



# ASEIC

## Eco-Innovation Watch

e - Newsletter



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**Indonesian decree a moratorium for forest clearance**

**Global MDBs' climate finance hit reached record high in 2018**

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## I Policy

### Vietnamese Ministry announces ICT guidelines for developing smart cities

- The Vietnamese Ministry of Information and Communication announced the Reference Framework needed to develop smart cities, suggesting the necessary standards for each localities and businesses to pursue smart cities. The guidelines were proposed as a part of ‘2018-25, Decision 950/QĐ-TTg on a sustainable development of smart cities,’ issued in August, 2018.
- The Reference Framework guarantees consistency and synchronisation in smart city development and can also be used as a basis for developing smart city plans, investment projects, service leasing plans, and ICT architecture.
- The prioritized sectors for smart city development include smart city management, water management systems, waste collection and treatment systems, electric grids, transportation systems, education, and healthcare.
- In the past few years, Vietnam started pilot projects for smart city development in cities such as Ho Chi Minh City, Hanoi, Da Nang, Thua Thien-Hue, Hai Phong and some cities. Smart township projects in each region includes BRG Smart City in Hanoi, Ecopark Smart City in Huong Yen, Dragon Smart City in Da Nang, and Thu Thiem Eco Smart City in Ho Chi Minh City.
- The Reference Framework is to provide a standard for services and township development to localities pursuing smart city development.

*(Reference: Vietnam+, “Ministry issues guidelines for smart city building,” 13 Jun. 2019)*

### Trends in the expansion of solar power production plans in Cambodia

- At the proclamation ceremony of the ‘ Cambodia 2020 Energy Vision’, Cambodia promised to

increase investments for solar power development up to 12% by the end of next year, and up to 20% in the next three years.

- Cambodia will produce 70MW of Solar power next year, with 10 MW from Syay Rieng solar power plant and 60MW from Kampong Speu solar power plant.
- The expansion of solar power production will facilitate the decrease in electricity prices in the industrial and commercial sectors. Concerning this, the private sector demanded that electricity prices be reduced from 600-800 riel (\$0.15 and \$0.20) to 400-500 riel in the future.
- The Cambodian government recently approved two solar power projects with the capacity of 120MW, which are expected to be accessible to the national power grid next year and 2021 respectively.
- Furthermore, the government approved the expansion plan to transform the production capacity of the Oudong Solar Power Plant in Kampong Speu from a 20MW to a 60MW.
- According to the Cambodia Chamber of Commerce, if Electricite du Cambodge increases investments in solar power, it could attract foreign investors, which would gradually lead to the lower cost of electricity.

*(Reference: Phnom Penh Post "Gov't to reduce reliance on hydro," 2019.7.8.)*

### Indonesian President signs a permanent moratorium for forest clearance

- Indonesian President, Joko Widodo, signed a permanent moratorium on new deforestation permits of primary forests and peat deposits.
- The newly issued moratorium bans activities - such as large-scale palm plantation and logging - that affect the forest. The moratorium was first introduced in 2011 and has been renewed annually.
- According to the explanations of a government official, the moratorium is effective on an area that includes 660,000 square kilometers of primary forest and peatland, and is expected to

reduce greenhouse gas emissions resulting from deforestation.

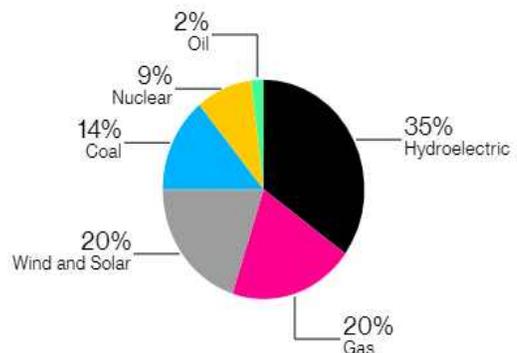
- Indonesia has been revealed to have the highest deforestation rates in the world in the past 50 years, with a forest area twice the size of Japan eradicated due to logging or burning.
- The current moratorium was devised as a response to a serious air pollution in Sumatra and Borneo, which arose the emergency caused by the smoke from forest fires.
- However, environmental activists believe that the President’s moratorium will not provide long-term protection of primary forests. These activists claim that deforestation rates have been increasing despite the continuous implementation of the moratorium since 2011; therefore, the moratorium alone is seen as an insufficient measure of decreasing deforestation.

