

## IICEC Webinar on Energy and Climate Relations Held with Broad Participation



Güler Sabancı

“Energy and climate topics have long been a special priority for us.”

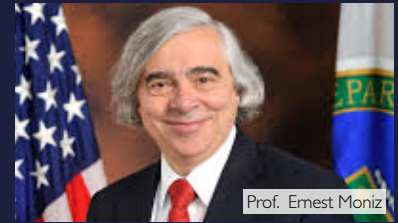
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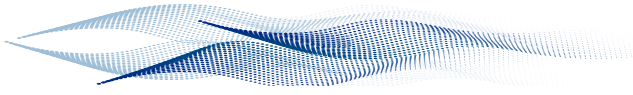
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## IICEC Webinar on Energy and Climate Relations Held with Broad Participation

IICEC's 6th online event within its webinar series entitled "A New Era in Global Energy and Climate Policies: What is Next with the New U.S. Administration?"<sup>1</sup> was held on February 23 with a large audience (around 2000) from a wide range of stakeholders. Moderated by

Prof. Fuat Keyman, Vice President of Sabancı University, the webinar hosted Güler Sabancı, Founding Chair of Sabancı University Board of Trustees, Dr. Fatih Birol, Executive Director of the International Energy Agency (IEA) and Prof. Ernest J. Moniz, 13th U.S. Secretary of Energy

(under the Obama Administration) at the opening session, followed by a business panel hosting three high-level sector representatives: Ahmet Erdem, Country Chair of Shell Turkey, Erkan Kafadar, CEO of Borusan Holding, and Kıvanç Zaimler, President of the Energy Working Group of TÜSİAD.

### Güler Sabancı: "Energy and climate topics have long been a special priority for us."

Güler Sabancı said that energy and climate were among special and priority interests of Sabancı University, which was why IICEC was established 10 years ago to act as a common platform for policymakers, the industry and academia to take consistent steps towards a better future. Reminding IICEC's work in a "Triangle of Success" with policymakers, the industry and academics to launch the Turkey Energy Outlook report, Güler Sabancı said: "This report met a crucial need in the Turkish energy sector and became a work of reference for all stakeholders. I am delighted to see IICEC grow and gain influence. Another ambitious project by IICEC this year will be the Turkey Electric Vehicles Outlook. The report, planned to be launched in this fall, will provide a comprehensive analytical perspective into electric vehicles and the e-mobility ecosystem and growth potential in Turkey."

Güler Sabancı thanked Prof. Moniz, Dr. Fatih Birol, Prof. Keyman and all speakers joining the Webinar: "I owe personal thanks to Secretary Moniz, who is with us here today, for inviting me to the forward-looking MIT Energy Initiative founded under his distinguished academic leadership. His tenure as US Secretary of Energy in the Obama Administration was illustrious: has had extraordinary success in propagating clean energy, science, innovation and technology, while also earning strategic wins. I would like to thank Secretary Moniz for his support in Sabancı University and IICEC,



Güler Sabancı

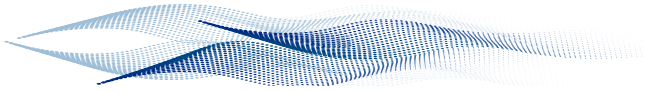
and for joining us from the United States at a very early time for him to avail us of his extraordinary wisdom and observations on a critical subject that is high on the agenda of the new US administration."

Güler Sabancı emphasized the leading role that the IEA has been playing under the Directorship of Dr. Birol including the transformation to clean energy across the world, continuing, "Just recently, Dr. Birol announced the first comprehensive roadmap that the International Energy Agency would prepare for the global energy industry to show the path to achieving net zero emissions by 2050. This special IICEC webinar is doubly important because it comes right after Dr. Fatih Birol's address to the US Senate's Energy and Natural Resources Commission."

**”** Just recently, Dr. Birol announced the first comprehensive roadmap that the International Energy Agency would prepare for the global energy industry to show the path to achieving net zero emissions by 2050.

**Güler Sabancı** **”**

<sup>1</sup> <https://www.youtube.com/watch?v=98NYNK2JcDU&feature=youtu.be>



## Dr. Fatih Birol: "We need a global solution, as CO<sub>2</sub> emissions don't have a passport."

Following Sabanci's opening speech, Dr. Fatih Birol, IEA's Executive Director, made his keynote address with great reflections on the energy-climate interrelations and how the world should address the climate change problem with a global perspective. Underlining energy and climate change are very closely interlinked, Birol touched upon three major points:

- Firstly, the energy sector has a critical role in global CO<sub>2</sub> emissions causing climate change. More than 80% of the global emissions originate from three fossil fuels, namely coal, oil, and gas.
- Secondly, the problem needs deep global cooperation rather than individual national efforts. CO<sub>2</sub> emissions do not have a passport. It affects everybody regardless of wherever it comes from. Therefore, we have to find a global solution.
- Thirdly, people sometimes confuse their positioning against CO<sub>2</sub> emissions and the energy sector in general. We are not against energy, we are against the emissions. Therefore, we should not put these two things into the same basket.

Emphasizing that the destructive impact of climate change would be several times worse than Covid-19, Dr. Fatih Birol said: "There are promising developments such as renewable energy. Many countries including Turkey have advanced greatly in this area. A lot of countries put special incentives for clean energy in their economic packages. However, countries doing a good job is not enough to solve the problem. We need to come up with a global solution."

"It's still difficult to say that we are on the right track." Dr. Birol underlined, but added that there are three reasons which make him optimistic about finding a solution to climate change:

- Various governments' determination towards climate change targets,
- Large-scale incentives for clean energy technologies in recent multi-trillion economic recovery packages,



Dr.Fatih Birol

- And, growing momentum under the U.S. leadership towards COP26 meeting to be held in November in Glasgow.

### Dr. Fatih Birol: "The magic word is innovation."

Mentioning IEA's "Net Zero Summit" to be held in March as the preparation phase of the COP26 and upcoming IEA Roadmap Report to be released in May, Dr. Birol emphasized the importance of technology and innovation: "In order to reach the target of net-zero emissions by 2050, about half of the emission reductions need to come from the technologies which are not in the market today."

### "Turkey will definitely be affected by the global wave."

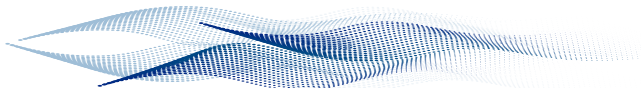
Placing special emphasis on electric vehicles as a means to reduce worldwide emissions to net-zero, Dr. Birol said: "Electric vehicles are garnering attention in Turkey, but it is not there yet. Turkey took important steps with TOGG, but the Turkish automotive industry needs to think about what more it can do about the electric vehicle revolution."

