy. And with its so many assets, the EU is positioned like no other to step up.

“The Clean Energy Ministerial is arguably the most impactful policy platform for EU's global leadership in this transition to clean energy. And with its so many assets, the EU is positioned like no other to step up”



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TALK TO SETIS

about Sustainable Energy for All

Sustainable Energy for All empower leaders to broker partnerships and unlock finance to achieve universal access to sustainable energy, as a contribution to cleaner, just and prosperous world for all

What are the main projects Sustainable Energy for All is involved in now and what are the low-carbon technology breakthroughs that have been achieved through these projects?

Technology is critical in accelerating energy access and supporting government policies are essential to enable these technologies to succeed. At Sustainable Energy for All (SEforALL), we work with a number of partners, governments and businesses who use a variety of technologies that will deliver affordable, reliable, sustainable and modern energy to help us achieve Sustainable Development Goal 7 (SDG7).

The latest Global Tracking Framework (GTF) report shows that just over 1 billion people worldwide have no access to electricity. About 80 percent of those lacking basic electricity services live in just 20 countries, all of them in Asia and Africa. And most of these populations are in rural areas, especially Sub-Saharan Africa (SSA) where electrification rates lag behind population growth. Many of these same populations also lack access to cooling technologies which are critical to everyday living, such as ensuring fresh food and safe storage of medicines.

SEforALL currently has two initiatives where we are using partnerships and technology to support greater action. This includes scaling up access to energy through integrated approaches that

embrace centralized and decentralized energy technologies and developing, far more quickly, lower-cost technologies for cooling solutions, such as air conditioners and refrigeration.

Momentum towards achieving universal access to electricity by 2030 is currently not at the speed and scale needed, and there is a growing body of evidence showing that an integrated approach that allows the rollout of decentralised technologies to scale can increase this progress. The costs of off-grid solar and other decentralized technologies have fallen dramatically in recent years, making them a quicker, cleaner less expensive solution for providing basic power than fossil fuel technologies. The appeal of off-grid renewables is especially strong in remote rural areas where centralized grid-scale power projects are less likely to be built in the foreseeable future. While some countries such as Afghanistan, Kenya and Bangladesh have made inroads bringing household and mini-grid solar to millions of people in rural areas, it's only the tip of the iceberg and far faster progress is needed.

SEforALL is keenly focused on supporting what we call 'high-impact' countries whose actions are critical to achieving the SDG7 goals. Countries in Africa and Asia have especially big energy access gaps. The latest research and evidence from the Regulatory Indicators for Sustainable Energy (RISE) and GTF reports show us what government policies and support can be put in place to

Interviewee



JANE OLGA EBINGER

As Director of Policy, Jane Ebinger oversees the work of SEforALL's global team on energy access, finance, gender and the evidence base underpinning our engagement partners and on activities that support the delivery of the Sustainable Development Goal on Energy (SDG 7). Before her assignment as Director of Policy at SEforALL, she was Chief Climate Change Specialist at the World Bank supporting the World Bank Group Vice President and Special Envoy for Climate Change on climate policy and finance. She has had previous assignments at the World Bank as Manager for Climate Change Policy; Thematic Coordinator for Climate Change in the Energy Sector Management Assistance Program and operational assignments in Europe and Central Asia on energy, environment and carbon finance. Prior to joining the World Bank she worked in the oil and gas industry for BP and BHP Billiton in environmental management, safety and risk assessment, oil spill/emergency response. She has an MA Mathematics and an MSc Mathematical in Modeling and Numerical Analysis from Oxford University.



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“Bolstering the EU’s energy efficiency policy targets would create another stream of new jobs, while helping reduce emissions with smarter energy use”

incentivise much-needed investment in electricity access, especially decentralized technologies, that will support high impact countries the most.

With this in mind, we need to re-think ‘business as usual’ practices so that decentralized solutions get more support on energy access financing commitments. We’re seeing progress from key players like the World Bank Group and African Development Bank in supporting decentralized solutions, but shifts like this need to happen faster if we’re to close the energy access gap.

In regards to the cooling access gap, the stakes remain equally as high. Roughly one in every seven people on the planet currently lack access to electricity and basic cooling. And with global populations and global temperatures rising, the challenges are growing.

This is further challenging since low-cost technologies are not as readily available today. Catalysing such innovation – and huge economic opportunities associated with such breakthroughs – is a key centerpiece of a global “Cooling for All” initiative that SEforALL announced in July of this year.

Supported by global experts, the project will focus on identifying technological, finance and business model solutions that can accelerate affordable, sustainable cooling solutions in the

world’s poorest regions. A key driver in this effort is the Montreal Protocol’s Kigali Amendment, a global pact approved last year which calls for reducing consumption and production of hydrofluorocarbons (HFCs), a potent greenhouse gas used widely in air conditioners and refrigerators. The HFC phase-out is a perfect opportunity for developing and leveraging new, super-efficient technologies that can lead to leaps in cooling efficiency.

As clean energy technologies gain traction for meeting the SDG7 goals and mitigating climate change, what are the implications on growth and jobs within the sustainable energy ecosystem within the EU?

One of the greatest benefits the global clean energy transition offers – whether with energy efficiency technologies, renewables or clean transportation – are the jobs it is creating globally.

Jobs related to the clean energy sector are now starting to produce as many jobs as those from traditional fossil fuel sectors. We’re already seeing evidence of this in the United States, the EU and, most especially, Asia. A recent International Renewable Energy Agency (see page 24) report shows that the renewable energy sector alone

employed 9.8 million people in 2016. Jobs in the solar and wind sectors combined have more than doubled in the last four years – and with both technologies becoming increasingly popular across Europe for businesses and countries as a source for their power supply – these sectors with the right investment and policy support show great promise to generate even more new jobs.

Economic and job growth driven from clean energy investment should also continue to grow as EU countries try to meet their intended nationally determined contributions (INDCs) goals under the Paris Climate Agreement. A big positive in this regard is the EU's recent Renewable Energy Directive which proposes specific targets for greening the transport sector by 2030. This effort has strong support from governments and businesses alike, including member countries and European businesses which have both committed to drop petrol and diesel vehicles in the coming years.

Improving energy productivity, another key SEforALL goal, is a further area of significant opportunity. Bolstering the EU's energy efficiency policy targets would create another stream of new jobs, while helping reduce emissions with smarter energy use.

How is the partnership between SEforALL and the European Commission helping to build partnerships and unlock finance to achieve universal energy access to sustainable energy?

The European Commission has been one of the strongest players worldwide in the fight to bring affordable, reliable, sustainable and modern energy to more people faster. From 2014 to 2020 alone, the European Commission allocated 3.7 billion Euros to sustainable energy aiming at enabling energy access for 40 million people, contributing to adding 6.5 GW of new generation capacity, and saving at least 15 million tons CO₂ emissions yearly. Billions more are being unlocked through the European blending facilities that support energy infrastructure projects and programs furthering the use of renewable energy and energy efficiency.

On the political level, EU Commissioner for International Cooperation and Development Neven Mimica, Commissioner for Climate Action and Energy Miguel Miguel Arias Cañete, and Commission Vice-President for Energy Union Maroš Šefčovič are outspoken, influential and active supporters of the sustainable energy for all agenda.

“From 2014 to 2020 alone, the European Commission allocated 3.7 billion Euros to sustainable energy aiming at enabling energy access for 40 million people, contributing to adding 6.5 GW of new generation capacity, and saving at least 15 million tons CO₂e yearly”

“New “People-Centred Accelerator,” a global effort to promote gender diversity, social inclusion and women’s empowerment in the sustainable energy sector.”