(References: Malaymail, “Indonesia president makes moratorium on forest clearance permanent,” 8 Aug. 2019.8.; Mongabay, “Indonesia forest-clearing ban is made permanent, but labeled ‘propaganda’,” 14 Aug. 2019.)

### Pakistani Government plans to increase renewable energy to 20% by 2025

- The Pakistani government proclaimed that they would increase clean energy resources such as photovoltaics and wind power to 1/5th of the total power production by 2025.
- The country plans to increase its renewable energy approximately four times its current rate to 8-9GW by 2025, increasing the country’s total power generation capacity by 40% to 42-43GW.
- The Pakistani government continued power production with coal and natural gases financed by China to solve the energy deficit in the past six years, but declared that the government would focus on

Pakistan’s 2025 energy mix plan



※Source: Bloomberg

renewable energy in the next 10 years.

- For this, Pakistan will launch an auction for the renewable energy capacity increase in December and will deregulate for clean energies to encourage participation from private businesses that focus on solar and wind power production
- The Pakistani government is also hoping that the expansion of renewable energy production will reduce the import of fossil fuels such as coal and natural gas. Pakistan's petroleum product imports reached 13 billion USD in the last 11 months ended May.

*(References: Bloomberg, "Pakistan Plans Clean Energy Wave to Make Up 20% of Its Capacity," 23. Jul. 2019.; Aljazeera, "Pakistan plans renewables for a fifth of energy supplies by 2025," 23. Jul. 2019.)*

### EIB plans to stop supporting fossil fuel projects from 2021

- The European Investment Bank (EIB) will stop funding fossil fuel projects from 2021 onwards. Instead, EIB will increase investments in clean energy to support projects responding to climate change.
- EIB explained that the strategy was devised to support the urgent implementation of goals preventing the global climate crisis, as the record-setting temperatures this summer in Europe are due to coal, oil, and fossil fuel.
- The strategy of the EIB intends to provide long-term investments as per the Paris agreement, which aims to stop the global warming in temperatures at 1.5°C compared to 1990 levels. EIB pointed out that solidarity for potentially vulnerable groups and regions are necessary in order to realize these plans.
- As per the strategy paper, member states of the EIB plan to create funds to support energy transition.
- Many environmental activists have agreed with EIB's movement and demanded that the EIB Board approves this plan. Moreover, the activists claimed that other financial institutions

should follow the steps of the EIB and suggest visions that ban the funding of fossil fuel projects.

- The EIB board, which is mainly comprised of financial ministers of member states, is planning to discuss this suggestion next September, and reported that it will take some time to reach a final decision.

*(Reference: Eco Watch “European Investment Bank Will Stop Funding Fossil Fuel Projects by the End of 2020,” 20. Jul. 2019)*

### French Government plans to charge eco-tax on all flights out of France

- The French government announced that from 2020 all seats on flights leaving France will be charged eco-tax.
- The French Minister of Transport mentioned that eco-tax will be charged according to the flight distance and flight class and is predicted to raise government revenue around € 180 million, which will be used to improve public transport.
- According to the specific plans, economy class for flights within France and the EU, and flights outside of the EU will be charged € 1.5 and € 3 respectively. On the other hand, business class for flights within France and the EU, and outside of the EU will be charged € 9 and € 18 respectively.
- Air France claimed that the eco-tax would introduce an annual additional cost of € 60 million, and this will in turn damage the competitiveness of the airline. 50% of Air France’s flights were operated outside of France, and losses accumulated to € 180 million in 2018 in terms of domestic network.
- On the other hand, CAN Europe, a climate change-related NGO, claimed that the tax is a good first step, but is insufficient to tackle the pollution created by the aviation sector. The NGO suggested that the highest eco-tax of € 18 is too low and needs to be gradually increased.
- Meanwhile, the French government is planning to annually another increase of € 140 million

revenue from 2020 by reducing tax benefits on diesel for trucks.

