

IICEC Conference "ELECTRIC VEHICLES OUTLOOK, Global & Turkey"



Sabancı University Istanbul International Center for Energy and Climate (IICEC) launched its first-of-its-kind Turkey Electric Vehicles Outlook (TEVO) report at a high-level conference: Electric Vehicles Outlook, Global & Turkey. This hybrid event hosted a broad range of participants.

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Actions to Increase the Utilization of Turkey’s Renewable Energy Resources Remain Key for a More Sustainable Power Future

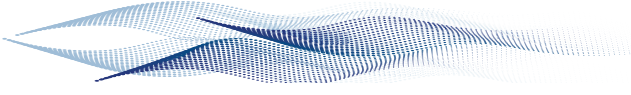
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IICEC Launches Turkey Electric Vehicles Outlook

Sabancı University Istanbul International Center for Energy and Climate (IICEC) launched its first-of-its-kind **Turkey Electric Vehicles Outlook (TEVO)** report at a high-level conference: **Electric Vehicles Outlook, Global & Turkey**. This hybrid event hosted a broad range of participants.

The conference opened with a keynote speech by the Executive Director of the International Energy Agency (IEA) and IICEC's Honorary Chair Dr. Fatih Birol and continued with guest speakers Gürçan Karakaş, CEO of TOGG, and Haydar Yenigün, Chair of Automotive Manufacturers Association (OSD).

Following the opening speeches, IICEC Director Bora Şekip Güray presented the TEVO report. The conference concluded with a high-level panel session that discussed business visions and perspectives pertaining to electric vehicles and e-mobility.



Dr. Fatih Birol: “Governmental Support is Crucial for Successfully Implementing Electric Vehicles”

In his keynote speech, Dr. Fatih Birol addressed the latest developments in the global energy market including the rising share of electric vehicles on the road, energy-climate interactions, and energy-market dynamics. Dr. Birol started his remarks by underscoring the importance of IICEC's event in addressing the potential of electric vehicles in Turkey. He highlighted that high commodity prices, which are more than seven-fold higher



Dr. Fatih Birol

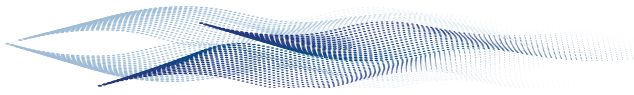
than previous years, as the most important energy agenda topic and emphasized high demand, production gaps, and supply shortages as the three major reasons for triggering price hikes. “Some oil- and gas-exporting countries did not deliver their production to the market despite having excess capacity. This is a major problem in Europe and Asia and is something that we must report. The cold weather during winter may result in higher prices,” he warned.

“Climate Change Plays Major Role in Shaping Policies”

By emphasizing that 80% of GHG emissions are due to oil, natural gas, and coal consumption, Dr. Birol pointed out that clean energy is the only way to address climate change.

“Some important steps have been taken so far and the most important achievement, in my opinion, was at Glasgow last month. After the COP-26 UN Climate Change Conference, 90% of the world economy became covered by climate-related commitments. There is a solid commitment for having net-zero emissions by 2050 and some later, for example for Turkey by 2053, China by 2060, and India by 2070,” he added.

Regarding the role of the IEA, Dr. Birol revealed that the agency prepares road maps for India and Indonesia to chart their progress towards their net-zero commitments and pointed out that almost all the countries carry out studies to determine how they can make net-zero a reality. Dr. Birol also commented that climate change is now playing a major role in shaping the policies.



“A new energy system has appeared on the horizon, which is different from what we have right now. A new energy system with more clean energy generation will be possible. Renewable energy, hydrogen, electric vehicles, digitalization, and nuclear are the main pillars of this,” Dr. Birol stated.

“95% of the power plants constructed in 2021 rely on renewable energy, and the remaining 5% use coal, natural gas, nuclear, oil, and so on. Most of this renewable capacity comes from solar power, which is followed by wind power,” he revealed, thanks to the IEA’s ability to access an extensive set of data sources on global investment and technology.

“New Nuclear Power Plants to Use Small Modular Nuclear Reactors”

The IEA’s Executive Director Dr. Birol emphasized that a solid global trend towards turning back to nuclear power is underway driven by the development of small modular reactors. “After Fukushima, we had setbacks, but I would say that now there is actually a return. Many countries now understand the significance of nuclear power in terms of energy security and the fight against climate change.”

Dr. Birol also provided significant information about the policy changes and new nuclear power plant construction plans of some countries: “In France, when President Macron stepped in to lead the government, he declared that France would reduce the share of nuclear power plants. But now, the country is maintaining its existing plants and even planning to build new ones. The UK has rapidly launched a support plan for nuclear, and the new government in the Netherlands included the construction of two nuclear power plants in their government plan,

which was released a couple of weeks ago. Nuclear projects are coming to the agenda in the United States and Asia as well.”

Dr. Birol pinpointed the growing trend of small modular nuclear reactors and revealed that these new plants will utilize smaller reactors, which would be constructed more easily and at a lower cost. He said that the UK’s Rolls Royce funded by Qatar dominates small modular nuclear reactors and TerraPower founded by Bill Gates drives this new technology in the United States.