The Commission has a very unique role in the SEforALL family, providing political leadership that helps deliver on-the-ground action and partnership connections that are vital to our work and success, as well as financial support towards a number of seminal efforts more specifically. SEforALL works with a wide array of public and private sector partners, including non-governmental organisations, academic institutions and multilateral institutions like the World Bank and the African Development Bank. Many are focused on specific aspects of SEforALL's agenda, whether at the regional or country level, a technology or solution level, or a thematic or stakeholder level. By working together, by convening the right partners, we can deliver far bigger results. The United Nations and SEforALL have a special relationship agreement that supports these collaborative activities, calling for, among other things, SEforALL to promote stakeholder participation in support of the Sustainable Energy for All movement, to work closely with the UN in coordinating activities across the UN system and to accelerate progress towards SDG7. Establishing an Advisory Committee to advise the UN and SEforALL on these areas of shared interest is integral in all this.

The Commission's support has enabled us to work with partners right now, for example, on cutting-edge research to track and analyse finance flows for electrification and clean cooking access across high-impact countries in Asia and Africa. This research, produced in collaboration with the World Bank, the African Development Bank, the Climate Policy Initiative and Practical Action Consulting, highlights finance holes in delivering energy access to these countries – especially across Sub-Saharan Africa – and actions that governments and finance players need to take to incentivise more energy access investments.

Another SEforALL partnership closely linked with our finance flows work is the “Shine: Investing in Energy Access for All” campaign. This work, led by Wallace Global Fund and GreenFaith, will bring together investors from the faith-based, philanthropic and development communities. It aims to mobilize larger, more diverse investments to support energy access. The campaign is especially focused on scaling up investment in decentralized renewable energy solutions that hold great promise to close the energy gap more quickly and at less cost than ‘business as usual’ approaches.

What does the future hold for the European Commission and SEforALL partnership?

The strong partnership between SEforALL and the European Commission cannot be overstated. This began in 2013, when the former Development Commissioner, Andris Piebalgs, attended the inaugural meeting of the SEforALL Advisory Board. Since then Klaus Rudischhauser, Deputy Director General at DG Development and Cooperation and Commissioner, Neven Mimica, have represented the European Commission respectively on the SEforALL's Executive Committee and the Advisory Board. SEforALL, on the request of Commissioner Neven Mimica, has also been asked to contribute and be a Member of the Advisory Board of the Covenant of Mayors in Sub-Saharan Africa.

Political leadership from the European Commission has featured prominently during its international events, including the 2017 Sustainable Energy for All Forum. The Commission's support was especially helpful in hosting this year's event, which brought together about 1,000 energy access leaders from across the world under the theme 'Going further, faster – together'.

The Forum created a space for our partners to tell stories about the work they are doing all around the globe to drive the transformation in energy access, renewables, clean cooking and energy productivity – all core elements of SDG7. Several new SEforALL initiatives were announced at the Forum, including the latest Global Tracking Framework report and our new "People-Centered Accelerator," a global effort to promote gender diversity, social inclusion and women's empowerment in the sustainable energy sector.

Looking ahead, we see even broader collaboration opportunities between the Commission and SEforALL. The Commission is considering further cooperations with SEforALL, amongst them in support of the 2018 SEforALL Global Tracking Framework (GTF) analytics and release, and other monitoring tools.

European energy companies are also playing bigger roles in SEforALL's sector-focused accelerators from Danfoss in Denmark to Philipps in the Netherlands, from ENEL in Italy to EDP in Portugal. This growing interest is driven by SEforALL's unique ability to convene and leverage public-private collaborations that are essential for accelerating on-the-ground progress and bringing affordable, reliable, sustainable and modern energy access to all.



"The strong partnership between SEforALL and the European Commission cannot be overstated"



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IRENA's combat against climate change through international cooperation

The International Renewable Energy Agency (IRENA) works to accelerate sustainable deployment and use of all forms of renewable energy globally. Since its establishment in 2011, IRENA's membership has grown to include 180 members, including the states in accession phase and the European Union. In the few years since the Agency's creation, the global energy landscape has witnessed a rapid and far-reaching transformation. Renewable energy is experiencing unprecedented growth due to a virtuous cycle of technological innovation and drastic cost reductions, driven by enabling policies. Solar PV module costs for example, have fallen by 80 per cent since 2010, with wind turbine costs falling by up to 40 per cent. IRENA estimates that renewables have accounted for the majority of global power generation capacity additions since 2012.

A transition to sustainable energy will be central to the fight against climate change. Around two-thirds of global greenhouse gas emissions can be attributed to the supply and use of energy from fossil fuels. These emissions need to drop by a factor of three by 2050. Renewable energy and energy efficiency are the two cornerstones of decarbonisation in the energy sector, with the potential to achieve 90 per cent of the required carbon reductions by 2050, as detailed in

Perspectives for the energy transition: Investment needs for a low carbon energy system.

The energy transition is technically and economically feasible. Worldwide more than 9.8 million people were employed in the renewable energy sector in 2016, as renewable energy has become an important engine of economic growth. Cumulative economic growth from accelerated renewable energy deployment from 2015–2050 could amount to approximately 16.16 trillion Euros¹, with 26 million people employed in renewables globally in 2050. Reduction of local air pollution and climate change mitigation are also key considerations. In fact, the health, environmental and climate benefits made possible by the energy transition are six times larger than additional investment needs, which amount to 29 trillion from 2015–2050.

Accelerating the energy transition contributes to tackling climate change and IRENA facilitates international cooperation towards this in several ways. These include: (a) state of the art analyses, such as REmap, Jobs, Costs, Market Design, the joint IRENA/IEA Policies and Measures Database, and developing REmade - the first global reference index on voluntary corporate renewable energy sourcing for all end-uses; (b) expert meetings and events, such as Innovation Week, the Legislators

Author



DOLF GIELEN

Dolf Gielen is Director of the IRENA Innovation and Technology Centre in Bonn since 2011. He oversees the agency's work on advising member countries in the area of technology status and roadmaps, energy planning, cost and markets and innovation policy frameworks.

Before joining IRENA, he was Chief of the Energy Efficiency and Policy Unit at the United Nations Industrial Development Organization (UNIDO). Previously, he was a Senior Energy Technology Policy Analyst at the International Energy Agency.

¹USD 19 trillion

Forum – a forum for policy dialogue between countries, Ministerial Roundtables – a forum for decision-makers, and topic-driven discussions; and (c) advisory services for countries and regions, including Renewables Readiness Assessments, and country-specific REmap analyses.

In the European Union, IRENA is working closely with European institutions on a 2030 policy package. Of the four main technology options to reduce energy-related emissions (nuclear, carbon capture and storage renewable energy, and energy efficiency), renewable energy and energy efficiency have proven to be the most viable options. Renewable energy has become increasingly cost-effective, with offshore wind in particular experiencing dramatic cost declines in Europe. Illustrative of the increasingly attractive business case for renewables is the rising number of cities, states, and major corporations committing to 100 per cent renewable energy targets, often surpassing national targets. Considering the increasing economic viability of renewable energy, EU Member States have the potential to go well beyond the proposed 27 per cent by 2030 renewable energy target, thereby enabling further economic growth and creating additional jobs. Tapping this additional potential would bring the EU closer to a decarbonisation pathway compatible with its goal of reducing carbon emissions by 40 per cent by 2030 and the 2°C objective established in the Paris Agreement, while improving the health and wellbeing of EU citizens. IRENA's REmap analysis for the EU to be released late 2017, will further elaborate on the EU's pathway to decarbonisation.