(References: Euronews, “France 'will introduce eco-tax' on flights out of France,” 2019.7.10.: Aljazeera, ” France's eco-tax on flights criticised by airlines and activists,” 2019.7.10.)

## Korean Government provides strategies responding to microplastic problem

- The Ministry of Science and ICT hosted the 6th Ministerial meeting for Science and Technology Ministries and discussed strategies that would respond to the microplastic problem.
- The strategy responding to the microplastic problem based on science and technology is a plan that attempts to relieve citizens from potential environmental and health threats that comes from microplastic in an preemptive and systematic manner.
- The strategy intends to provide a scientific and technological basis with systematic R&D such as development of an effective technology for reducing and managing plastic waste, research on health and environmental risk assessment, and the development of alternative material.
- The meeting set up a vision of ‘a society in which citizens are relieved from microplastic’ and provided the following short-term and mid-to-long-term response measures.
  - Promote preemptive technologies that minimize the generation of microplastic and effective policies on plastic waste management
  - Promote research on standardization the measurement and analysis of microplastic, investigation actual pollution, and environmental and health risk assessment, as well as, producing and accumulating information through establishing a global network
  - Develop alternative and new material and technologies that manage and treat microplastics, and establish a scientific response institutional system
- The Korean government is planning to promote the ‘microplastic multi-ministry R&D project’ from 2021 by going through a cooperative plan on a preliminary feasibility study, and establish the inter-ministry consultative group for an integrated response to the microplastic problem.

(Reference: 과학기술통신부, “제6회 과학기술관계장관회의 개최,” 17 Jul. 2019.)

### Korean MOTIE hosts private and public joint council for renewable energy

- On July 25<sup>th</sup>, 2019, the Korean Ministry of Trade, Industry, and Energy (MOTIE) hosted the first private and public joint council on renewable energy and assessed the ‘renewable energy 3020 implementation progress’ and future promotion plans
- After the announcement of the renewable 3020 implementation plan (December, 2017), the scale of the renewable energy production units supplied in the 18 months between 2018 to June 2019 was confirmed to be 4,583MW, surpassing the original goal for this period of time of 2,939MW by approximately 1.56 times.
- This scale supplied in the 18 months is 1/3 of the total renewable energy units (15,106MW) installed in 2017.
- The joint council discussed measures to prevent any problems, such as preventing environmental problems, recycling PV modules, and others, that comes with the process of supplying renewable energy.
- The MOTIE, while expediting the renewable 3020 project, emphasized the importance of timely solutions in the case of side effects during the implementation and declared that true achievement of aims through renewable energy expansion entails practical benefits to the region and its inhabitants.

*(Reference: 산업통상자원부, “산업부, 재생에너지 3020 민관 공동협의회 개최,” 25 Jul. 2019)*

### Chinese industry catalogue (2019) to encourage foreign investments

- The Chinese National Development and Reform Commission and the Ministry of Commerce announced the “2019 industry catalogue for encouraging foreign investment” and declared that they would implement it from July 20th, 2019 onwards.
- The industry catalogue massively expands the foreign investment sector, encourages the

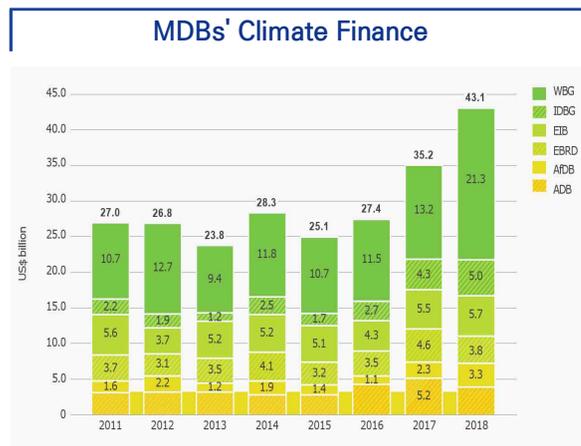
participation of foreign capital in the manufacturing sector, encourages foreign capital investments in service industries that increase manufacturing productivity, and supports the relocation of foreign companies to the mid-west region.