*"The magic word in the relationship between energy and climate is innovation. We need extensive, comprehensive innovation to bring all the required technologies to the market. It is impossible for this tidal wave not to hit Turkey. The industry needs to take lessons from developments around the world. We need to read the game in real-time, and prepare our economy and energy industry accordingly."*



Dr. Fatih Birol





A week after IICEC's 6th webinar, IEA's press release as of 2 March 2021, carries the warning that global CO<sub>2</sub> emissions have rebounded strongly towards the end of 2020, after a steep drop in the beginning of the year. Global energy-related CO<sub>2</sub> emissions were 2% higher in December 2020 than in the same month of 2019.<sup>2</sup>

“The rebound in global carbon emissions toward the end of last year is a stark warning that not enough is being done to accelerate clean energy transitions worldwide. If governments do not move quickly with the right energy policies, this could put at risk the world's historic opportunity to make 2019 the definitive peak in global emissions.”

“In March 2020, the IEA urged governments to put clean energy at the heart of their economic stimulus plans to ensure a sustainable recovery. But our numbers show we are returning to carbon-intensive business-as-usual. This year is pivotal for international climate action – and it began with high hopes – but these latest numbers are a sharp reminder of the immense challenge we face in rapidly transforming the global energy system.”<sup>3</sup>

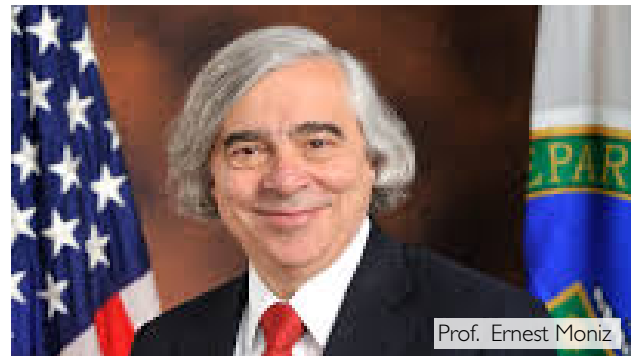


Dr. Fatih Birol

## Prof. Moniz: “Next 10 months ahead of the COP26 will be very exciting.”

Following Dr. Birol's keynote speech, Prof. Ernest J. Moniz<sup>4</sup>, who served as the 13th U.S. Secretary of Energy under the Obama Administration from 2013 to January 2017 and currently serving as the Cecil and Ida Green Professor of Physics and Engineering Systems Emeritus at the MIT (Massachusetts Institute of Technology) Energy Initiative and Special Advisor to the MIT President, made a speech on energy and climate priorities of the new U.S. administration.

Pointing out the appointment of the former Secretary of State John Kerry by President Joe Biden as the Special Presidential Envoy for Climate as a strong signal in return of the country to climate issues, Prof. Moniz referred to the importance of settling upon country's Nationally Determined Contributions (NDCs) for the



Prof. Ernest Moniz

pathway to COP26 in Glasgow.

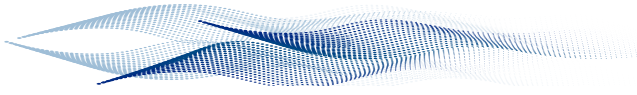
Prof. Moniz also listed some actions that would have a major effect on the return of the U.S. to the global climate debate.

- A series of climate-related legislation needs to roll back from the Trump Administration.
- Obama-era vehicle emission standards should

<sup>2</sup> <https://www.iea.org/news/after-steep-drop-in-early-2020-global-carbon-dioxide-emissions-have-rebounded-strongly>

<sup>3</sup> Ibid.

<sup>4</sup> Prof. Moniz also is the President and CEO of the Energy Futures Initiative (EFI). <https://energyfuturesinitiative.org/about>



be re-adopted in order to accelerate the U.S. automotive industry's ongoing innovation efforts on EVs.

●The Biden Administration is committing to re-examining, re-instituting, and using what is called 'the social cost of carbon'. This is not an easy thing to compute. What it represents is the

net present value of the impact of a ton of CO<sub>2</sub> in the future.

●The new Administration's regulatory changes would have an impact on financial regulatory agencies as well as corporate board rooms in terms of acknowledging climate risks.

*Saying that the new US administration would implement an extensive policy in climate change and clean energy technologies, Prof. Moniz stated, "This fight is decisive for reaching the net-zero emission target. It is a crucial action. Everyone in the Biden Administration has joined forces to make this a reality."*

**Prof. Ernest Moniz**



Although Prof. Moniz said that he expects these four areas would be open to trigger partisan debates, he underlined there would still be strong bipartisan support in the Congress for innovation programs that would create markets to have clean energy technologies faster while also enhancing infrastructure development projects, particularly in light of the recent Texas experience: "Texas situation, unfortunately, gave an obvious lesson about the clash between the realism of the climate change and an outdated infrastructure."

Prof. Moniz also reminded the "Mission Innovation", which was founded during the Paris COP21 Summit, and added, "The challenges are two-fold: to create common practices within the European Union to impose carbon border tax and to sustain the consensus between the U.S. and China on climate change issues despite growing geopolitical tensions." Saying that the path to the Glasgow COP26 climate conference in November will be an exciting one, Prof. Moniz emphasized that net negative emissions must be achieved within the century.

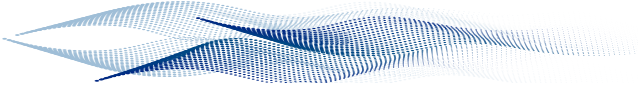
## Business Perspectives :

### **Ahmet Erdem: "All industries, all countries will progress at their own pace, but we must act quickly."**

Shell Turkey Country Chair Ahmet Erdem said that Shell's approach to energy transformation was clear, and that they had drawn the roadmap to reach the zero-emission target. Stating that they intended to supply more clean energy to the world, Ahmet Erdem continued, "The energy system will transform one way or another - the question is when. All industries, all countries will progress at their own pace, but we must act quickly. All countries must do this. All companies and institutions must envision shared roadmaps that will lead to zero emissions. We need predictable policies in areas that require long-term investment.



Key stakeholders must act in unison to achieve net zero emission." Along with the transformation in upstream activities, Erdem also underlined that the CCS (Carbon Capture and Storage) would play a key role in Shell's policy. Sharing Shell's plans to invest in electric charging stations globally, Erdem also referred to the role of hydrogen production.



## Erkan Kafadar: "If we cannot reach green funding, we may be out of this game."

Borusan Holding CEO Erkan Kafadar noted the importance of the automotive industry as Turkey's leading export sector saying: "We all need to work together to transform the internal combustion engine industry. It is crucial that we create a shared definition of transformation along the industry, government and university. This transformation must be supported with a network of charging stations and electricity distribution." Kafadar emphasized the need for transformation in the energy industry and other high carbon emitting sectors. "There will be a general need



Erkan Kafadar

for financing to undertake transformation. We should have access to low-interest, long-term eco funding programs offered by Europe. Eco funding is what will support technology and innovation. If we cannot reach green funding, we may be out of this game."