Similar analysis has been done for other regions such as Southeast Asia and Africa, and for 70 countries covering 90 per cent of global energy demand. This body of work, combined with

“Of the four main technology options to reduce energy-related emissions (nuclear, carbon capture and storage, renewable energy, and energy efficiency), renewable energy and energy efficiency have proven to be the most viable options”

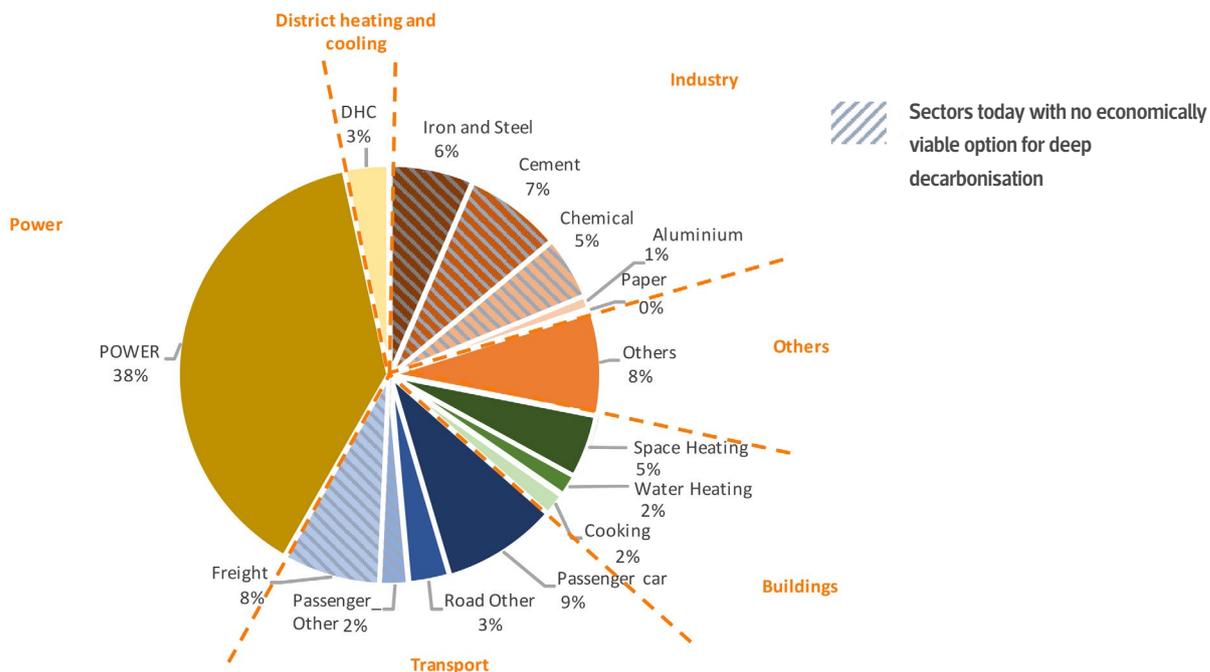
assessments of renewables in existing intended nationally determined contributions (INDCs) to climate change mitigation, can inform the process of INDCs revisions, which begins in 2018. Renewable energy presents countries with unique national growth opportunities and should be seen as a low-risk, high-reward investment.

Moving forward, the role of innovation in decarbonising certain sectors will become increasingly important, as described in Accelerating the Energy Transition through Innovation. In the EU, the path to 2030 is laid out with current technology, however innovation will be required to move beyond this target and slash energy-related emissions threefold by 2050. While cost-competitive low-carbon technologies for the power sector exist today, continued innovation will enhance their performance, further reduce their costs and help scale-up the deployment of the best available technologies. In end-use sectors (buildings, industry and transport), strengthened research, development and demonstration efforts are especially needed to improve the business case for currently available technologies and to develop new solutions for applications for which few sustainable options exist today. Sector coupling, battery storage, electric vehicles, and information and communication technology, among others, will all play a greater role moving forward, and all require increased attention to ensure a tripling of renewable energy share by 2050.

The next challenge is the large-scale deployment and integration of renewable energy technologies in energy systems. Addressing this challenge requires innovation beyond technology development, including new ways to operate energy systems, industrial processes, emerging infrastructure and business models. To enable these innovations, governments must set the



R&D priority areas in energy use sectors



Source: IRENA (2017) Accelerating the energy transition through innovation

stage for private-sector innovation through credible long-term policy signals and assist innovation in areas where the private sector lacks specific capacity or reach, such as certain enabling infrastructure. International cooperation on innovation has an important role to play, but needs to be further enhanced through initiatives such as Mission Innovation (see page 10), which seeks to strengthen international clean energy RD&D to further reduce costs. Initiatives such as Horizon 2020, the EU framework programme for research and innovation, have been successful in increasing RD&D funding, but more is needed as we look to meet long-term decarbonisation goals.

The role of renewables will be even more critical moving forward, enabling the reduction of emissions that will be needed in the coming decades. The renewable energy sector is highly dynamic and international exchange is essential to find the best energy transition pathways at the country level. The fact that IRENA has reached near universal membership in only seven years is an indicator of growing country awareness and interest in renewable energy. Given the importance of energy sector decarbonisation, IRENA will continue to work with its Members and other international and national institutions to accelerate the energy transition to meet long-term climate goals.

“While cost-competitive low-carbon technologies for the power sector exist today, continued innovation will enhance their performance, further reduce their costs and help scale-up the deployment of the best available technologies”





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Covenant of Mayors: Going Global

Putting policy into context

Urban energy consumption generates about three-quarters of global carbon emissions. Cities play a crucial role in terms of energy and climate policy, offering potentially comprehensive opportunities for contributing to shifting energy consumption towards more sustainable pathways and creating local opportunities for investment and growth. These same cities are also in a privileged position to meet the climate-change challenge by fostering the participation of citizens and building partnerships with local stakeholders.

In 2008, acknowledging the role of local authorities, the European Commission (EC) launched the Covenant of Mayors (CoM) initiative to endorse citywide efforts in the implementation of sustainable energy policies.

Since its launch, the CoM has proved successful as the mainstream European movement involving those local authorities which commit voluntarily to contributing to the European Union's objective of reducing greenhouse gas emissions by both meeting and exceeding the target of a 20% cut in CO₂ emissions by 2020, through better energy efficiency and the use of renewable energy sources within their territories.

The important role of the Covenant is mentioned and acknowledged in several European Commission policy documents: the Energy Efficiency Directive¹, the European Commission's Energy Union Package², the European

Commission's European Energy Security Strategy³, the Heating and Cooling Strategy⁴ and the European Strategy for Low-Emission Mobility⁵.

In 2014, in the context of the European Commission's European Strategy on adaptation to climate change⁶, the European Commission launched a separate initiative called Mayors Adapt, based on the Covenant of Mayors model, with the aim of engaging cities in taking action to adapt to climate change.

Building on the Covenant of Mayors and Mayors Adapt, the new Covenant of Mayors for Climate and Energy was announced in October 2015 and is based on three pillars:

- ★ Mitigation (40% CO₂ emission reduction target by 2030)
 - ★ Adaptation
 - ★ Secure, sustainable and affordable energy.
- Mayors who join the Covenant commit to taking the lead and enhancing the transparency and accountability of local climate and energy policies by:
- ★ Setting ambitious and quantified emission-reduction targets;

¹ Energy Union Package, COM/2015/080

² Energy Union Package, COM/2015/080

³ European Energy Security Strategy COM/2014/0330

⁴ An EU Strategy on Heating and Cooling COM/2016/51 final

⁵ A European Strategy for Low-Emission Mobility COM/2016/501 final

⁶ An EU Strategy on Adaptation to Climate Change COM /2013/ 216

Co-Author



JEAN FRANCOIS DALLEMAND

Mr Dallemand is currently part of the Energy Efficiency & Renewables Unit of the Joint Research Centre of the European Commission. He is contributing to activities in the field of Decarbonisation at Local Level in Urban zones. During the last few years, he has been focused on the issue of the sustainability of bioenergy. In the past, he was a Scientific Coordinator of the European Biomass Conference and a Member of the UN ICAO Alternative Fuels Task Force. He is an Agronomist, specialising in agricultural & environmental remote sensing. He joined the EC in 1997 after working with UN FAO and ESA. He also has experience in West Africa, Brazil and Indonesia.