- In order to expedite investments from foreign capital, the catalogue opens and expands the foreign investment sectors in the new agriculture sector, advanced manufacturing sector, new technology sector, energy saving and environmental protection sector, and the modern service sector.
- The industrial catalogue includes 1,108 different industrial lists. Out of the 1,108 lists, 415 are national wide catalogues, and 693 are catalogues on the mid-western region.
- The main catalogues relating to the environmental protection industry of the industrial catalogue stipulates the following:
  - 3. Manufacturing sector: the manufacturing industry on soil pollution management and restoration facilities, manufacturing facilities that use resource recovered from agricultural waste and scaled livestock and cultural waste, manufacturing facilities preventing water pollution, manufacturing facilities treating solid waste, and manufacturing instruments that monitors the environment
  - 9. Scientific research and technology service industry: high value seawater integrated use technology such as collecting and processing deep sea salt manufacturing, potassium, bromine, magnesium, lithium related to desalination, technology managing petroleum contamination in the sea and facilitating ecological restoration and developing other related products, developing and applying circular economy technology along with energy conservation and environmental protection, monitoring technology for environmental pollution management, technology for recycling resources, technology for radioactive waste treatment, and integrated use technology for recovering modern livestock waste
  - 10. Irrigation and management of environment and public facilities: environmental management of waterways and lakes, restoration of water ecology and management protection, construction and operation of city-closed roads, construction and operation of city subways and light rail, establishment of landfills, construction of treatment facilities for hazardous waste and environmental facilities.

*(References: 环保在线 “两部门发布《鼓励外商投资产业目录(2019年版)》,” 2019.7.2.; 商务部 “鼓励外商投资产业目录” 2019.6.30.)*

## Global MDBs' climate finance hit record high in 2018

- According to the newly issued 'Joint report on multilateral development banks' climate finance' (six MDBs including African Development Bank (AfDB), Asian Development Bank (ADB), the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB), the Inter-American Development Bank Group (IDBF), and the World Bank Group (WBG)), MDBs' climate finances for developing countries and emerging economies reached all time high of \$43.1 billion in 2018. Out of the total, \$40.23 billion was procured from the MDBs own funds, and \$2.871 billion were procured from external funds through MDB.
- This record is a 22% increase from last year's 35.2 billion dollars and is thought to be a response to the unequal effects of climate change in low-income countries and countries vulnerable to climate change since the 2015 Paris agreement.
- According to the analysis of the report, 30.2 billion dollars (70%) of the climate finance of 2018 has been used for reducing climate change such as reducing greenhouse gas and preventing global warming.
- 12.9 billion dollars (30%) of the total climate finance was used in efforts to tackle to effects of climate change such as draught and floods.
- In terms of the fund use in 6 MDBs, the proportion that climate related fund use increases annually. In 2013 climate finances only comprised 18% of the total finances and in 2019, comprised 29%.



※출처: Joint Report

(References: Climate Action in Financial Institutions, "2018 Joint report on Multilateral Development Banks' climate finance," Jun. 2019; ADB, "MDB Climate Finance Hit Record High of \$43.1 Billion in 2018," 13 Jun. 2019)

## II Industry

### Vietnamese Commercial banks expands loans for household solar energy

- Due to the popularization of solar power installations following the active support from the Vietnamese government, Vietnamese commercial banks have implemented an expansion of loans for solar power installations
- HSBC Vietnam, cooperating with GIC Joint Investment, started offering loans with interest rates as low as 10-13% annually for households that install rooftop solar panels.
- Clients from Da Nang or Ho Chi Minh City who get loans from HSBC can receive financing at unsecured loans with interests as low as 11.99% for a long repayment term of up to 50 months to install rooftop solar panels.
- The Bank for Investment and Development of Vietnam (BIDV) cooperated with SolarBK to support 75% of the cost for household solar power project. The repayment term for BIDV is between 12 months to 36 months in interest rates of 10% with interest waved for the first year.
- Meanwhile, the Vietnamese Ministry of Industry and Trade announced that there is a total of 26,000MWp worth of solar power projects that have been approved or is being constructed.