## Kıvanç Zaimler: "Climate and technology are at the core of energy transformation."

TÜSİAD Energy Working Group Chair Kıvanç Zaimler stated their objective at the TÜSİAD Energy Working Group was to develop competitive, innovative, environmentally compatible, specific and actionable recommendations to support sustainable growth in energy. "The transformation and development of the energy sector in Turkey and the world goes on at a rapid pace. The energy ecosystem is growing. As the transformation occurs, we need to consider all aspects of it together: the consumer, innovation, and environment. As megatrends quicken the pace of transformation with climate and technology, the notion of sustainability rises to the foreground. Climate and technology are at the core of energy transformation, which started with three Ds: decarbonization, digitalization, and



Kıvanç Zaimler

distributed energy. In the TÜSİAD working group, we support this transformation under four subjects that we communicate. First is efficient growth. Second is renewable transformation. Third is technology and fourth is consumer. We strive to support a secure and sound transformation". Zaimler also emphasized the importance of renewable energy support mechanism among the key issues that would reduce the power generation costs in the long run as all consumers ask for more predictability in the market.

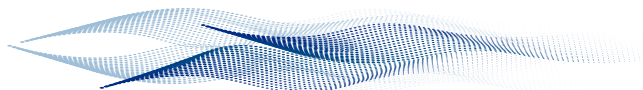
Prof. Keyman noted the importance of global developments in energy-climate relations and drew attention to very important changes such as emission trading system, carbon taxing, the incoming EV revolution, and emphasized the importance of the road to Glasgow. Prof. Keyman has also laid stress on the dynamics of the energy sector in Turkey and underlined how energy and climate relations would affect the energy sector in Turkey.

Please click [here](#) to watch the webinar.



Prof. Fuat Keyman





## The Resilience of the Electric-Car Market in 2020

The global electric vehicle fleet grew considerably over the last decade, mainly underpinned by supportive policies and technological advances. Backed by existing policy support and additional stimulus measures, the global stock of electric passenger cars continued to increase at a rapid pace in 2020 despite the negative consequences of the Covid-19 pandemic on the automotive industry, personal travel, and mobility.

A recently released IEA Commentary on electric vehicles (EV) provides an overview of global electric car sales throughout 2020 together with regional drivers and developments in major markets. Global electric car sales reached over 3 million making a record-year in EV penetration with over 40% annual growth (Figure 1).<sup>5</sup>

China and Europe have been the major engines of growth in 2020. Europe demonstrated the fastest annual growth in sales (55%) while China remained the leading market in EV deployment with 12% growth. Electric car sales represented 10% of total car sales in Europe and 5% in China. The electric car sales in the U.S were also higher than in 2019 (4%) despite the lack of any EV-oriented stimulus measures at the federal level and in an overall car market that plummeted by 15%.

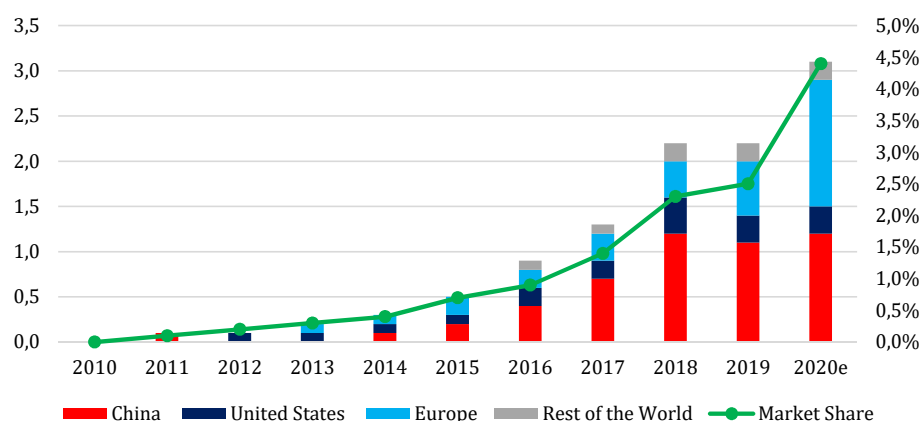
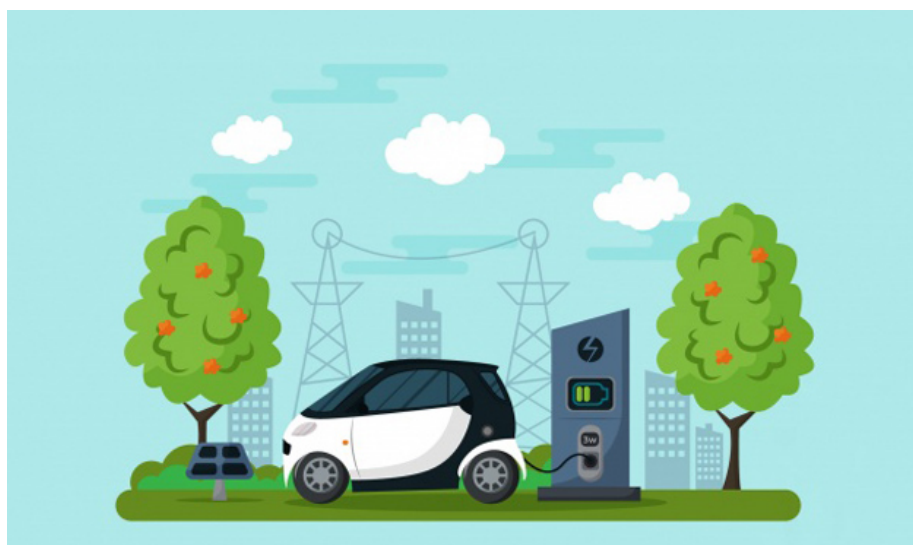


Figure 1: Global Electric Car Sales by Key Markets and Global Market Share (2010-2020e, millions and %)

Source: IEA, 2020

### Impact of Covid-19

The outbreak of the Covid-19 pandemic caused a drastic drop in electric car sales over the first half of 2020 with average global electric car sales 15% down over the same period in 2019. During the period of strict lockdown measures, both manufacturing facilities and supply chains were significantly impacted. These measures also impacted personal travel and mobility activity. However, with a partial lifting of the measures in the second half of the year, market trends started to change dramatically.

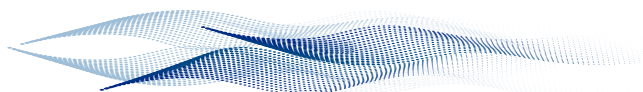
### EV-oriented policy measures combined with stimulus packages supported growth

There were early signs of electric vehicle market resilience in 2020 as a result of technological advances and enhancing policy support. The continuous decline in battery costs supported the wider growth of EVs across major markets. Governments had started to introduce several policies that are supportive of the wider electrification of transport.

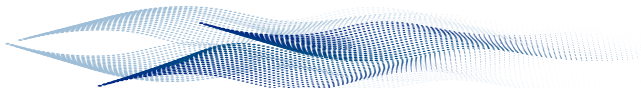
These policies take a variety of forms including national greenhouse gas reduction targets, fuel efficiency and emission targets across the transport sector, EV stock, and sales-related targets enabling charging infrastructure regulations as well as deployment support. Additional policies implemented during 2020 combined with Covid-19 stimulus measures, primarily in the form of financial incentives for car purchases, provided a significant boost to the EV market.