“The peculiarity of the CoM commitment compared to other GHG mitigation initiatives concerns the participation of small and medium-sized towns in an effort to reduce GHG emissions”

Co-Author



SILVIA RIVAS CALVETE

Silvia Calvete is a Scientific Officer at the Energy Efficiency & Renewables Unit of the Joint Research Centre of the European Commission, mostly focused on methodological adaptation to the Global Covenant of Mayors. She is a key person in the implementation of the Covenant in Global Regions such as sub-Saharan Africa and Latin-America. She is involved in local energy allocation projects and support of the Energy Efficiency Directive implementation. She has more than 13 years of experience as an environmental quality manager and scientific advisor for: Air quality, Energy Efficiency, Agenda 21 and Sustainability, Urban Design and Waste management policies. She was a board member of the expert group for the Environmental Noise European Directive MS transposition and involved in several EU Twinning projects.



“Unless there is a rapid change in priorities, 1 billion people will still be without electricity in 2030, and 2.6 billion people will be without clean cooking facilities”

- ★ Measuring their Greenhouse Gas (GHG) emission level in a base year, according to a common methodological approach;
- ★ Assessing climate risks and vulnerabilities within their territories;
- ★ Defining a strategy and concrete actions to mitigate and adapt to climate change;
- ★ Approving and making their action plan publicly available;
- ★ Regularly reporting (both qualitatively and quantitatively) to the EC on the implementation of their action plan;
- ★ Sharing their vision, results, experience and know-how with fellow local and regional authorities within the EU and beyond through direct cooperation and peer-to-peer exchange.

In this context, the role of subnational regional authorities is key to the implementation of climate change policies especially in small and medium-sized cities and towns, which often lack the resources to develop and implement a Sustainable Energy & Climate Action Plan (SECAP) and can benefit from support provided at higher

administrative levels.

Covenant of Mayors commitments and achievements in terms of energy efficiency and renewable energy

At the cut-off date of the last analysis (4 September 2016), the number of CoM local authorities totalled 6,926 (96.5% from the EU-28), covering 213 million inhabitants (85% in the EU-28 representing 36% of the total EU-28 population).

The peculiarity of the CoM movement compared to other GHG mitigation initiatives concerns the participation of small and medium-sized towns (with less than 50,000 inhabitants) in an effort to reduce GHG emissions (89% from the total signatories).

The signatories overall commitment to reducing GHG emissions is 27% by 2020, i.e. 7 percentage points above the minimum requested target of 20%.

The mitigation commitment of the Covenant signatories is mainly related to the emissions associated with energy consumption in sectors

which can be influenced by the local authority (housing, services and urban transport), leaving out other emitters such as the Emissions Trading System (ETS) industry and transport outside the mandate of the local authority (e.g. highways).

Results from the 315 monitoring inventories submitted (covering 25.5 million inhabitants and mainly for the period 2012–2014) reveal an already achieved 23% overall reduction in emissions.

This decrease in GHG emissions between baseline and monitoring years was driven by:

- ★ GHG emissions due to electricity consumption fell by 17% from the baseline to monitoring years due to a less-carbon-intensive fuel mix and more efficient electricity generation power plants;
- ★ GHG emissions in buildings from heating and cooling fell by 36% from the baseline to monitoring years, driven by improved energy efficiency in buildings and consequently lower energy consumption levels, more efficient local heat production from district heating networks, and by increasing shares of renewable resources in decentralised local heating production;
- ★ GHG emissions in the transport sector fell by 7% from the baseline to monitoring years driven by more efficient vehicles, an increase in the share of biofuels, and the shift towards public transportation and electric mobility.

These results underline the interconnected nature of climate mitigation and energy efficiency actions adopted at the local level. The CoM signatories adopted a range of policies and measures for improving energy efficiency through building regulations, increasing the share of renewable energy, integrating district energy systems, and a gradual transformation to more efficient and sustainable transportation. The most common policies being implemented are:

- ★ Energy management and public procurement;
- ★ Building standards and energy certification labelling for new and existing buildings;
- ★ Awareness-raising and training;
- ★ Financial incentives;
- ★ Third-party financing;
- ★ Urban planning: local authorities establish local mobility plans defining limited traffic zones, low emission zones, designated parking spaces for low-emission vehicles, and free parking for cleaner efficient vehicles. Furthermore, they set road pricing schemas, and integrated ticketing/charging to foster sustainable mobility.

In addition to the above policies, many municipalities have ownership or jurisdiction over local energy and water utilities, public

transportation and social housing. There is a potential for improvements in energy efficiency in the provision of these services. Urban energy planning throughout the development of district energy networks in high-density districts can improve the energy efficiency of urban energy systems.

The combination of effective urban energy policies and better coordination between national and local governments is crucial for the potential of the urban mitigation of climate change.

The results obtained so far show how climate mitigation and sustainable energy actions adopted at the local level are interconnected. The role of local authorities in leveraging sustainable development, mitigation and adaptation measures is crucial. Developing a 'sustainable energy and climate action plan' that requires the setting up of a baseline emission inventory and the adoption of policy measures is already a tangible achievement for cities. This is the first step towards an effective, transparent system for tracking progress and concrete results.

The quantitative assessment of the Covenant of Mayors was presented in Marrakech during the COP 22 Conference in November 2016.

Covenant of Mayors in Sub-Saharan Africa: perspectives and knowledge needs

The methodological framework developed by the JRC in collaboration with city networks offers municipalities a comprehensive tool to support the development of climate and energy policies, which can be successfully replicated and adapted in other regions of the world.

The JRC provides scientific and technical support to the Covenant of Mayor (CoM) initiative, covering cities in the EU Member States, the Eastern Partnership and Central Asian countries and the Southern Mediterranean countries, in collaboration with the Commission's Directorate-General for Energy (DG ENER), the Directorate-General for Climate Action (DG CLIMA), the Directorate-General for European Neighbourhood Policy And Enlargement Negotiations (NEAR) and the Directorate-General for International Cooperation and Development (DG DEVCO). In 2017, the Covenant of Mayors activities are being extended to Sub-Saharan Africa (SSA) in order to include African cities. Technical cooperation is also being established with the Global Covenant of Mayors (GCoM) which JRC will support.

The Covenant of Mayors activities started mainly with a climate change mitigation component,

“Developing a ‘sustainable energy and climate action plan’ that requires the setting up of a baseline emission inventory and the adoption of policy measures is already a tangible achievement for cities”

Co-Author



ALBANA KONA

Ms Kona has been a Scientific Officer at the Energy Efficiency & Renewables Unit of the Joint Research Centre of the European Commission since 2013, working in the Covenant of Mayors (CoM) initiative. Her research activities include assessment of the Sustainable Energy Actions Plans of cities, descriptive statistics for robust assessment of the CoM initiative and developing performance indicators of energy sustainability in cities. She graduated in Energy Engineering from Politecnico di Torino (Italy). After two years working as a consultant for international energy companies, she joined a utility company in Italy, working as an energy manager in the field of district heating and gas networks. Within her Ph.D. studies she proposed a methodology for multiobjective optimizations of urban energy systems based on probabilistic procedure.