(참고: VIR, "Commercial banks provide loans for green energy projects," 3 Jul. 2019.7)

### Renewable energy plants improve the lives of locals in Viet Nam

- Recently active investigation and investments about solar and wind power generation are happening in Dak Lak and Gia Lai, located in the central highlands of Vietnam.
- Serepok 1 and Quang Minh solar power plant located in Buon Don, Dak lak is one of the first projects to be connected to the national grid in the area.

- The project scales a total of 120 hectares, with 2.3 trillion VND (\$99 million) invested and the production capacity of 100MWp. The project, which started operation on March, 2019, is expected to contribute 150 million KWh of electricity to the national grid, with the annual turnover reaching 300 billion VND (\$1.3 million) and contributions to the local tax revenue reaching about 30 billion VND.
- The Tay Nguen wind farm in village of Elie Yang, another region in Dak Lak, started construction in 2017 is expected to be completed in 2022. The total investment is 13 trillion VND (\$560 million) and the total capacity it thought to reach 436MW. In the first phase, 12 turbines with the capacity of 28.8MW were constructed, and operations will start in September, producing approximately 108 million kWh annually.
- Krong Pa solar power plant in Gia Lai started construction in late 2018, and Chu Mgon LICOGI 16 started operations in May, 2019. The total investment in the two projects reach 2.7 trillion VND (\$16 million).
- The Vice Chairman of Buon Don district People’s Committee mentioned that a lot of ethnic minority people lived in this area and were in difficult circumstances due to the dry land and harsh climate. However, the chairman claimed that the life and environment of the locals have changed as enterprise investments in solar power plants have changed the value of the land and created many jobs for locals.

*(Reference: Nhân Dân, “Central Highland provinces enhance development of renewable energy,” 25 Jul. 2019)*

### The first floating solar power project in the Philippines is under testing

- The first 200kW floating solar power project in Philippines developed by SN Aboitiz Power (SNAP), a renewable energy company in the Philippines, started its 10 month testing period.
- The solar power project installed in Magat dam is being tested to see its validity in commercial expansion, and it will have to endure a 10 month stress test under harsh conditions.

○ Currently, SNAP is producing 360-380 MW of electricity every year through Magat hydropower plant.

○ The Secretary of Department of Energy claimed that energy security is needed for the development of the country and indicated that the potential of the new floating solar power can partially satisfy that demand.



※출처: PNA

○ The National Irrigation Administration chief explained that the Philippines has about 350 dams, and thus expects that power production from floating solar power plants will contribute more to national power production rather than converting land into solar fields.

*(References: PNA "Firm pilots 200KW floating solar power in Magat Dam," 27. Jun. 2019.: Eco-Business, "Filipino firm pilots 200-KW floating solar power in Magat Dam," 1 Aug. 2019)*

## Project for sorting municipal solid waste using robots and AIs in Spain

○ The European Institute of Innovation and Technology Climate- Knowledge and Innovation Community (EIT Climate-KIC), in cooperation with Spain's Ferrovial and a startup called Zen Robotics, developed a technology that uses Artificial Intelligence (AI) and robotics to facilitate the accurate and speedy categorization of solid waste in the area.

○ According to the regulations passed by the European Parliament, all municipalities in Europe are required to recycle 55% of their waste. In 2016, Spain's waste recycling rate did not even reach 30%, thus the effort to increase recycling rates has been becoming gradually urgent.

○ Recycled waste is gradually becoming automatic, but the task to recover and sort valuable materials is still happening manually. The workers who recover valuable material are under

risk of direct exposure to waste and bodily harm caused by repetitive movements.

- The Zen Robotics Recycler robot is equipped with multiple sensors that observe the flow of waste. When the AI identifies desired materials, Grippers – industrial robotic arms – quickly and accurately pick out these materials.



※출처: EIT Climate-KIC

- The technology of ZenRobotics was tested on construction and demolition waste sorting. The Gripper managed to pick desired materials 2000 times per hour with purity rates of 98%.
- If the test result supported by the EIT Climate-KIC proves to be successful, the technology could be used for bigger and more diverse waste, leading to increased collection of recyclables.  
(참고: EIT, “*EIT Climate-KIC supported initiative: revolutionising municipal waste with AI*,” 17 Jul./ 2019.)