<sup>5</sup> <https://www.iea.org/commentaries/how-global-electric-car-sales-defied-covid-19-in-2020>





	Major EV policies in place or implemented from January 2020	Stimulus policies announced as a response to the Covid-19 crisis
<b>European Union</b>	CO <sub>2</sub> emission standard for cars with corporate average target of 95 g CO <sub>2</sub> /km for 2020-2021 (plus tighter targets in 2025 and 2030).	EUR 750 billion as part of Next Generation EU and recovery plan for Europe, including 37% funds towards climate change mitigation.
<b>China</b>	New energy vehicle (NEV) mandate: 12% credit target (with annual tightening until 2023).	Full NEV subsidy programme phase-out postponed from end of 2020 to end of 2022 (from April 2020, NEV subsidy reduction of 10% from 2019-2020, and an additional 20% reduction in 2021).
	NEV subsidy reduction of approximately 50% from 2018 (CNY 16 200-22 500 BEV / CNY 8 500 PHEV).	Relaxation of car permit quotas in a number of cities.
<b>United States</b>	Corporate average fuel economy (CAFE) standard of around 38.5 mpg in 2020	
	Maximum number of federal purchase tax credits (up to USD 7 500 for BEVs) reached in 2019 for a number of key automakers.	
<b>France</b>	Purchase subsidy EUR 6 000 for cars emitting 2/km.	Maximum BEV purchase subsidy increased to EUR 7 000.
	Cash-for-clunker scheme up to EUR 2 500, subject to revenue conditions.	New PHEV purchase subsidy of EUR 2 000.
	Charging infrastructure deployment target of 100 000 publicly accessible chargers by the end of 2022.	Cash-for-clunker scheme increased for first 200 000 vehicles to EUR 5 000 for the purchase of an EV, and to EUR 3 000 for other cars, and revenue conditions relaxed. (June to December 2020; to be continued under tighter conditions in 2021).
		Charging infrastructure deployment target advanced to end of 2021.
<b>Italy</b>	(since 2019) Purchase subsidy EUR 4 000-6 000 for cars emitting < 20 g CO <sub>2</sub> /km / EUR 1 500-2 500 for cars emitting 21-60 g CO <sub>2</sub> /km.	Additional EUR 2 000 (EUR 4 000 with scrappage) purchase subsidy for cars emitting 2/km.
		Up to EUR 1 750 (EUR 3 500 with scrappage) purchase subsidy for other cars. (initially August to December 2020, and extended to 2021).
<b>Germany</b>	(from 2020) Purchase subsidy EUR 6 000 (BEV) / EUR 4 500 (PHEV).	Purchase subsidy EUR 9 000 (BEV) / EUR 6 750 (PHEV) (June 2020 to end 2021, and gradual phase-out until 2025).
		General VAT rate decrease from 19% to 16% (July to December 2020).
		All petrol stations to provide charging infrastructure.
		No subsidies to conventional cars in the support package to the automotive sector.
<b>United Kingdom</b>	Maximum purchase subsidy GBP 3 500 (BEV and PHEV 2/km and with range conditions).	Maximum purchase subsidy GBP 3 000 (BEV and PHEV 2/km and with range conditions).
		(from March 2020, with scheme extended to 2022-2023).
<b>California</b>	Up to USD 7 000 purchase subsidy, subject to revenue conditions	USD 1.5 billion towards the purchase of electric or hydrogen vehicles equipment, plus USD 300 million towards infrastructure in proposed 2021 State budget, and all cars to be zero-emission by 2035.



A notable example in the instrumentality of policy measures was Europe, as 2020 was an important year for emissions standards, among several other policy drivers. Four major markets in Europe (France, Italy, Germany, and the United Kingdom) had significantly higher electric car sales in the second half of 2020 in comparison to 2019. The enthusiasm of electric car buyers, in particular for affluent households, also provided a fertile ground for stronger EV uptake. Monthly sales

of electric cars showed increased growth each month during the second half of the year in all major markets including China, the European Union, the United States, India, Korea, and the United Kingdom, despite second waves of the Covid-19 pandemic.

Despite all these promising developments throughout 2020, as stated in another IEA commentary on the global car market, the share of electric vehicles in total car sales remains at only one-tenth of conventional SUV sales<sup>6</sup>. However,

this pattern would significantly alter. Several countries have already announced the full phase-out of internal combustion vehicles over the next decades. Stronger innovation together with technological advances along the e-mobility ecosystem could enable faster uptake of EVs. Especially with increasing commitments to achieving net-zero emissions, EV uptake is expected to achieve a rapidly accelerated global growth to support a more secure and clean energy future.



Prof. Ernest Moniz

At the IICEC's 6th online event within its webinar series entitled "A New Era in Global Energy and Climate Policies: What is Next with the New U.S. Administration?" that was held on February 23, the former US Secretary of Energy Prof. Ernest J. Moniz emphasized the rapid growth of electric vehicles in the US, remarking "This growth is not only because we have an administration that encourages electric vehicles. The industry is leaping in bounds as well. So buckle up, because the electric vehicle revolution is about to take a turn into the fast lane."<sup>7</sup>

**Prof. Ernest Moniz**

**Dr. Fatih Birol:**  
**"One of two vehicles sold worldwide must be electric if we are to achieve net-zero emissions."**



Dr. Fatih Birol

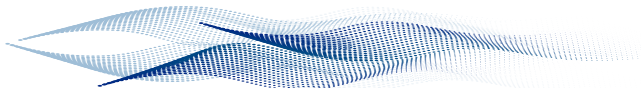
IEA Executive Director Dr. Fatih Birol stated the importance of innovation and clean energy solutions as a global approach to fighting climate change at IICEC's 6th webinar titled 'A New Era in Global Energy and Climate Policies: What is Next with the New U.S. Administration'<sup>8</sup>: "One of two vehicles sold must be electric if we are to achieve net-zero emissions. Right now, only three out of 100 vehicles sold are electric at best. Some countries have already banned the sale of conventional vehicles; others may soon follow suit."

**Dr. Fatih Birol**

<sup>6</sup> <https://www.iea.org/commentaries/carbon-emissions-fell-across-all-sectors-in-2020-except-for-one-suvs>

<sup>7</sup> <https://www.youtube.com/watch?v=98NYNK2JcDU&feature=youtu.be>

<sup>8</sup> Ibid.



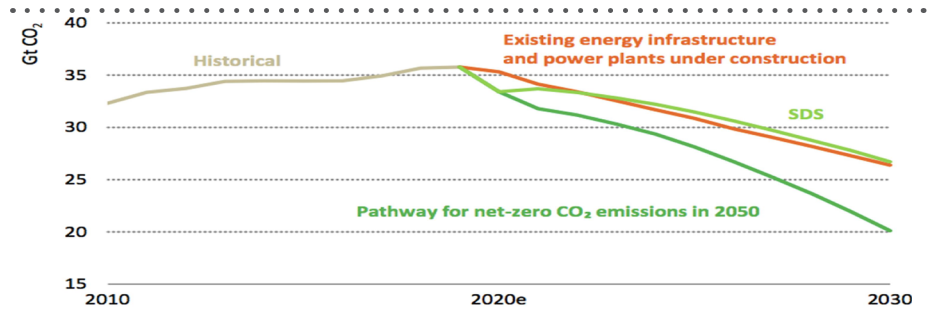
# Climate Impacts on the Energy System

Adaptation and Mitigation composed the two key elements of the Paris Agreement. The mitigation target of the Agreement is specified as: "Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change"<sup>9</sup>. According to IEA WEO 2020, with today's existing energy infrastructure in use and power plants under construction, if operated as per past practices, temperature rise is locked with 1.65°C (Figure 2).