Co-Author


**PAOLO
BERTOLDI**

Paolo Bertoldi has gained a Doctor Degree in Electrical Engineering in 1985 at the University of Padova (Italy). He has been working with the European Commission since 1986. From 1986 to 1993 he was working in the EU nuclear fusion project, the Joint Undertaking Torus (JET) in the UK. For 1993 until April 2001, he was Administrator with the European Commission, DG Energy and Transport (DG TREN, Brussels Belgium), in charge of EU regulatory and voluntary programmes for energy efficiency in end-use equipment, buildings and industry. He was also in charge of voluntary agreements with industry and tertiary sectors and the GreenLight programme. Since May 2001, he is at the European Commission Joint Research Centre (Ispra, Italy), in charge of research activities on energy efficiency policy analysis, the efficient use of electricity (in particular ICT) and innovative policy instruments for energy efficiency (e.g. white certificates, financing mechanisms, ESCO, EPC, emission trading). He also manages the Covenant of Mayors activity at the JRC. In 2015 Mr. Bertoldi has been nominated Senior Expert

He has published over 80 papers on energy efficiency in scientific journals and conference proceedings.

He is the Editor-in-Chief of the peer reviewed journal Energy Efficiency

activities in the field of adaptation to climate change are now being included and activities dealing with access to energy and electricity will be added as well for Low Income Countries or communities. The Project activities of Covenant of Mayors for Sub-Saharan Africa are performed in close cooperation with institutions such as DG DEVCO, the Council of European Municipalities and Regions (CEMR), the EC Joint Research Centre (JRC), the African Union, Sustainable Energy for All (SEforALL) (see page 20), United Cities and Local Governments (UCLG), UN Habitat, PLATFORMA project, United Cities and Local Governments of Africa (UCLGA), the Global Covenant of Mayors for Climate and Energy.

Regarding the Covenant of Mayors in Sub-Saharan Africa, pilot projects have been awarded to a first group of cities/municipalities including Kampala (Uganda), Lubumbashi (République du Congo); Dakar (Sénégal), Bouaké (Côte d'Ivoire), Communauté de Communes du Zou (Bénin), Nouakchott (Mauritanie), Tsévié (Togo).

With the support from DG DEVCO, the main activities of JRC related to Covenant of Mayors sustainable energy planning in African cities are the following:

- ★ Methodology adaptation to develop Sustainable Energy Access and Climate Action Plans (SEACAPs) and calculating Emission Inventories (EIs) taking into account the specific processes and needs of cities in Sub-Saharan Africa and development of reporting tools,
- ★ Guidebook for SSA local and national authorities, adaptation of the documents and of the experience of the Covenant of Mayors in the EU and the South Mediterranean region to support SSA actors in order to improve their capacities and to design, facilitate and implement SEACAPs,
- ★ Assistance in developing SEACAPs (including Emissions Inventories for up to 45 cities and corresponding training & help Desk,
- ★ In-depth evaluation of up to 10 SEACAPs and overall assessment.

The expected policy impacts in Sub-Saharan Africa are:

- ★ Enabling the effective implementation and monitoring of the Covenant of Mayors initiative, including its adaptation to a new timeframe (2030) with quantitative goals of GHG emissions reduction, development of criteria for multi-level governance and sustainable energy policies and plans.

In the case of African cities, there is a priority to

improve the situation regarding access to energy & electricity, in addition to activities addressing climate change mitigation & adaptation to climate change. There are strong links between living conditions in rural zones and urban growth.

Regarding the access to electricity, an estimated 1.2 billion people (i.e. 16% of the global population) did not have access to electricity according to WEO-2016, 15 million fewer than reported in the previous year. Many more suffer from supply that is of poor quality. More than 95% of those living without electricity are in countries in Sub-Saharan Africa and developing Asia, and they are predominantly in rural areas (around 80% of the world total). While still far from complete, progress in providing electrification in urban areas has outpaced that in rural areas two to one since 2000.

Regarding the traditional use of solid biomass for cooking, according to WEO 2016, more than 2.7 billion people (i.e. 38% of the world's population) are estimated to have relied on the traditional use of solid biomass for cooking, typically using inefficient stoves or open fires in poorly ventilated spaces. Developing Asia and Sub-Saharan Africa once again dominate the global totals. While the number of people relying on biomass is larger in developing Asia than in Sub-Saharan Africa, their share of the population is lower: 50% in developing Asia, compared with more than 80% in Sub-Saharan Africa. Overall, nearly three-quarters of the global population living without clean cooking facilities (around 2 billion people) live in just ten countries.

According to IRENA REmap 2030 Project (see page 24), worldwide, nearly 1.3 billion people today do not have access to electricity, and 2.6 billion people do not have access to clean cooking facilities. This severely affects their well-being and economic development, presenting a strong case for an increased deployment of renewables.

Unless there is a rapid change in priorities, 1 billion people will still be without electricity in 2030, and 2.6 billion people will be without clean cooking facilities. Universal global access to electricity for lighting and other basic needs would raise global electricity demand by only 1%. IRENA analysis suggests that more than half of this demand could be met with decentralised renewable electricity.

In 2010, half of renewable energy use worldwide was traditional use of biomass, accounting for nearly 9% of global energy consumption. This usage is unsustainable and is a major source of indoor air pollution. The bulk of traditional use of biomass is used for cooking and heating. Switching from polluting traditional cook stoves to modern

clean biomass cook stoves could halve traditional use of biomass use and save lives due to reduced indoor air pollution. Clean cook stoves and other modern renewable alternatives for traditional use of biomass can contribute substantially to the global doubling of the renewable energy share. The switch will also save the equivalent of 3% of today's energy use.

REmap 2030 points the way to sustainable solutions, including technological solutions as well as practical and cultural changes. Although access to electricity is increasing, the replacement of traditional use of biomass is moving more slowly. To achieve this, there is a need to enhance access to the diversity of existing technology solutions, including by making reliable and affordable equipment readily available and by helping to meet people's practical and cultural needs. (www.irena.org/remap)

Going global

To support the international dimension of the Covenant of Mayors, the EC has been funding CoM initiatives in the EU Neighbourhood to the East, the Southern Mediterranean and in Sub-Saharan countries. The development of Covenant activities in North America, Latin America/Caribbean, China and South-East Asia, India and Japan is also under way.

The Global Covenant of Mayors for Climate & Energy formally brings together the Compact of Mayors and the European Union's Covenant of

Mayors, the world's two primary initiatives of cities and local governments to advance their transition to a low emission and climate resilient economy, and to demonstrate their global impact.

The Compact of Mayors was a global coalition of mayors and city officials pledging to reduce local greenhouse gas emissions, enhance resilience to climate change, and to track their progress transparently. The Compact was launched in September of 2014 by UN Secretary-General Ban Ki-moon and his Special Envoy for Cities and Climate Change, Michael R. Bloomberg. The Compact was activated under the leadership of the global city networks — C40 Cities Climate Leadership Group (C40), ICLEI – Local Governments for Sustainability (ICLEI) and the United Cities and Local Governments (UCLG) — and with support from UN-Habitat, the UN's lead agency on urban issues.

Commitments made under the Compact of Mayors will be folded under the Global Covenant of Mayors for Climate & Energy, joining those made through the EU Covenant of Mayors. Under this global framework, there is no change to commitment or compliance requirements until January 2019.

Four GCoM Technical Working Groups are being constituted on issues such as Data, Regional Coherence, Climate Action and Communication. The transition phase necessary to develop an integrated approach is supposed to last till the end of 2019.