## Looking for ways to recycle decommissioned wind turbine blades in EU

- WindEurope, a European Wind Power Company, made a cross-sector platform to recycle wind turbine blades with the European Chemical Industry Council (ECIC) and the European Composites Industry Association (EUCIA).
- Since the beginning of wind power in Europe, the first generation of wind turbines are now coming to the end of their functional life. The recycling of these first-generation blades is becoming a top priority task. Consequently, WindEurope is looking for the most effective recycling method by cooperating and chemical and compositors industries.
- In 2018, wind energy supplied 14% of the EU’s electricity with 130,000 turbines under operation. In order to make the blades with lighter and longer-living material, blades are being

made through composite material. Currently 2.5 million tons of composite material are being used in the wind power sector.

- Five years in the future, approximately 12,000 wind turbines are predicted to be dismantled and there is a need for a variety of measures to recycle these turbines.
- The Director General of Cefic declared that Cefic is looking forward to lead innovation through research on blade recycling in cooperation with other industries.
- The president of EUCIA explained that the wind power blades were products at the forefront compositors sector and claimed that the industry will research with other sectors in order to realize sustainable energy production.
- WindEurope emphasized that the experiences of wind turbine recycling will act as an exemplary case for other markets to proliferate the sustainability of composites.

*(Reference: New Europe, "Wind and chemical industry team up to advance turbine blades recycling," 4 Jul. 2019)*

### Increase the scale of renewable energy in the first half of 2019 in Korea

- The Korean Ministry of Trade, Industry, and Energy announced that 1.6GW of renewable energy units newly installed in the first half of 2019.
- Solar power and wind power spearheaded the renewable energy proliferation as the scale of their installations increased 52% compared to the scale last year and covered 92.6% of the total renewable energy supply for the first half of the year.
- On the other hand, the scale of newly installed bioenergy and waste-to-energy has reduced 94MW (85.4% reduction) and 21MW (36.9% reduction) respectively compared to last year's scale. This was due to the influence of REC weight reduction that was implemented last year.
- In the first half of this year, the localization rate of photovoltaic modules increased significantly compared to rates of the first half of last year (61.5%) and reached 79.8%. The rate for wind

power turbines also increased to 59.8% compared to the rates of 2018, 39.2%.

- After assessing the government's 'Renewable Energy 3020 Implementation Plan' as a positive signal to the market, the Korea New & Renewable Energy association demanded that measures supporting renewable energy industry be strengthened in the future.

*(Reference: 산업통상자원부, "상반기 태양광 풍력 보급, 지난해 대비 52% 증가," 17 Jul. 2019.)*

### Japanese Consortium devised for the development of electric tanker

- Japan's Asahi Tanker, Exeno Yamamizu, MOL, and Mitsubishi Corporation made a consortium in order to provide new infrastructure services for building electrically powered vessels.
- The corporations established a new company called 'e5 Lab' with the aim to develop new clean, zero-emission transportation systems.
- The company, established by the technologies and know-hows of its 4 shareholders, is expected to serve as a platform to provide cutting-edge technological development services using the advantages of electrically powered vessels.
- The first goal of the e5 Lab is to build the world's first zero-emission tanker by 2021, and the large-capacity battery powered tanker is to be operated in Tokyo Bay.
- Moreover, e5 Lab will actively pursue the electrification of marine and coastal ships and share technology, human-power, and operational know-how required to achieve the 50% GHG reduction target of the International Maritime Organization (IMO)
- The company also plans to develop a vessel communication system to improve working environment and develop sophisticated sensor technologies to improve the vessel operation and management, reinforcing safety on aging vessels.