“Share of Electric Vehicles in Total Vehicle Sales Nears 10%, Up From 2% Two to Three Years Ago”

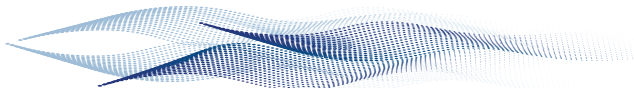
After outlining the main pillars of the global energy and climate-change agenda, the IEA’s Executive Director Dr. Fatih Birol assessed the latest developments in electric vehicles. Stating that electric vehicles are the top priority on the agendas of the major global automotive manufacturers, he pointed out the rapid development in this field that cannot be ignored. “In 2018 and 2019, two out of every 100 vehicles sold in the world were electric vehicles. This is just what we have two years ago. The share of electric vehicles reached 10% by 2021, according to the latest figures, which is a huge increase. So, it is a very major development,” Dr. Birol said. Regarding the role of countries in the expanding share of electric vehicles, he said that China provides half of the electric vehicles sold globally. He also stated that 15 out of 100 vehicles sold in China are electric vehicles. He defined Europe as the second biggest market after China with a similar share of around 15% and marked the United States as the third market with its solid growth potential thanks to recent policies to accelerate investment.

“Three Reasons Behind Incentivizing Electric Vehicles: Environmental Concerns, Energy Security and Competition”

Dr. Birol listed three main reasons behind supporting and incentivizing electric vehicles: “Environmental concerns are the first reason, as electric vehicles are environmentally friendly if the electricity is generated from clean energy resources. But of course, in saying environmentally friendly, everyone has a different understanding. Some claim that the environmental benefits are just the climate, but China or India, for example, are embracing them to reduce air pollution in their urban areas. Therefore, environmentally friendly electric vehicles help us to fight against climate change while reducing air pollution.”

Reducing the oil-import dependency and assuring energy-supply security is considered the second reason behind the policies. Dr. Birol also added that efforts to reduce countries’ current-account deficits are a triggering factor. “Countries are considering this both from an economic and geopolitical point of view, as they refrain from being that too oil-dependent,” he added.

“The third reason is economic competition, which perhaps is the most significant factor, in my opinion,” stated Dr. Birol, who pointed out that China is the market leader in this new technology. “That is all about competition between countries and companies,” he marked. “A couple of weeks ago, during an energy meeting with the CEOs of the 20 largest automotive manufacturers, 18 representatives told me that electric vehicles will be the sole product on their main production lines by 2030. And the reason why they are saying this is not only to save the planet or the environment but at the same time to prepare their organizations for the future so as not to be left behind,” he stated.



“Battery is a Topic that should be Underlined so Precisely”

Dr. Birol conveyed his views from a broader perspective and provided outstanding foresight into the transition towards electric vehicles. “Despite electric vehicles’ rapidly growing market share, there are still certain problems, mainly arising from batteries and prices. Since the manufacturing cost of an electric vehicle is higher than that of an internal combustion engine-vehicle, any reduction in the cost of a battery is good news for all of us. The average cost of battery production, which was around US\$1,100 a decade ago, is now US\$120-US\$130, and even below US\$100 in China. There is a decline in production costs, but we still do not know whether there will be a declining trend in the future. The battery is a topic that should be underlined precisely. We expect a 10-fold increase in battery production capacity, especially in lithium-ion batteries, by 2030.”



Dr. Fatih Birol

“There is a Dependence on Critical Minerals Which Requires Taking Necessary Steps”

Dr. Birol emphasized the importance of the critical minerals that are used to produce batteries by discussing the traditional risks related to oil supply. Reminding the audience about oil prices, oil’s availability in markets, and some geopolitical tensions surrounding it, Dr. Birol stated that critical minerals such as lithium, magnesium, and cobalt will play a crucial role in the future as they are used in batteries, solar PV, and in other areas.

Dr. Birol said that critical mineral deposits are distributed all around the world but almost three-fourths of them are concentrated in a few countries.

“Dependence on critical minerals is not about where the minerals are located and where they are extracted, but where they are refined and processed. 90% of the refining capacity is in a single country, China. So many countries in Europe, Asia, and the United States are cooperating under the leadership of IEA and working on establishing a new system for energy-supply security. This is an important topic that requires taking the necessary steps,” Dr. Birol added. If governments fulfill all their climate change commitments, lithium demand is expected to increase seven-fold in a year, which is a significant rate. A seven-fold increase in demand would boost battery prices, which would be reflected in the cost of electric vehicles. Eventually, the competitive edge will be reduced when compared to internal-combustion engine vehicles,” warned Dr. Birol, in response to a question from the audience.

“Government Support is Required When Taking the Initial Steps”

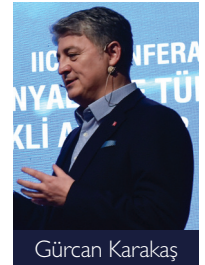
While assessing prospects for electric vehicles, the IEA’s Executive Director underlined the role of governments in supporting the expansion of vehicles in a sustainable and proper way. “It is not possible for any specific emerging technology to be deployed without the support of governments. Government support is required during the initial steps, and the major initial role has always been taken by governments, as we saw in China, Norway, and the Netherlands. If governments do not take this seriously, it is impossible to be successful,” he remarked. Dr.