This finding of the WEO 2020, by taking an x-ray of the existing and under construction carbon-emitting structures, reveals the fact that there is very little room from 1.65 °C to 2°C. Dr. Fatih Birol had pointed that the chances of below 2°C were getting slimmer and slimmer at previous years' **IICEC Annual International Energy and Climate Forums** <sup>10</sup> and stated that "Countries have achieved their Paris Convention objectives in general, and have even exceeded them in certain circumstances, which is adequate to slow the CO<sub>2</sub> emissions related to global energy, but not enough to keep temperature change below 2°C... The path to 1.5°C is uncharted territory."<sup>11</sup>

**"Climate Change will have Increasing Impacts on Hydropower Generation in Latin America"**

The other key element is adaptation to the impacts of climate change. In a recent report, Climate Impacts on Latin American Hydropower<sup>12</sup>, IEA qualitatively assessed climate risks to Latin American hydropower and examined potential climate impacts quantitatively.



CO<sub>2</sub> emissions from existing energy infrastructure and power plants under construction could already lead to a long-term temperature rise of 1.65 °C

**Figure 2:** CO<sub>2</sub> emissions from energy infrastructure in use and power plants under construction operated in line with past practice.

Source: WEO2020

Climate change poses an increasing challenge to Latin American hydropower with rising temperatures, fluctuating rainfall patterns, melting glaciers, and increasing occurrence of extreme weather events. Climate Impacts on Latin American Hydropower, IEA

The total hydropower installed capacity in Latin America was 196 GW in 2019, of which 176 GW was from South America and the rest from Central America and Mexico.

The IEA report assesses climate impacts on over 86% of the hydropower installed capacity of Latin America, focusing on 13 countries with the largest hydropower installed capacity. The assessment is based on three different scenarios: "Below 2°C", "Below 3°C", and "Above 4°C". Each scenario represents a different level of greenhouse gas (GHG) concentration and a global average temperature increase outcome by 2100. The IEA report provides 4 main policy recommendations on how governments can contribute to enhancing the Climate Resilience of Latin American hydropower:

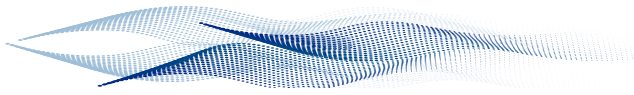
- Mainstream climate resilience as a core element of energy and climate policies.
- Mobilize investment in the modernization of aging hydropower plants.
- Build and strengthen climate risk insurance.
- Support scientific research to increase the accuracy of climate projections.

<sup>9</sup> United Nations Framework Convention on Climate Change, Paris Agreement, UNFCCC, Bonn (2015), pg.3

<sup>10</sup> <https://iicec.sabanciuniv.edu/content/international-center-energy-and-climate-forums>

<sup>11</sup> Keynote Presentation of the WEO 2016, <https://iicec.sabanciuniv.edu/content/world-energy-outlook-2016>

<sup>12</sup> <https://www.iea.org/reports/climate-impacts-on-latin-american-hydropower>



“Climate projections show an increased probability of extreme precipitation events such as heavy rainfall, floods, and droughts across the world, which will consequently increase risks to hydropower generation by altering water availability, increasing sediments, or making physical damages to assets. Some areas of Latin America are likely to experience more frequent extreme precipitation events, although there will be a significant spatial variation.” *Climate Impacts on Latin American Hydropower, IEA*

In the previous issue of the **IICEC Newsletter** (Issue:18)<sup>13</sup>, IICEC detailed key priorities and special projects of the IEA for 2021. The IEA is now preparing the world's first comprehensive roadmap for the energy sector to reach net-zero emissions by 2050. This report will set out in detail what is needed from all stakeholders to fully decarbonize the energy sector and put emissions on a pathway in line with limiting the temperature rise within 1.5°C.

IEA Executive Director Dr. Fatih Birol pointed out the impacts of climate change in several IICEC International Energy and Climate Forums<sup>14</sup> and stated that “We are seeing a very sharp increase in CO<sub>2</sub> emissions worldwide on one hand. On the other hand, we see an increasing number of extreme weather events. Normally, increasing CO<sub>2</sub> emissions and the increasing number of extreme weather events should put climate change higher in the policy agenda.”

At the IICEC's 6th online event within its webinar series entitled “A New Era in Global Energy and Climate Policies: What is Next with the New U.S. Administration?”<sup>15</sup> on 23 Feb 2021, in his keynote titled “Global Perspective,” IEA Executive Director Dr. Fatih Birol spoke about the leading dynamics,



Dr. Fatih Birol

opportunities and necessary steps in energy and climate worldwide. Dr. Fatih Birol noted that energy and climate change were closely related, continuing, “We cannot solve the climate problem before addressing issues in the energy industry. The energy industry is responsible for 80% of the emissions that cause climate change.”<sup>16</sup> Emphasizing that the destructive impact of climate change would be several times worse than COVID-19, Dr. Fatih Birol underlined the need for a global solution.

At the 6th IICEC Webinar former US Secretary of Energy Prof. Ernest J. Moniz noted that the US was rejoining the Paris Agreement under the Biden Administration, continuing, “We must fulfill our international commitment. We have April 22 Earth Day just ahead of us. We will take joint action to achieve the target of net-zero carbon before COP26 Glasgow.”



*Prof. Moniz said that the new US administration would implement an extensive policy in climate change and clean energy technologies, and set national commitments to fight climate change. “This fight is decisive for reaching the net-zero emission target. It is a crucial action. Everyone in the Biden Administration has joined forces to make this a reality. Great steps will be taken institutionally. Technology and innovation will receive ample support.”*

**Prof. Ernest Moniz**

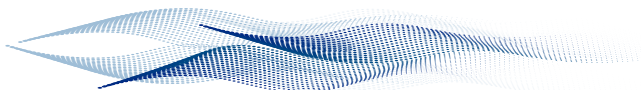
<sup>13</sup> [https://iicec.sabanciuniv.edu/sites/iicec.sabanciuniv.edu/files/iicec\\_energy\\_market\\_newsletter\\_issue\\_18.pdf](https://iicec.sabanciuniv.edu/sites/iicec.sabanciuniv.edu/files/iicec_energy_market_newsletter_issue_18.pdf)

<sup>14</sup> <https://iicec.sabanciuniv.edu/content/weos>

<sup>15</sup> <https://www.youtube.com/watch?v=98NYNK2JcDU&feature=youtu.be>

<sup>16</sup> Ibid.