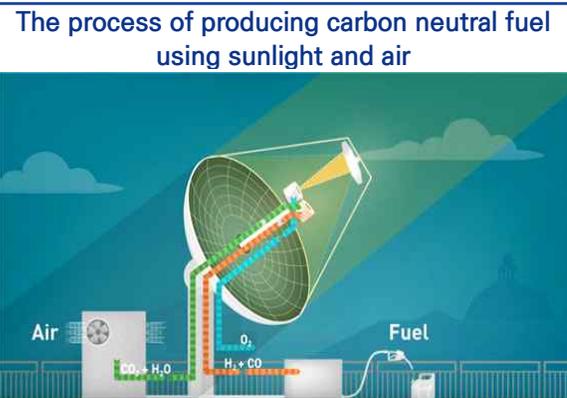
*(Reference: Safety4sea, "Japanese consortium to develop first fully electric tanker," 7 Aug. 2019)*

### III Technology

#### New technology that turns sunlight and air into hydrocarbon fuels in Swiss

- A research team from ETH Zurich in Switzerland developed technology that produces liquid hydrocarbon fuel from sunlight and air, demonstrating thermochemical process chain under real field conditions.
- The mini-refinery installed on the rooftop of the laboratory produces 1 deciliter of fuel per day. A larger scaled refinery is to be tested near Madrid, Spain.
- The researchers predicted that theoretically a plant the size of 1km<sup>2</sup> would produce 20,000 liters of kerosene.

- The process of fuel production by the mini-refinery starts off with extracting carbon dioxide and water from the ambient air, then splitting water and carbon dioxide through solar power, and finally liquidizing the carbon dioxide and water into hydrocarbon through an absorption and desorption processes



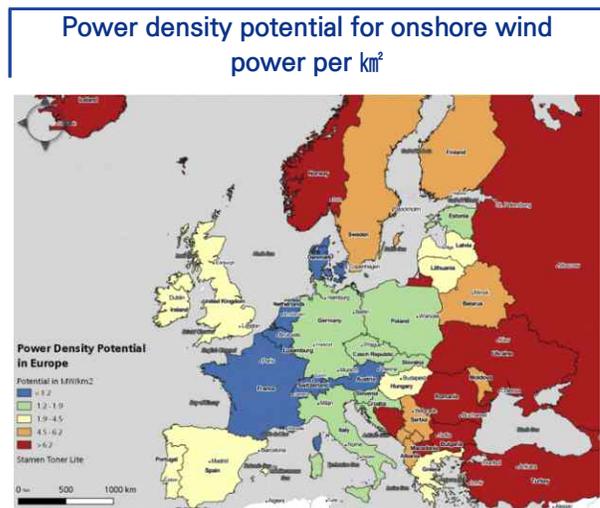
※ Source: ETH Zürich, You Tube

- The important aspect of this process is increasing the temperature of the solar reactor- made of cerium oxide - up to 1,500 degrees and splitting water and oxygen into synthesis gas through a process called the Redox Cycle. The liquid hydrogen and carbon monoxide mixture then can get transformed into liquid hydrocarbon fuels through conventional methanol or Fischer-Tropsch synthesis.

(Reference: ETH Zürich, “Carbon-neutral fuel made from sunlight and air,” 13 Jun. 2019))

## Research on onshore wind power development capacity in Europe

- The University of Sussex in England and Aarhus University in Denmark published a study that claimed Europe's wind power development capacity is 100 times the current production capacity.
- By analyzing all the places that onshore wind farms can be built, the study elucidated that onshore wind power can supply a sufficient amount of energy for global use by 2050.
- If all potential onshore wind farm areas are built, then 52.5TW of energy can be produced. This means there would be 1MW of energy for every 16 European citizens.
- The Professor Sovacool from University of Sussex explained that the study is not a blueprint for development, but a guide for policy- making on the potential of onshore wind power.
- The research team from Aarhus explained that even if the current wind power turbine technology does not develop for the next 10 years, it is possible to convert Europe to 100% renewable energy grid.