“To support the international dimension of the Covenant of Mayors, the EC has been funding CoM initiatives in the EU Neighbourhood to the East, the Southern Mediterranean and in Sub-Saharan countries. The development of Covenant activities in North America, Latin America/Caribbean, China and South-East Asia, India and Japan is also under way”

“Clean cook stoves and other modern renewable alternatives for traditional use of biomass can contribute substantially to the global doubling of the renewable energy share. The switch will also save the equivalent of 3% of today's energy use. REmap 2030 points”



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Energy Community. Driving Sustainability in EU neighboring countries

After the 2015 Paris Agreement, sustainability has become the foremost consideration and a driver of any future energy policy. Its importance has also significantly increased in the Energy Community. When the Energy Community was created back in 2005, the main purpose and approach – the export of European energy *acquis* to non-EU countries – was still built on an “old-school” understanding of energy policy, based essentially on market liberalization and security of supply. Yet, the improvement of the environmental situation in the Contracting Parties was included as one of the objectives in Article 2 of the Treaty establishing the Energy Community. As regards climate change, however, the original Treaty in Article 13 only includes a rather lukewarm “recognition of the importance of the Kyoto Protocol” without any binding consequences. The Secretariat of the Energy Community proposed to update this provision as we believe that otherwise there is serious risk for the Energy Community to be decoupled from the global commitment to fight climate change. Upgrading the Energy Community in that respect is even more important as all Contracting Parties are signatories to the Paris Agreement

To be fair, even the Energy Community as it currently stands does not turn a blind eye to the fight against climate change. Besides an increasing amount of pieces of environmental *acquis* (with a strong focus on air quality), the Energy Community Contracting Parties are already under an obligation to implement the EU’s rules on energy efficiency and renewables with a similar level of ambition

and binding effects as EU Member States. Moreover, some of the internal market rules such as the State aid prohibition have turned into tools with a considerable impact on the promotion of fossil fuels, which is reflected in the Secretariat’s infringement practice. The Regional Energy Community Strategy 2011-2021 also reaffirms the paramount importance of developing a competitive, secure and sustainable energy market, by increasing the uptake of low-carbon technologies and providing a transparent regulatory and market framework for attracting national, regional and international investments. More recently, on 14 October 2016, the Ministerial Council of the Energy Community adopted a Recommendation for Contracting Parties also to implement and align their legislation to the Monitoring Mechanism Regulation (MMR) Regulation (EU) No 525/2013. This may be considered a small yet very important step of the Energy Community into the domain of tackling climate change and assuming a role in the implementation of the Paris Agreement.

Inside the Contracting Parties, progress in terms of transposition has been achieved already. This includes, for example, the market for energy services in Serbia, or the adoption of the “Law on Promotion of the Use of Energy from Renewable Sources” in Albania, introducing for the first time a competition-oriented auction procedure for the allocation of future renewable energy capacities (supported by contracts for difference). Draft legislation on climate change is under preparation in a number of countries. A final draft of the climate change law has already gone through public

Co-Author



DIRK BUSCHLE

Dirk Buschle is Deputy Director of the Energy Community Secretariat since 2011 and has led its legal unit since 2007. In this position, he is in charge of ensuring implementation of European energy law in the countries of the Energy Community. As Chairman of the Energy Community Dispute Resolution and Negotiation Center, he is also responsible for dispute resolution and negotiations and has acted as mediator in high-profile investor-state conflicts in the energy sector. He is a certified negotiation facilitator. Professor Buschle is also Dean of the Energy Community Summer School. He is also Professor and Chairholder of the European Energy Policy Chair at the College of Europe in Bruges. He teaches the annual course “European and International Energy Policy and Governance” and organizes regular high-profile conferences on energy policy and law. Prior to his current position, he was Head of Cabinet of the President of the Court of Justice of the European Free Trade Association (EFTA) in Luxembourg. The EFTA Court is the supreme judicial body for the EFTA States parties to the EEA agreement.

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Irina Lazzerini is a sustainable energy expert at the Energy Community Secretariat in Vienna. A sinologist, she has over 10 years of working and research experience in the field of international green policies, with a focus on Europe and Asia. Before joining the Energy Community, she was a research fellow on sustainable development at Tsinghua University (Beijing), policy officer within the European Commission Environment Directorate General (Brussels) and energy analyst at Enel Foundation (Italy). She has managed projects on European and Asian emerging energy markets, climate change, access to energy, sustainable urbanization and energy security. She worked with UNIDO on green industry policy and co-authored several publications on energy transitions in cities with the European Institute of Comparative Urban Research. She cooperated with the Global Shapers of the World Economic Forum to a number of projects evaluating the impact of renewable energy solutions on off-grid households in emerging economies.

consultation in Albania and is expected to be adopted by the end of this year.

At the same time, urgent catching-up is required in other areas. Most notably, renewable energy development in the Contracting Parties is still at an early stage, apart from large hydropower capacity. This stands in stark contrast to the vast untapped renewable energy potential in the Energy Community region, including about 98 GW of wind energy and 5.2 GW of solar PV, which could be deployed cost-competitively already today (IRENA, 2017)¹. Increased investments in renewable energy deployment and clean technologies could also boost the transition to a more sustainable economic development in the Energy Community region. Falling costs of renewable energy technology, large availability of natural resources like sun and wind and the interest of investors could be the perfect match for a successful low-carbon energy transition and a real opportunity for sustainable job creation in the region. Still, many Contracting Parties perceive the low-carbon transition as a threat rather than an opportunity, in particular because of the energy-intensive industries and the conventional business and societal model they promote. Environmental and climate change consequences and costs are usually not internalized and the limited human resources capacity assigned to climate action in the relevant ministries remains a barrier to further progress.

More in general, the obstacle to be overcome

the first place is the absence of a holistic approach to the challenges posed by climate change; this is what the Energy Community is lacking on an institutional level as well as in its Contracting Parties. As the European Union, the Energy Community is part of a transition in which energy, environment and climate change policies are intrinsically linked and need to be addressed in a coordinated manner. The European Commission's attempt to achieve this is the Clean Energy Package for all Europeans (November 2015), and in particular the proposed Regulation on Governance which follows a process-based approach. This package will be essential in fostering the pan-European energy transition and should be extended to the Energy Community immediately upon its adoption in the EU.

Given the challenges of implementing the Paris Agreement and the risk of regret investments, the Energy Community cannot sit back and without acting in the meantime. To start the action, during the Western Balkan 6 Summit in Paris (July 2016) and in the framework of the so-called Berlin Process, the Secretariat proposed a Sustainability Charter, including a set of regulatory, policy and practical measures on low-carbon development and climate resilience. Moreover, the first edition of the Sustainability Forum was launched by the Energy Community Secretariat and the Balkan Green Foundation on 9 June 2017 in Vienna, as a platform to discuss and brainstorm on how to better shift towards a more sustainable development in

¹ Cost-competitive renewable power generation: Potential across South East Europe, IRENA, 2017



the Energy Community region. More importantly, the first Joint Meeting of Ministers responsible for energy, environment and climate change on 9-10 June in Dürnstein established the Climate Action Group (CAG), whose core objective is to coordinate the integration of energy and climate policies at national, regional and international level. The first meeting of the Energy Community Climate Action Group took place at the premises of the Energy Community Secretariat on 5 September 2017.

Summing up, it is fair to admit that until today, sustainability has been peripheral to most governments and institutions in the Energy Community. At the same time, a process of market reform, integration of and support to clean power sources and mainstreaming of energy and climate obligations is underway. Transition has been the Energy Community's leitmotif throughout the past ten years. It is now about time to let sustainability and climate action take center stage in that transition.

“Transition has been the Energy Community's leitmotif throughout the past ten years. It is now about time to let sustainability and climate action take center stage in that transition.”