Birol outlined the role of governments from the points of providing financial incentives, priority in traffic, power supplies, and power grid availability.

Dr. Birol concluded his remarks by congratulating IICEC for the “Turkey Electric Vehicles Outlook” report and the important timing of the IICEC Conference.

“We Are Progressing Rapidly with the State’s Support and Vision of Transition to Electrification”

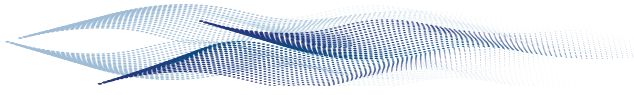
Gürcan Karakaş, the CEO of Turkey’s Automobile Joint Venture Group (TOGG), aims to start mass production



Gürcan Karakaş

in 2022 and outlined the latest developments about Turkey’s first-ever electric vehicle, the TOGG as a guest speaker in the Conference.

Karakaş underlined the interaction among different vectors such as electric vehicles, energy system transformation, and climate change at the beginning of his remarks. “First of all, we do see that the rules of the game are changing particularly across a triangle of automotive and energy industries and climate. There is a series of new megatrends. Due to the concerns about climate change, we need to figure out clean solutions, and electric vehicles are part of a broader technology wave. The range of electric vehicles used to be a problem in the past, but now we can consider this as resolved with increasing average ranges of vehicles. 80% of a battery can be charged in less than half an hour with fast charging technology. Of course, progress in electric vehicles is not alone sufficient. We need to append some other factors to the e-mobility ecosystem to maximize the potential of electric vehicle technology.”



Karakaş emphasized the changing patterns in turnover and profitability in the automotive sector and underlined that the data-driven business models emerging with new generation vehicles would become more favorable by 2035. He pointed out the crucial role of R&D activities by saying: “if we do not allocate 40% of our space for product development today, we would definitely have trouble in terms of profitability in the future.” Karakaş also stated that TOGG is progressing rapidly with the government’s support and vision for a transition towards electrification.

Sustainability and Use Case Mobility

Underlining the importance of environmental awareness, Karakaş revealed that TOGG is currently constructing one of the cleanest facilities in Gemlik and emphasized that this is probably the world’s cleanest facility. Karakaş stated that designing the future is more important than manufacturing a car. “At this point, we also need to consider the processes in a holistic fashion. It is not just designing a concept car, but we all need to consider the future as well. We want to have a different approach to this debate taking the abbreviations ‘Use Case’. We define ourselves as a ‘Use Case’ mobility provider,” he marked.

Innovation Opportunities

Emphasizing the great potential for innovation to pursue new technology opportunities, Karakaş added: “We are all striving for innovation. 75% of all the innovations today stem from private companies. By 2035, more than 70% of innovation will be coming from startups. This is not our hypothesis, but what one independent study shows. Therefore, from now on, we must concentrate on new technologies together with startups. For more than a year, we have been

working on blockchain solutions. We are also planning to offer our clients the option to choose the resource for the electricity they consume in their vehicles. As TOGG, we have a unique and holistic perspective. We are spending efforts to achieve a ‘more than a car’ solution. We need to design the vehicle as a smart device including the battery. We do this within the framework of new generation architecture. Software power will make the difference, not horsepower. The future is heading towards centralized computer systems. We divided the central computer into four segments because we are racing against time as we are committed to starting our mass production and market launch in the first quarter of 2023. We are planning to finalize the design and industrialization process of our central computer in 2026 and 2027,” he added. Karakaş also reminded the audience that TOGG’s first global launching ceremony was in Las Vegas in January.

Turkish Car Manufactures to Complete Electrification Transition by 2030

Haydar Yenigün, Chair of Automotive Manufacturers Association (OSD), participated in the conference as a guest



Haydar Yenigün

speaker and provided extensive information and valuable insights from the industry perspective.

Yenigün reminded the audience that the Automotive Manufacturers Association (OSD), established in 1974, represents the automotive manufacturers operating in Turkey in both domestic and international markets. “With our 13 members and specialized teams, we have successfully been serving the

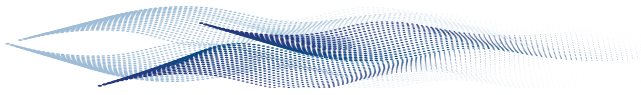
automotive industry for 47 years. I would also like to take this opportunity to invite TOGG to be our 14th member following their mass production,” he said. OSD has been a member of the International Automotive Manufacturers Association (OICA) since January 1995 and a liaison member of the European Automotive Manufacturers Association (ACEA) since March 2006.