# Korea Electricity Security Review



## Korea Electricity Security Review

A joint report with the Korea Energy Economics Institute



International Energy Agency

Strong electrification trends combined with increasingly more variable generation and demand patterns require a multi-faceted perspective to address electricity security. Korea Electricity Security Review<sup>17</sup>, written jointly by the International Energy Agency and the Korea Energy Economics Institute, provides an overview of the current conditions and future opportunities of Korea's power system with the view of ensuring electricity security and system flexibility to address these dynamics.

In light of the existing institutional and market structures, the study explains available options to maintain the country's current high level of electricity security, while integrating growing shares of solar PV and wind. More flexible generation, storage, demand-side flexibility, and enhanced grids are the key elements to support the secure growth of the power system. The report analyzes key aspects of operational security and long-term planning, both recognizing current progress in terms of grid and market code updates. The study proposes market design improvements that can be implemented within the

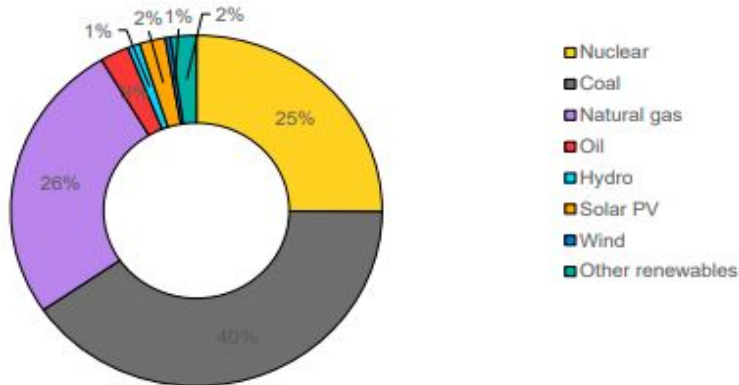
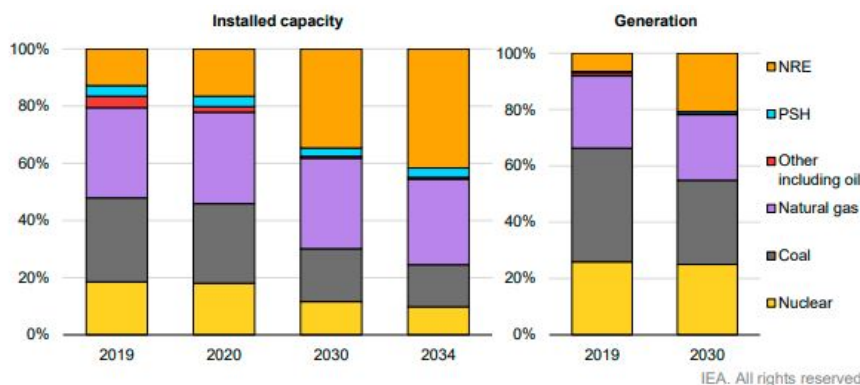


Figure 3: Share of Electricity Generation by Source in Korea (2019, %)

Source: IEA, 2021



Note: Korea uses new and renewable energy (NRE) for the classification of energy sources and national targets, which includes solar PV, wind, hydro, oceanic, bio/landfill gas, by-product, fuel cell and integrated gasification combined cycle energy sources. Solar PV and wind are the most prominent technologies in this group.

Figure 4: Evolution of Installed Capacity and Generation According to 9th BPLE

Source: IEA, 2021

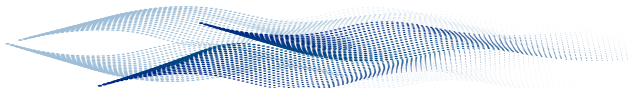
current framework through price formation mechanisms. These price mechanisms can be integrated with the existing emissions trading scheme. Suggesting that Korea has a history of a well-diversified and secure electric system, the report presents policy and operational recommendations to sustain and improve security in the power system.

Korea's total electricity generation was 581 TWh in 2019. Korea currently relies mainly on fossil fuels and nuclear power for electricity generation (Figure 3). Coal is the largest source with a 40% share, followed by natural gas (26%) and nuclear power (25%).

By contrast, renewables accounted for 6% of annual generation. Solar PV and wind supply only half of that amount despite the accelerated growth in these two technologies over the past five years.

Taking into consideration the ambitious goals set under the 9th Basic Plan for Long-term Electricity (BPLE), Korea plans to increase the share of New Renewable Energy (NRE) generation (hydro, oceanic, biogas, landfill gas, fuel cell, solar PV, and wind) to 20% in 2030 and up to 30-35% in 2040. The Plan forecasts a decrease in nuclear power generation until 2030 and a ban on new coal-fired generation.

<sup>17</sup> <https://www.iea.org/reports/korea-electricity-security-review>



### Flexibility

The increase in NRE generation will significantly alter the generation mix. The first outcome anticipated from the long-term objectives is a shift from dispatchable to non-dispatchable generation. From 2019 to 2030 the share of dispatchable generation is projected to decline from 94% to 79% (Figure 4). This shift in the power mix accompanies a sustained increase in electricity demand of 0.6%/yr. and a 1.1%/yr. growth in peak load. Moreover, attaining the Variable Renewable Energy (VRE) targets will bring about significant changes to the power system operation. Korea's power system will experience a strong increase in its flexibility requirements.

Several options are offered to meet Korea's increasing flexibility requirements. These include making use of flexibility in existing assets as well as deploying new and more flexible technologies. Operational guidelines and market rules could be updated to enable the flexible operation of coal and nuclear plants. Different storage technologies

could contribute to meeting Korea's increased flexibility requirements while realizing the connection between the technological ability and the value of various storage durations through a system-wide perspective. For example, battery storage provides a better case for very short-term to short-term flexibility while pumped storage hydro can serve requirements for longer durations. Power-to-gas technologies can also support longer-term flexibility requirements in the Korean power system. Demand-side flexibility should increase its role in serving the overall flexibility needs.

### Operational security

System-friendly deployment of VRE will be indispensable in ensuring the operational security of the power system. This includes assessing the technology mix among different VRE resources together with their spatial distribution. The Grid Code needs to be continuously reviewed and updated for addressing technological developments and emerging system requirements.

### Long-term planning

The report assesses long-term planning as an essential component to ensure adequacy and operational security with increasing penetration of VRE. One of the main developments improving electricity system planning is making use of multiple reliability indicators. Integrated resource planning will become an increasingly important tool for coordinating the development of the power system. Further developments can be achieved by integrating traditional generation and transmission planning with more advanced models.

### Market improvements

Improving electricity market design will be critical for maintaining and improving electricity security. This requires effective regulatory oversight to ensure competitive transparent, and flexible markets to meet changing needs of the overall power system landscape. Strengthening the link between the existing emissions trading scheme (ETS) mechanism and overall price formation in the wholesale market is one of the key recommendations of the report.