“This package will be essential in fostering the pan-European energy transition and should be extended to the Energy Community immediately upon its adoption in the EU”

“Given the challenges of implementing the Paris Agreement and the risk of regret investments, the Energy Community cannot sit back”



EUROGIA2020 contribution to clean energy innovation

Embraces programmes for specific energy technologies

Covering the entire energy mix except nuclear, EUROGIA stands as a unique tool in the European Research Area (ERA) which mostly embraces programmes for specific energy technologies. EUROGIA2020 is the EUREKA Cluster for low carbon energy technologies. Its aim is to support and promote transnational low carbon energy technology projects in more than 40 EUREKA Member and Associated Countries. Since 2008, EUROGIA2020 gave the EUREKA label to 41 transnational energy technology projects, enabling the project partners to access public funds in EUREKA Member and Associated Countries, including 28 EU Member States.

Supported by 10 leading energy technology companies such as Acciona Energy, Air Liquide, Bureau Veritas, CARDTEK, ENERJISA, ENGIE and GE Oil&Gas, EUROGIA2020 is a complementary tool to the European Framework Programmes in reaching SET Plan objectives.

EUROGIA2020 responds to the technological changes

EUROGIA2020 is the only programme in the ERA covering the entire energy value chain. This enables the industry to respond swiftly to the current technological challenges and project participant companies benefit from the wide spectrum of technologies that EUROGIA2020 represents.

The period between 2008 and 2013 witnessed the large deployment of wind and solar spectrum renewable energy source (RES) across Europe and eventually led to the generation of many

EUROGIA2020 projects in these technology fields. Now that Europe has reached the largest installed and connected photovoltaic (PV) capacity in the world and overall wind power, a wide-range international, innovation programme like EUROGIA2020 is utmost importance to address energy storage challenges related to intermittency of renewable energy. A leading information and communications technology (ICT) Company CARDTEK chose to join EUROGIA Board and got elected the chairing company with the aim of providing smart ICT solutions for energy efficiency. EUROGIA2020 responds to the major shift from energy generation to storage, management and efficiency.

Expanding Horizons

EUROGIA2020 benefits from the expansion of EUREKA towards non-European countries and is currently the leading EUREKA Cluster in terms of generating proposals with South Africa, and has active participation of Canada in its project calls.

The Global Stars initiative launched by EUREKA provides a multifaceted approach for the internationalisation of EUREKA. This programme enables EUROGIA2020 project participants to develop R&D&I cooperation between EUREKA countries, including the associated countries South Korea, Canada, South Africa and Chile, and non-EUREKA partner countries. Access to new and emerging markets through the Global Stars initiative makes EUROGIA2020 a more attractive funding tool for low carbon energy technology projects.

Editor



NIL ATMACA

Nil Atmaca is the Head of Secretariat and EU Affairs at EUROGIA2020. Her lead role is to ensure the access of transnational, low carbon energy technology projects to public funds in more than 40 EUREKA Member and Associated Countries. In addition, she represents leading energy technology and management companies such as Acciona Energy, Air Liquide, Bureau Veritas, CARDTEK, ENERJISA and ENGIE at EUREKA level. She is specialised in RES-E support mechanisms. After earning a bachelor's degree in public administration at University of Marmara and SciencesPO Paris, she completed her master's degree at the College of Europe.



From Industry for Industry

Led by prominent energy technology companies, EUROGIA2020 follows a bottom-up approach and its non-thematic project calls allow industry to focus on its needs and new market challenges. Market oriented EUROGIA2020 projects do not only lead to the development of new energy technology products, processes and services in the market; they initiate job creation and respond to major societal challenges in more than 40 EUREKA Member and Associated Countries and beyond.

Our Impact – RENERSTA Success Story POWIDIAN, a spin-off from AIRBUS as a result of RENERSTA Project

As a market oriented programme, EUROGIA2020's success can easily be assessed. The RENERSTA project, a pioneering concept to provide remote outlying locations with access to reliable renewable energy, has led to the creation of a new business and opened up a new market for sustainable energy technology. The project developed a highly reliable sustainable solution to produce, store and deliver electricity for isolated sites or in areas where the power grid is not reliable enough.

Relying on renewable energy sources however, presents its own set of problems, such as intermittent production according to availability of wind or sun, which means that energy

production is either wasted or is insufficient. The key to the success of the RENERSTA project has been developing an autonomous renewable energy solution that eliminates these issues.

Running the project through EUROGIA2020 enabled the Airbus team, which led the project, to connect with major industrial companies like SAFT and AEGPower Solution. The project partners from both participating countries benefited from funding: in France the Direction Générale des Entreprises (DGE) supported the French participation, the German part of the project was funded by the Federal Ministry for Economic Affairs and Energy (BMWi).

Successful spin-off

Following completion of the project in 2014, Airbus created Powidian, a spin-off company to focus on developing and marketing this novel renewable energy storage technology.

As a pioneer in this field Powidian has been assessing the market, and increasingly sees itself as a provider of reliable renewable electricity. The long term objective is to partner up with major providers such as EDF in order to deliver sustainable electricity solutions to islands, remote areas or buildings where coverage is bad. In this way, Powidian will be able to provide solutions at scale and at prices that would be attractive.

“EUROGIA2020 projects initiate job creation and respond to major societal challenges in more than 40 EUREKA countries, including Member States and Associated Countries”



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Technology & the Paris Agreement

New opportunities for technology transfer and business cooperation with the Climate Technology Centre and Network (CTCN)

Better technologies and new ways of using existing knowledge are an important means to cut greenhouse gas emissions and enhance climate resilience. The UN Climate Change Convention (UNFCCC) negotiations, in particular the Paris Agreement's chapter on technology transfer and development, create a broad framework for greater global collaboration. The International Energy Agency (IEA) estimates that implementation of the national climate plans submitted by countries for the Paris Agreement – the intended nationally determined contributions, or INDCs – will mean approximately 11.48 trillion Euros¹ of investment in low-carbon technologies, renewables and energy efficiency over the next 15 years.

These are emerging markets for EU companies, ones that will create quality jobs in Europe and abroad. While the EU is home to thousands of cleantech companies, developing country markets remain uncharted territory for many of them. Yet as developing countries around the world seek to fulfil their national climate commitments and sustainable development goals, a rapidly growing need for low-carbon and clean energy technologies and training is emerging.

To maximise opportunities, both in the EU and in

developing countries, cooperation and networking are key. Joint projects with international partner countries and exchanges of knowledge help to create synergies and allow the sharing of experiences on how to best innovate. Technology transfer is an important pillar of the UNFCCC and the Paris Agreement. In order to accelerate matchmaking opportunities between technology providers and interested parties in developing countries, the UN's Climate Technology Centre and Network (CTCN) was launched in 2014 with support from the EU. Three years later, almost 200 clean technology transfers are now underway in more than 70 countries, in sectors ranging from agriculture and energy to industry and waste management.

About the CTCN

The CTCN helps developing countries to prioritise their technology needs, research potential regulatory and policy barriers and support technology deployment (including identifying sources of additional public or private funding). The Centre is able to provide these services by mobilising expertise on policy and technology support from a global network

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¹USD 13.5 trillion

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Jukka Uosukainen is the Director of the Climate Technology Centre and Network (CTCN). He has worked in the fields of environment, technology and development for over three decades, serving as the EU Lead Negotiator and Co-Chairman for UNFCCC subsidiary body meetings, the Basel Convention and the Montreal Protocol. He has also acted as the Chairman for the UNFCCC Expert Group on Technology Transfer (EGTT) and facilitated technology negotiations during the Poznan and Durban Climate Meetings. Prior to joining the CTCN, he served as Director General of the International Affairs Unit in the Ministry of the Environment of Finland.

of finance, NGO, private sector and research stakeholders. The CTCN is based in Copenhagen, an ideal location from which to build such a network, as Denmark was ranked number one in developing green technologies by the 2017 Global Cleantech Innovation Index.