“Turkey’s Role in Europe with Annual Manufacturing Capacity to Increase to 2.5 million”

Yenigün emphasized that Turkey ranks sixth in automobile production and second in commercial vehicles production in Europe. “The automotive industry is so important for Turkey, as more than 5% of Turkish GDP is produced by this sector. We have an annual production capacity of two million, which will rise to 2.5 million in a couple years. Turkey manufactured 1.3 million cars during the challenging year 2020. It was 1.7 million a year ago. 15% of Turkey’s total exports are from the automotive industry. Due to the semiconductor crisis and the pandemic, our export figures declined, but it has great potential for the future.”

More than 500,000 Employment and Strong R&D

“Turkey’s automotive industry directly employs 53,000 people, and total employment exceeds 500,000 with indirect employees. R&D is a must in this industry. Especially during the last decade, R&D investments have been receiving incentives and there are now over 4,000 R&D employees and 157 R&D centers.”



Two Key Triggers for Electric Vehicles

“When it comes to electric vehicles, two pictures emerge. Customers are now prioritizing environmental concerns for protecting our world. They also want connected vehicles, autonomous vehicles as well as sharing-friendly vehicles, and electric vehicles. All of these must be implemented by 2030. The Green Deal, which had been signed by European countries, gives us a clear picture of future trends. Many of the Automotive Manufacturers Association members will convert almost all their production to electricity-powered automobiles by 2030. Because the Turkish automotive industry exports more than 85% of its production to Europe, this is essential for us. The transformation in passenger cars will come first, and it will be followed by light commercial vehicles, trucks, and buses. As the automotive industry, we aim to achieve net-zero before Turkey’s overall committed date.”

Important Technology Avenues and the Role of Policies

Yenigün underlined that charging stations are in the middle of a technological development process that is almost as interesting as the technological transition of the automotive industry. “We also need digital technologies here. You cannot control this circular economy without blockchain,” Yenigün added.

“For achieving all these targets and this vital transition, we need to improve our legislation, implement a transition plan, adopt an incentive mechanism, and seriously restructure the tax policy specific to Turkey. All these issues need to be seriously addressed by policy makers and regulators,” Yenigün Said.

IICEC Turkey Electric Vehicles Outlook Presents Multiple Energy and Climate Benefits of Electric Vehicles

IICEC Director Bora Şekip Güray presented the key findings and recommendations from the Turkey Electric Vehicles Outlook (TEVO). Guray stated that the TEVO is based on the IICEC Turkey Energy Outlook (TEO), which was a first-of-its-kind study in Turkey, and an energy modeling framework that reflects a holistic perspective on the entire value chain of the Turkish

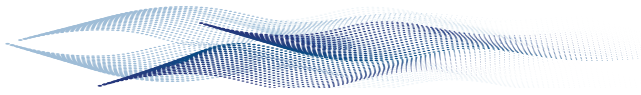


Bora Şekip Güray

energy sector. “TEVO employs a scenario-based analytical approach that relies on a detailed data and accounting framework for road transportation and electrification and benefits from contributions of sector experts, academia and industry. We owe deep gratitude to all of them for their valuable contributions.” Güray added. Guray also emphasized that TEVO is a first-of-its-kind study in Turkey, like the TEO that IICEC launched in 2020. The TEVO models the growth outlook for EVs in Turkey based on two main scenarios. It analyzes the impact of different EV penetration levels along two different pathways and assesses how these will shape Turkey’s energy balances and emissions inventory out to 2030.



The growth and development of the electric vehicles (EV) market and their related technologies are accelerating worldwide. Recent progress provides an important base for Turkey from the standpoints of ongoing investments in the manufacturing of EVs in Turkey, the announced targets for 2030, developments within the regulatory framework in 2021, and value-oriented new initiatives in the battery ecosystem, digitalization, and connected technologies. The ratification of the Paris Agreement and the announcement of its net-zero emissions target by 2053 have triggered a new era for the clean energy transition in Turkey. All these developments will harness the great potential in electric vehicles and broader e-mobility.



“One-Third of Light Vehicles Market Sales Becomes Electric by 2030 in the High Growth Scenario”

Güray explained that the High Growth Scenario posits a wider and faster adoption of e-mobility in Turkey. “By 2030, one-third of light vehicles sales becomes electric. The EV fleet is forecast to reach 2 million, and EVs represent 7% of the light vehicles fleet. This is achieved by long-term policy targets backed by technology and investments and an entrepreneurial ecosystem that also benefits from the best practices around the world,” Güray added (Figure 1).

“Turkey Saves up to US\$2.5 Billion by 2030 in High Growth Scenario That Supports a Cleaner Energy Future”

The High Growth Scenario achieves 10 million tons of CO₂-equivalent reduction in GHG emissions by 2030 (Figure 2). This is equivalent to 13% of the sector’s emissions at present and the current emission inventory of agriculture. “This scenario also shows the peaking of road-transport emissions before 2030, supporting a clean energy future compatible with a net-zero emissions perspective. It also makes significant contributions to the improvement of energy balances, as clean electricity replaces oil. At current oil price levels, a savings of US\$ 2.5 billion in total oil spending can be realized by 2030, while the risks arising from global oil price fluctuations are also reduced. The additional electricity demand of about 6 TWh/yr. by 2030 can be met from clean power generation with an average of US\$1.3 billion of spending on renewable-energy-based capacity (all in 2021 real prices),” Güray revealed (Figure 2 and Figure 3).