## Electricity system developments experienced in Korea show similar patterns to Turkey

The objectives for expansion and further diversification in power supply, largely through low carbon generation options, are projected to foster the sustainability of Turkey's growing electricity economy. **Turkey Energy Outlook** projects the most significant installed capacity growth in VRE: solar PV and wind. With its favorable resource base, supportive energy policy, and power market industry orientations, Turkey can achieve much faster growth in these technologies in the next 20 years compared to current trends. In TEO Scenarios, power generation from solar

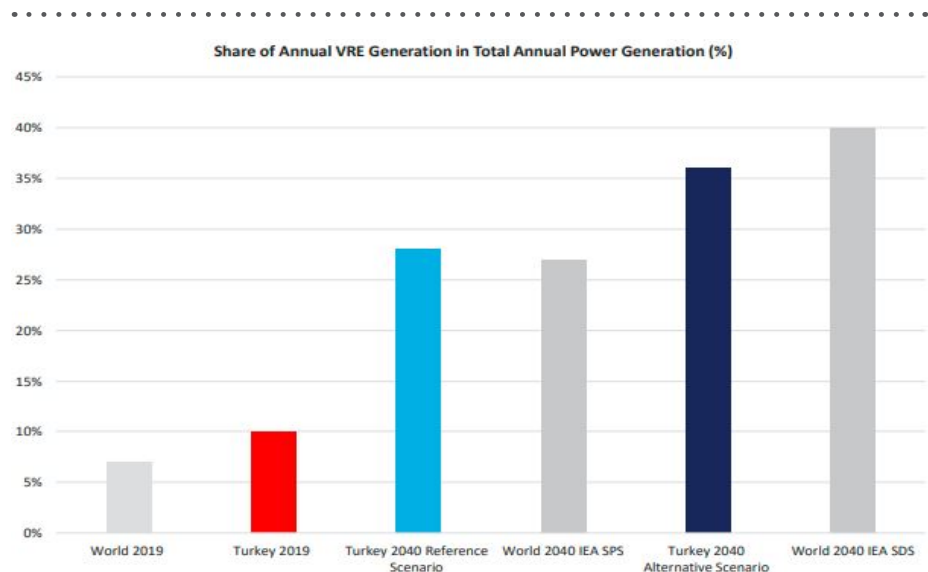
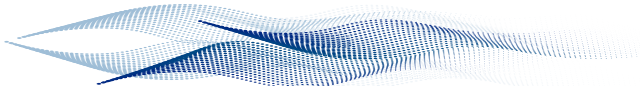


Figure 5: Share of Annual VRE Generation in Total Annual Power Generation (%)

Source: IICEC Turkey Energy Outlook, November 2020



PV increases by at least 7-fold and from wind by 4 to 5-fold until 2040. In the TEO Alternative Scenario, which reflects further development of a competitive power market and increased uptake of clean power technologies also benefitting from innovation and technology advancements, the share of VRE increases from 11% to 36% by 2040 (Figure 5).

The flexibility of the power sector is an important policy objective addressed in the TEO. Adding to security and reliability objectives, power system flexibility will become a major issue for the Turkish electricity economy with strong uptake in intermittent generation capacities and increasingly variable demand services. As Turkey moves toward further enhancing system flexibility in a cost-effective, reliable, and environmentally sound manner, complementing flexibility resources and tools

will be needed to ensure system-wide flexibility of its growing power system. A suite of solutions including utilization of efficient gas-fired generation, battery storage, and pumped storage hydro will be needed to manage increasingly variable generation and demand in a more flexible system structure. Smart grids and demand-side platforms could also provide value in expanding flexibility resources for improved load balancing. The TEO proposes a system-level perspective to sustain power security and reliability while awarding value propositions from flexible supply and demand technologies in an increasingly sophisticated generation and grid architecture. This approach would maximize the social, economic, and environmental benefits to all stakeholders.

**For further details:** <https://iicec.sabanciuniv.edu/teo>

## Supplies from TANAP build up



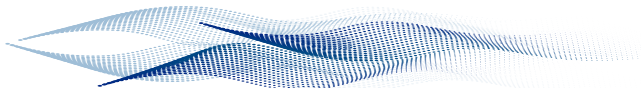
Turkey's Energy and Natural Resources Minister Fatih Dönmez attended the 7th meeting of the Southern Gas Corridor Advisory Council on February 11. Saying that Turkey has procured 9.4 bcm of natural gas via the Trans Anatolian Natural Gas Pipeline Project (TANAP) to date, Minister Dönmez underlined that the Turkish Government would continue to follow a multi-dimensional energy policy to enhance energy security. Minister Dönmez also pointed out that the latest example of the close cooperation between Azerbaijan and Turkey is the MoU on Nakhchivan-Turkey Natural Gas

Pipeline Project that was signed in December 2020.

TANAP currently has 16 bcm/yr. annual transportation capacity, 10 bcm/yr. of which is targeted for Europe. Saltuk Düzyol, General Manager of TANAP, earlier announced that Azerbaijan aims to raise its cumulative gas exports via TANAP to 12.2 bcm/yr. by the end of 2021, up from 5.0 bcm/yr. in 2020. Speaking during a press conference on January 14, Düzyol underlined that this capacity could be increased to 31 bcm/yr. with additional investments. Reminding that TANAP, the key element of the US\$ 40 billion Southern Gas

Corridor, has been in commercial operation since mid- 2018, Düzyol also said that the pipeline would serve throughout its 49-year concession period provided that additional reserves are tapped in the Caspian basin. According to the official figures disclosed by Düzyol, TANAP's annual transportation revenue will exceed the US \$1.5 billion when the pipeline reaches its full capacity by 2022. TANAP's shareholders are SOCAR (51%), BOTAŞ (30%), BP (12%), and SOCAR Turkey (7%). Last year, TANAP was awarded the 'Project of The Year' by the Project Management Institute (PMI).





## Power Distribution Investments to Grow Including Enhanced Digitalization and Technology

The new elements of Turkey's power distribution regime as defined by the 4th Implementation Period covering the 2021-2025 period have just started. During the 13th Sector Meeting of the Association of Distribution System Operators (ELDER) on 24 February 2021, the Minister of Energy and Natural Resources Fatih Dönmez shared his perspectives for the electricity distribution grid including the sectoral performance in the previous implementation period and the major priorities and investment allocation for the new period. Minister Dönmez stated that an investment of 66.7 billion TL is planned for the 4th implementation period covering 2021-2025. This amount is almost twice the investment budget planned for the previous implementation period (34 billion TL). Minister Dönmez underlined that the power distribution investments realized in the previous implementation period (40 billion TL) are well above this planned investment level. Minister Dönmez also shared some key performance indicators including outages that demonstrate notable improvements and further added that a separate budget of 10.5 billion TL is now defined for planned maintenance activities.

### Power Grid to Support Growth of Renewables

TBMM Industry, Trade, Energy, Natural Resources, Information, and Technology Commission President Mustafa Elitaş referred to



Fatih Dönmez



Mustafa Elitaş



Mustafa Yılmaz

the importance of renewable energy resources and added that half of the total increase in Turkey's installed capacity has been from renewables over the past 18 years. Elitaş also highlighted the importance of supply security and quality improvements along with the electricity distribution grids.