How it works

Local and national stakeholders in developing countries convey their clean technology-related needs to the CTCN via a national focal point. Upon receipt of a request, the Centre conducts an open bidding process among its network members and contracts them directly for their services.

Almost 100 of the CTCN members are from the EU. Network members represent a broad array of expertise in technology development, deployment, capacity building, finance, investment and policy. As the CTCN helps countries to create environments that are conducive to attracting and supporting technology implementation, many of its technology projects focus on both soft and hard technologies and take the form of training, assessments, feasibility studies and guidance on policy and regulatory structures.

In Uganda, for example, although geothermal energy prospects have been known about for more than 30 years, exploratory drilling for geothermal resources has yet to take place anywhere in the country. The government and development partners conducted surface studies, identified at least four sites with medium to high temperature hydrothermal systems and issued geothermal exploration licenses to private sector prospectors. However, this resulted in little or no exploratory drilling over the years. At the Ugandan government's request, the CTCN called upon its UK network member Carbon Counts, an energy and climate change consultancy, to identify barriers to geothermal development and propose solutions. Carbon Counts pinpointed a lack of a clear

geothermal energy policy and legal framework and worked with stakeholders to develop a draft geothermal energy policy for Uganda, as well as a geothermal energy law and guidance on necessary institutional structures. Once the policy and legal framework has been implemented, the development of 100 MW of geothermal energy production could provide a clean, secure, reliable and affordable source of power for over 500,000 Ugandan households.

Clean energy demand

Over 70% of all requests received by the CTCN focus on low-carbon technologies, from the energy, industry and transport sectors among others. Developing countries also make requests for adaptation-related technology assistance, with numerous requests for early warning systems, flood modelling and water management strategies. A growing number of requests include appeals for assistance in catalysing project financing, including multilateral funding from the likes of the Green Climate Fund (GCF).

Visibility and networking

In addition to providing technology assistance, the CTCN serves as a platform for engagement between its network members, government representatives and financing agencies. The Centre organises seven regional fora each year for this purpose. Its members also have the opportunity to gain greater visibility for their work by presenting interactive webinars to a global audience and sharing publications and event information on the [CTCN's online portal](#).

Because of its reputation as a trusted technology broker, the CTCN can create opportunities for companies and organisations to find partners for project implementation in order to supplement various local and sectoral expertise. In one such case, the Centre brought together the

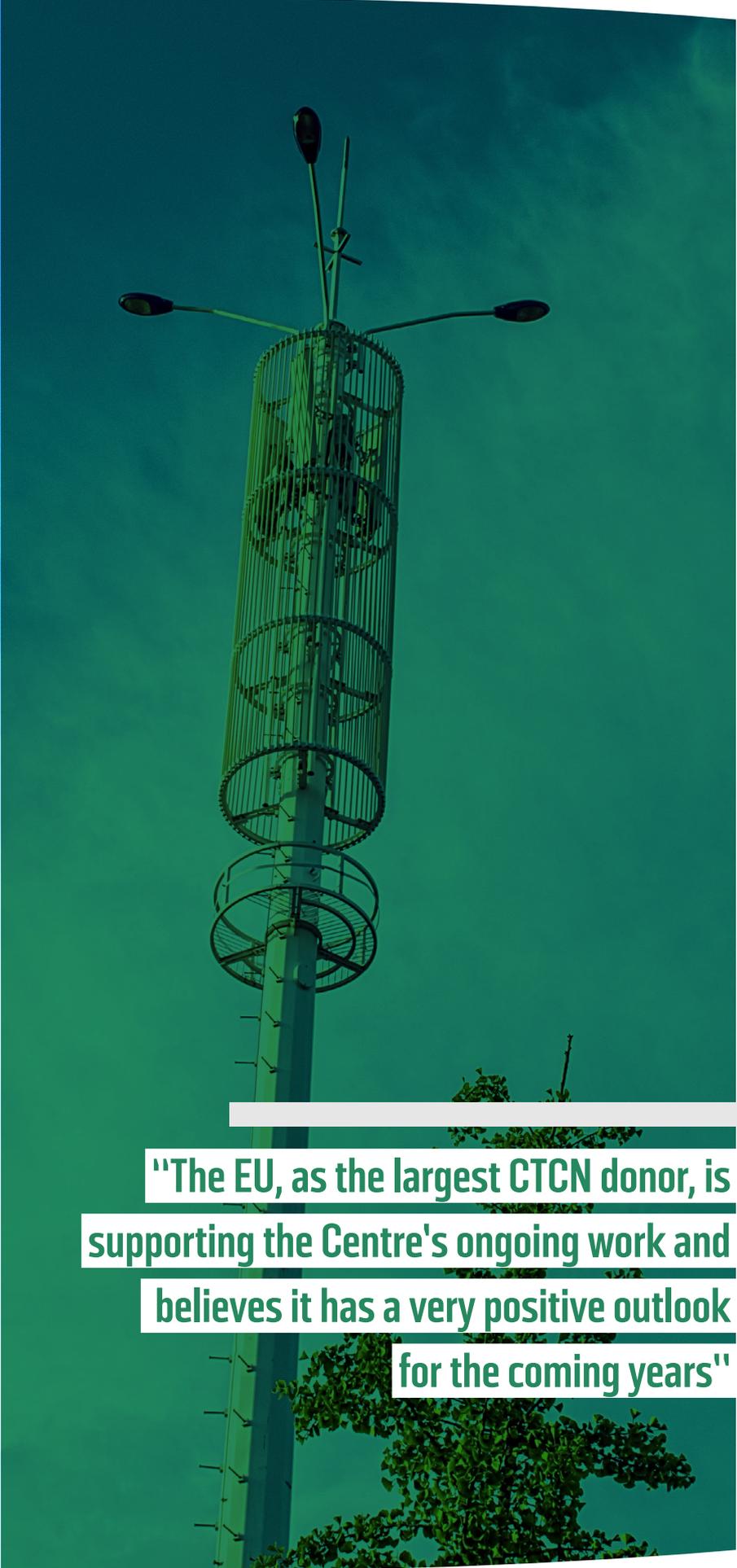


Bariloche Foundation of Argentina, the Energy Research Centre of the Netherlands and the US National Renewable Energy Laboratory to assist the Colombian government to prioritise economic sectors with the highest potential for improving energy efficiency. By providing their complimentary experience and analysis, the three groups identified the transport and industry sectors as priorities and proposed new actions, policy instruments and cross-cutting measures for the country to implement. These recommendations contributed directly to the development of Colombia's National Indicative Action Plan for Energy Efficiency for 2017-2022.

The EU, as the largest CTCN donor, is supporting the Centre's ongoing work and believes it has a very positive outlook for the coming years. EU Member States and the European Commission have established contact points as interlocutors for the Centre and its growing network. While the CTCN is designed to support developing countries, there is also a role for the EU and other developed countries to build networks, enable technology transfer and build capacity about climate action in both the public and private sectors.

About the CTCN:

As the implementing arm of the United Nations Framework Convention on Climate Change (UNFCCC) Technology Mechanism, the Climate Technology Centre is hosted and managed by the United Nations Environment and the United Nations Industrial Development Organization (UNIDO). The CTCN is financed through bilateral funding, including support from the European Union. Membership in the Climate Technology Network is free and offers the opportunity to engage in new markets and strengthen networks.



"The EU, as the largest CTCN donor, is supporting the Centre's ongoing work and believes it has a very positive outlook for the coming years"



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