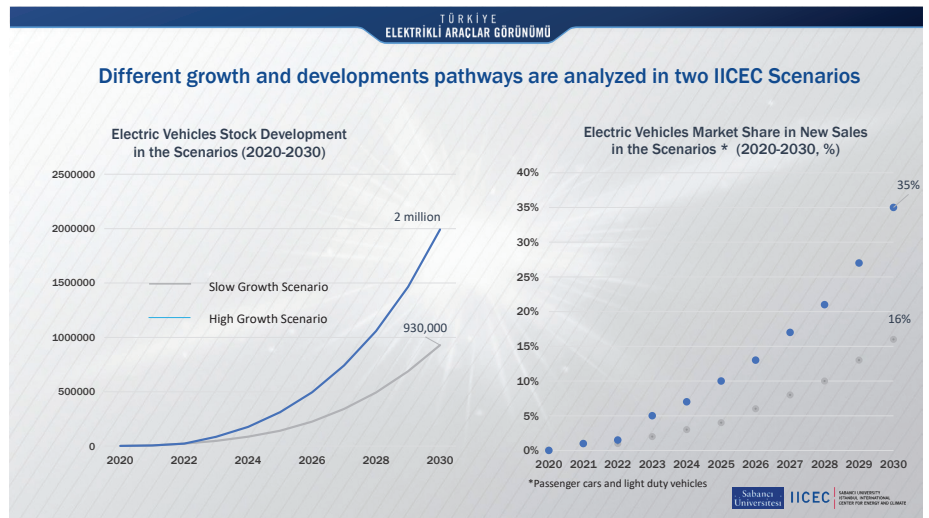


Figure 1. Growth and Developments Pathways IICEC TEVO Scenarios

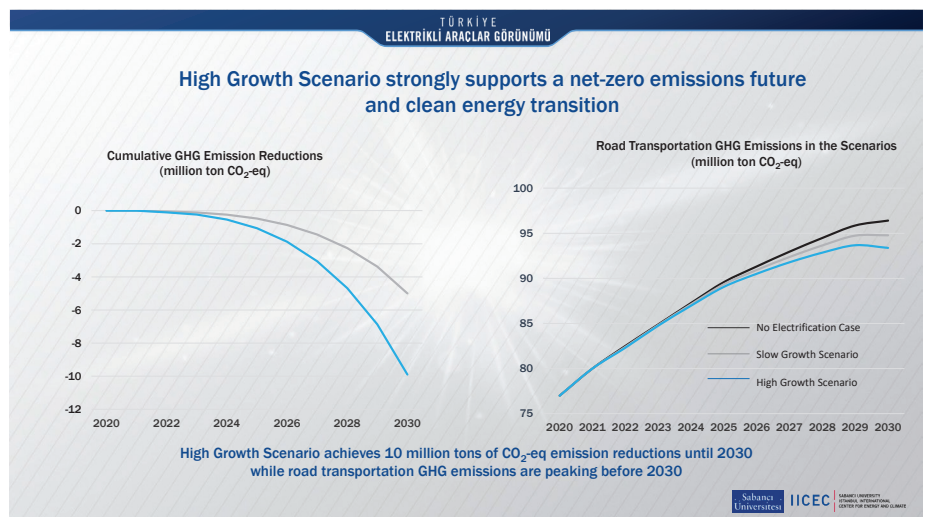


Figure 2. IICEC TEVO GHG Emissions

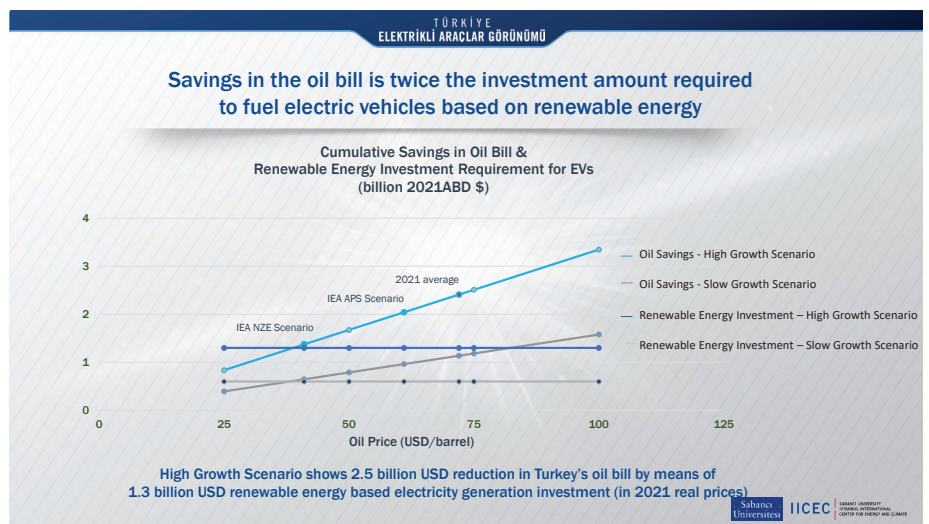
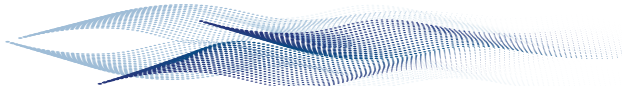


Figure 3. IICEC TEVO Oil Bill and Renewable Energy Investments by Scenario



Güray explained that the Slow Growth Scenario is characterized by limited predictability in the policy framework to support electrification and a slow pace of investment, infrastructure growth, and adoption of innovative business models. “In this scenario, technological opportunities are only partially realized, and approximately one-sixth of light vehicle sales is electric by 2030. This roughly corresponds to an EV fleet of around one million,” Güray noted.