※ Source: University of Sussex

*(References: University of Sussex, "Wind it up: Europe has the untapped onshore capacity to meet global energy demand," 14 Aug. 2019.; Engineer, "Study shows huge potential of Europe's onshore wind," 15 Aug. 2019.)*

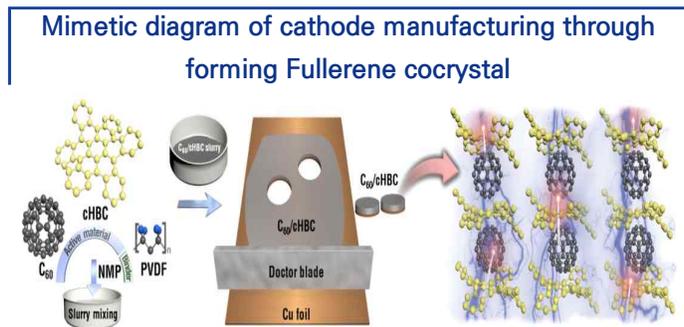
## Korean researchers develop new cathode material for lithium-ion batteries

- The research team from the Korea Institute of Science and Technology (KIST) and the Ulsan

National Institute of Science and Technology (UNIST) announced that they have developed a cathode for lithium batteries by synthesizing highly conductive organic semiconductors

- Lithium-ion secondary batteries conventionally use graphite as the cathode, but this brings forth disadvantages such as small intervals and long ion diffusion distances, ultimately curtailing the performance and life of the battery.
- The research team improved the low conductivity of the standard semiconductor cathode by forming a Cocrystal with the ball-shaped organic semiconductor Fullerene and a glove shaped material called Hexabenzocoronene to catch the ball. The team also mentioned it reduced manufacturing costs - as the new technology does not require mixing other conductors - and increased battery life to be some of the advantages.

- The KIST research team elucidated the importance of this discovery as the cocrystal material does not only solve the conductivity problem of current organic semiconductors, but also can be used in future research and development of sodium batteries, the secondary batteries of the next generation.



※ Source: KIST

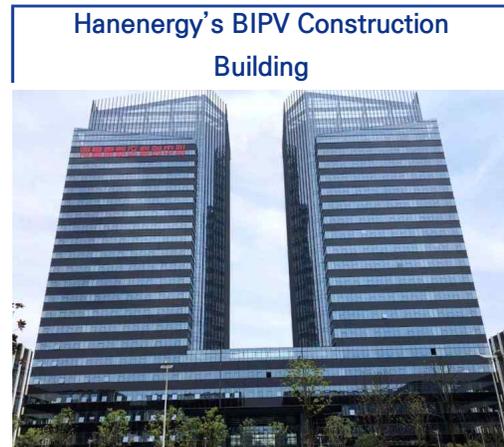
(Reference: KIST, “리튬 배터리의 수명 향상 해법 찾았다. 첨가제가 필요 없는 음극(-) 신소재 개발,” 9 Jul. 2019.)

### Chinese Hanenergy succeeds in install PV modules on the wall of building

- Hanenergy, a renewable energy company in China, announced that it completed its HanWall project, which wraps the outer walls of a building with building integrated photovoltaic (BIPV) products.
- The new HanWall project at China Pharmaceutical International Innovation Park is the biggest

photovoltaic glass curtain in Nanchang city as it reaches 6,000m<sup>2</sup>.

- Each 1,200mm X 1,130mm module in the newly installed HanWall has the capacity of 100W. The total 4,600 of electric production unit amounts to a total production capacity of 460kW.
- The BIPV system of Hanenergy is not only capable of electrical production, but it can also decrease indoor temperatures as it reduces solar radiation. This subsequently leads to lower energy consumption, reduced gas emissions, and less light pollution.
- The BIPV products from Hanenergy include HanWall, HanTile, and HanBrick, and they show excellent performance in environments with low sunlight and high temperatures. These products also allow options in terms of color, size, and transparency.
- Hanenergy is currently constructing the BIPV on an 18 floor, 85m high building in Heyuan, Guangdong Province. The solar curtain wall of this building will be 2,823.67m<sup>2</sup> wide and produce 210,000 kWh of energy which is equivalent to the environmental impact of planting over 10,000 trees



※ Source: Hanenergy

(References: Hanenergy, “发电绿建新成果：6000平米汉能汉墙成就全国最大光伏发电玻璃幕墙” 4 Jul. 2019.: Utilities, “Hanergy Completes China’s Biggest Photovoltaic Glass Curtain Wall Project,” 10 Jul. 2019)