### Further Digitalization and Enhanced R&D focus

Minister Dönmez highlighted the role of digitalization in growth of the power distribution sector with enhanced customer satisfaction. The Automated Meter Reading System will be one of the key elements of the new power distribution activities, among several other digitalization-oriented operations and investments. EMRA President Yılmaz and ELDER Chairman Serhat Çeçen also underlined that R&D activities across different aspects of power distribution would be another important priority. Yılmaz noted that

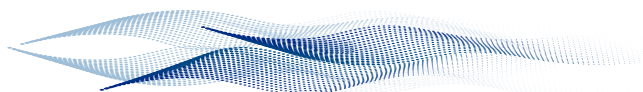
an average annual budget of about 200 million TL is allocated to R&D activities until 2025. Localization including smart meter systems and use of domestic technology in several other activities is a sectoral priority, Çeçen emphasized, adding that further improvements in quality performance is another central pillar of the sectoral drivers and strategies.



Serhat Çeçen

As a result of private sector investments backed by energy policy objectives and regulatory frameworks, the length of the power distribution lines reached close to 1.2 million kms now serving about 46 million subscribers.





## New, TL-Based YEKDEM Feed-in Tariffs will be Effective Starting July 1, 2021

Turkey's new renewable feed-in tariffs (FITs) including a price escalation mechanism are determined by a Presidential Decree on January 30. The new mechanism will apply to power plans that will be commissioned from 1 July 2021 until 31 December 2025. The major change in the new tariff setting is to switch to TL terms from \$-denominated tariffs. New renewable FITs will again be applied for the first 10 years of operation. The

TL-based prices will be escalated quarterly by a hybrid formula reflecting the domestic Producer Price Index (PPI) and the Consumer Price Index (CPI) (with a weight of 52%) and US\$/TL and €/TL rates (with a weight of 48%). The new FIT rates include a local content premium of 8 TL/MWh for all renewable energy sources for the first five years of operation. A \$-based ceiling price is determined for each renewable

energy technology group.

The new tariffs, even considering the announced ceiling prices, reflect significant reductions when compared to the current \$-based tariff levels. The bankability of projects under the new YEKDEM regime will be one of the key factors to watch for sustainable growth of renewables-based power generation capacity.

Plant Type	YEKDEM Price (TL/MWh)	YEKDEM Duration (Year)	Local Content Premium Price (TL/MWh)	Local Content Premium Duration (Year)	Ceiling Price (\$/MWh)
Hydropower	40	10	8	5	64
Wind	32	10	8	5	51
Geothermal	54	10	8	5	86
Solar	32	10	8	5	51
Biomass	Landfill Gas / Waste Tire	32	10	8	51
	Biomethaneization	54	10	8	86
	Thermal Disposal	50	10	8	80

## Mergers & Acquisitions Rebounded in the Turkish Natural Gas Distribution Market

A flurry of big deals by the end of 2020 drove mergers and acquisitions (M&A) to \$1.1 billion in the Turkish energy market, representing an extraordinary rebound of takeover activity.<sup>18</sup> Natural gas distribution companies and gas-fired thermal power plants were among the major energy-related M&A focus throughout 2020 and early 2021.

The acquisition of Enerya Energy, Turkey's second-largest natural gas distribution company operating in 10 cities, by Ahlatçı Holding was the first M&A process closed in 2021. Another M&A process is ongoing for the Baymina Natural Gas Combined Cycle Power Plant with an installed capacity of 770 MW and gas distributor İZGAZ, both owned by ENGIE. Istanbul-based Palmet Energy signed a share

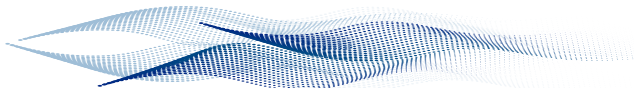
purchase agreement with ENGIE in December 2020, to purchase the whole shares of the two assets. The Competition Authority and EMRA had approved the application and allowed the transfer of shares from ENGIE to Palmet Energy. Palmet Group, which started its commercial activities in 1984, operates in gas distribution with Palgaz in Gebze district (a region with high industrial natural gas consumption), and Palen in Erzurum. The group also has activities in electricity generation as well as electricity and natural gas trading. İZGAZ was founded by Izmit Metropolitan Municipality in 1992 and authorized for natural gas distribution in 1994 with the Decree of the Council of Ministers. The company operates in one of the most industrial and gas-demanding regions in Turkey. Back in June 2019, SOCAR

Turkey acquired the shares of gas distribution companies Bursagaz and Kayserigaz from Germany-based EWE. SOCAR Turkey also took over the EWE's energy trading arm EWE Energy, service company Enervis, and Millenicom Telecommunication throughout the process.

### Turkey expands natural gas distribution grids

By the end of 2020, the total length of the natural gas distribution lines reached over 150,000 kilometers. Energy Market Regulatory Authority reported that the population having access to gas reached 67.7 million, 54.5 million of which is actively using gas. Turkey prioritizes the gas distribution grid expansions including legislative changes to further increase natural gas access.

<sup>18</sup> <https://www.pwc.com.tr/tr/sectorler/enerji/turkiye-enerji-sektorundeki-birlesme-ve-satin-almalar-2020.pdf>



## Zorlu Energy Plans to Build a Solar Power Plant Pursuant to EMRA's New Hybrid Power Regulation

Zorlu Energy announced to build a solar power plant in its Alaşehir-I Geothermal Power Plant in Manisa. The total installed capacity of the plant, which was commissioned in 2015, will be increased to 45 MWE after the installation of a 3.58 MWP solar power plant.

31,200 thin-film solar panels, each at 115 Wp, will be used in the project. The company estimates that the

project would create a 4.5 million TL contribution to Turkey's economy with an annual power generation of 6 GWh that is equivalent to the annual electricity need of 1,700 households. The project will be one of the pioneers in combined geothermal and solar power in Turkey.

Under the Regulation on the Amendment of the Electricity Market Licensing Regulation, which was

promulgated in the Official Gazette on March 8, 2020, and entered into force on July 1, 2020, the Energy Market Regulatory Authority (EMRA) enabled energy investors to build integrated hybrid power plants within existing renewable facilities. Hybrid facilities would have an increasingly important role to utilize Turkey's rich renewable energy potential.

## Borusan EnBW Increased Kiyıköy WPP Capacity up to 100 MW

Borusan EnBW Energy, JV of Turkish conglomerate Borusan Holding and EnBW (Energie Baden-Württemberg) AG, announced that it added 20 turbines, each having a capacity of 3.6 MW, to its Kiyıköy wind power plant that has been operating with an installed capacity of 28 MW since 2014. With this latest capacity increase, the total capacity of Kiyıköy reached 100 MW and the plant became the largest power



plant within the company's whole renewable portfolio.

Borusan EnBW aims to reach up to 725 MW by the second quarter of 2021 by commissioning ongoing projects. The company's portfolio solely consists of renewable energy-based power plants with wind

facilities having the lead.

Due to the deadline of the current feed-in tariff scheme by the end of June, construction works to commence operations along a diverse range of renewable power projects continue intensively.

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