“Realizing these advantages most affordably requires efficient planning and investments in charging infrastructure and electricity grids with a long-term perspective. Furthermore, savings from potential costs of externalities due to environmental impacts, especially those related to carbon emissions, will also add to economic contributions from a holistic perspective. It is essential to achieve major improvements in critical areas within the cooperation of the public and private sectors and academia,” the TEVO underlines. Güray pointed out the importance of the regulatory and legislative regimes for sustainable and solid growth in electric vehicles. “It is critical to advance the growth in a way that matches with a robust increase in EV sales starting from 2022, which will further accelerate especially after 2025. To realize the multidimensional benefits of e-mobility, it will be critical to continue to develop a regulatory framework as defined by primary legislation. This secondary legislation should provide technology and user-centric approaches, while enabling the acceleration of investments, reflecting free-market principles, and addressing different usage characteristics and regional variations,” Güray emphasized.

The TEVO reflects the importance of the use of clean energy resources and a more flexible power grid to support growth in e-mobility. “The environmental benefits from

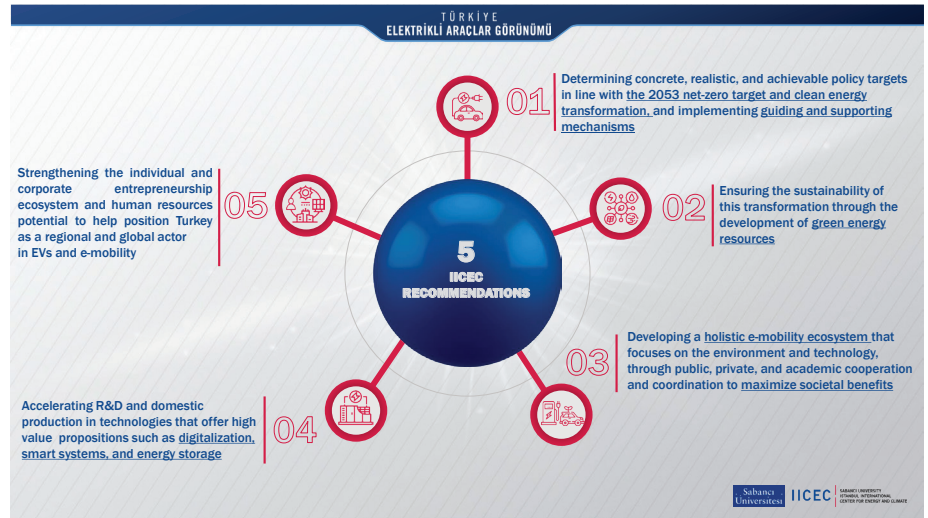


Figure 4. IICEC TEVO Recommendations

electrifying transportation can be achieved by increasing clean electricity production as part of a broader clean energy transition. In addition to the rise in supply variability, EVs add variable and fluctuating demand challenges to power grids. These can be managed by increasing the efficiency and flexibility of the electricity-distribution networks, which form the backbone of the evolving electricity system,” the TEVO writes.

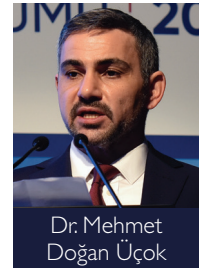
Please click [here](#) to download TEVO Executive Summary (both in Turkish and English)

Please click [here](#) to watch the conference (in English)

Please click [here](#) to read the TEVO Launch slide deck (in English)

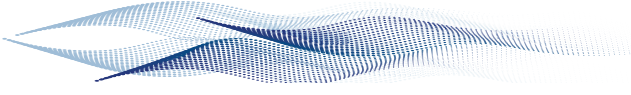
“IICEC Hosted Ten-Thousand People During its Events in 2021”

The Electric Vehicles Outlook: Global & Turkey conference opened with IICEC’s Coordinator Dr. Mehmet Doğan Üçok’s introductory speech. Dr. Üçok stated that IICEC enhanced its research activities in energy and climate and hosted a total of ten-thousand people in its audiences on live-stream for its events in 2021.



Stating that TEVO will stand out as a signpost for the sector, Dr. Üçok said that it will shed light for policymakers and the business community with the contributions of the ‘Government-Industry-Academia Success Triangle’.

Dr. Üçok conveyed IICEC’s gratitude to IICEC Board Members Borusan EnBW, EnerjiSA, Eren Holding, SANKO Energy, Shell, SOCAR, Zorlu Energy, and the Executive Committee of IICEC for their support for IICEC’s activities.



Important Messages from Turkish Business Leaders on Electric Vehicles

The conference hosted a high-level panel session on business perspectives around the potential of electric vehicles

and e-mobility. Distinguished business leaders assessed the latest developments in Turkey during a panel moderated by EBRD's Energy Sector Country Department Manager Mehmet Erdem Yaşar.

The panel featured Ahmet Erdem, Shell Turkey Country Manager; Sinan Ak, CEO of Zorlu Enerji; Özge Özden, Secretary General of Association of Electricity Distribution System Operators (ELDER); Özgür Özel, Managing Director of SiRo; and Murat Pınar, Chairman of EUROGIA ve Eşarj.



“We Aim to Establish 250,000 Charging Points by 2025”

Ahmet Erdem, Country Chairman of Shell Turkey:

“One of the most important events in 2021 was undoubtedly the approval of the Paris Agreement by the Turkish Parliament. The expectation for 2022 is to prepare the studies that will determine the roadmap for a net-zero carbon journey to 2053. As a company that has been working on this topic since the mid-1990s, we clearly support the net-zero carbon target by 2050 in line with the Paris Agreement. While doing so, we have plans to decrease by one half the carbon emissions resulting from our operations by 2030.

With regards to new products, we already started to work in fields such as hydrogen and biofuels. Shell has plans to transform six of its 15 large refineries into energy parks. In this context, we will decrease our refined product manufacturing by 55% by

2025. One of Shell's biggest investments is in renewable energy. There are vehicle-charging facilities that we install at our own stations. As Shell, we carry out many partnerships and procurement operations. We aim to establish 250,000 charging points by 2025, and 5 million by 2050.”



Ahmet Erdem

“Investments Will Be Accelerated if Regulatory Steps are Completed”

Sinan Ak, CEO of Zorlu Enerji:

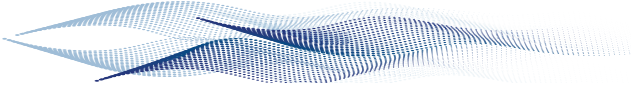
“Under the current circumstances, to travel with gasoline vehicles, you go to a petrol station, buy petrol in 5 to 10 minutes, and you drive on. But when you drive an electric vehicle, you will be charging your vehicle at home, at your workplace, or at shopping malls. If you want to electrify the automotive sector,

considerable infrastructure investments will be needed, especially on the municipality-owned premises. This seems to be the most challenging part of the process.

What is important at this point is that the regulatory framework has not been completed yet. It will be useful if all the stakeholders participate in this process. Investments will be accelerated if regulatory steps are completed. The range of electric cars is 500 kilometers, but considering the speed on the roads, infrastructure work for charging points should be accelerated. We believe the government should have some incentive mechanisms for certain locations. The most important aspect is to incentivize the establishment of infrastructure along intercity roads, especially for the periods of intensive circulation.”



Sinan Ak



“Distribution Companies will Play an Important Role”

Özge Özden, General Secretary of the Association of Electricity Distribution System Operators (ELDER):

“When we look at domestic trends, we see TOGG investments, while companies like Zorlu Group are currently producing charging units.



Therefore, we should be talking about a multidimensional impact area on the national scale involving industry, technology, employment, and growth. The Economic Reforms Action Plan dated 12 March 2021 includes the government’s target for the implementation of electric vehicles charging infrastructure by the end of this year. There is a main goal merging all these trends: equip every corner of Turkey with electric vehicle charging infrastructure.

At this point, considering the technological costs and the specific conditions of our country, there are some obstacles to realizing this goal when only considering market dynamics. Investments seem to have an onerously long break-even period. In addition, there are challenges to be addressed in terms of extending the EV charging network. I believe electricity distribution companies could play a role in overcoming such obstacles.”

“By 2026, We Aim to Start to Manufacture Enhanced Battery Cells in Turkey”

Özgür Özel, General Manager of SiRo:

“As TOGG, we have been in contact with the world’s leading battery manufacturers. We had a detailed set of criteria for this matter. One of the criteria is energy density, and the others are cost and logistics.



We chose Farasis as it stood out as the best option for battery manufacturing in Turkey, in addition to meeting other criteria such as warranty conditions, durability, and safety. Compared to its competitors, Farasis has a technology that provides an advantage of 15% to 25% in terms of energy density. We have also started discussions for a strategic partnership. Our goal is to manufacture batteries in Turkey and get to the core technology.

As a priority, we want to make our production facilities ready next year. We want to organize our production in a way that supports TOGG’s production plans. We aim to enhance our R&D, grow our team rapidly, and start to manufacture enhanced battery cells in Turkey in 2026. This is not confined to TOGG and can be expanded to energy-storage systems. There is a window of opportunity with electric vehicles, and there is a window of opportunity with batteries. We believe we are doing the right thing at the right time.”

“We are Working on a New Lifestyle”

Murat Pınar, Chairman of EUROGIA and Eşarj:

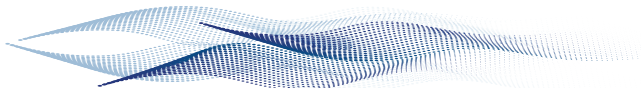
“In electric vehicles, we need to design the technology around the battery but also more broadly around the people. Today, we are still talking about cars for four, as is the case in the American story.



When we look at evolution, we should revisit this. Does everyone really want a car for four people, or will micro-mobility take the lead? You manufacture vehicles, you focus on people because they will spend part of their lives in those vehicles. But how about the human focus? It is no longer only about going from point ‘a’ to point ‘b’.

Vehicles have computers in them. You are connected to the internet, which means you remain connected to life. In addition, vehicles are now connected to an active network. In other words, they are like moving generators, and you will be able to use the power in your car when there is a power cut. New requests arise as designs are developed. At the end of the day, we should merge all these requests. As a matter of fact, we are all working on a new lifestyle. Of course, if we are to change the lifestyle of the future, we should consult future generations about it.”





France Honors Dr. Birol with 'Chevalier de la Légion d'honneur'

Dr. Fatih Birol, Executive Director of the International Energy Agency (IEA), has been awarded the Chevalier de la Légion d'honneur, France's highest state award, for his contributions to the fight against climate change.

Following the announcement, Dr. Birol told Anadolu Agency that he was proud to receive the honor and underlined the critical role of the Paris Agreement towards efforts to achieve global climate goals: "The Paris Agreement is the most important agreement made after World War II. The purpose of this agreement is to prevent the climate crisis." Mentioning the roadmap prepared by the IEA last year, which included concrete steps to achieve targets in the agreement, he added: "In addition to this analysis, we have done these studies on how to keep energy prices at a reasonable level and how energy security can be ensured while trying to reach

the targets of the Paris Agreement. While fulfilling the commitments of the agreement, we looked at the issue from the perspective of developing countries."

Dr. Birol also thanked French President Macron on his Twitter account: "Great honor to be named Chevalier de la Légion d'honneur. I would like to thank French President Emmanuel Macron for this distinction, which I share with my hard-working IEA colleagues. I will continue to do my utmost to make the Paris Agreement's global energy & climate goals a reality."

In September, Dr. Birol was named as one of the world's 100 most influential people of 2021 by TIME magazine.

Having a BSc degree in power engineering from Istanbul Technical University and an MSc and Ph.D. in energy economics from the Vienna



Dr. Fatih Birol

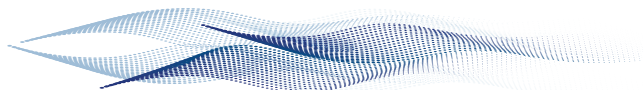
University of Technology, Dr. Birol worked at OPEC in Vienna before joining the IEA. After rising through the ranks of the Agency over two decades, he was appointed as the Executive Director in 2015. He chairs the Energy Advisory Board of the World Economic Forum in Davos. He is the recipient of numerous state decorations, including the Japanese Emperor's Order of the Rising Sun, the Order of the Polar Star from the King of Sweden, and the highest presidential decorations from Austria, Germany, and Italy. He was awarded a Doctorate of Science honoris causa from Imperial College London in 2013. Dr. Birol is also the Honorary Board Chairman of IICEC.

IEA Calls for Massive Policy Changes to Achieve Decarbonization in Power

The International Energy Agency (IEA) released the third edition of its semi-annual Electricity Market Report. The report, released on 14 January 2022 analyses the extraordinary rebound in global electricity demand in 2021 with a major impact on electricity prices and GHG emissions. The report also presents power supply and demand forecasts to 2024.

Following its first-ever-edition released in December 2020, which focused on electricity market developments amid the Covid-19 pandemic, and the second edition in July 2021, the latest report focuses on key dynamics behind the steep increase in global electricity demand in 2021 as well as unprecedented increases in power prices and warnings about CO2 emission levels.





The report shows that global electricity demand grew by 6% in 2021. This is the largest percentage rise since 2010 following the global financial crisis and the largest ever annual increase in absolute terms with over 1,500 TWh (Figure 5). In addition to the rapid economic recovery in 2021, mostly originating from China, extreme weather conditions also played a role in demand growth, the report demonstrates.



Dr. Fatih Birol

The IEA pointed out that, despite various coal phase-out commitments by governments, coal met more than half of the increase in global power demand throughout 2021. Coal-fired electricity generation reached an all-time peak with 9% annual growth, the fastest increase since 2011. Hydropower resources underperformed in 2021 due to extensive droughts but renewables overall achieved a combined growth of 6%. Gas-fired generation and nuclear both demonstrated respectively slower growth rates of 2% and 3.5% (Figure 6).

The increased demand for fossil fuels combined with supply constraints resulted in scarcities in power supplies and increasing prices. The analyses in the report show that the average wholesale electricity prices in Europe during the 4th quarter of 2021 were more than four times higher than the average prices that occurred during the same periods between 2015 and 2020.

“Sharp spikes in electricity prices in recent times have been causing hardship for many households and businesses around the world and risk becoming a driver of social and

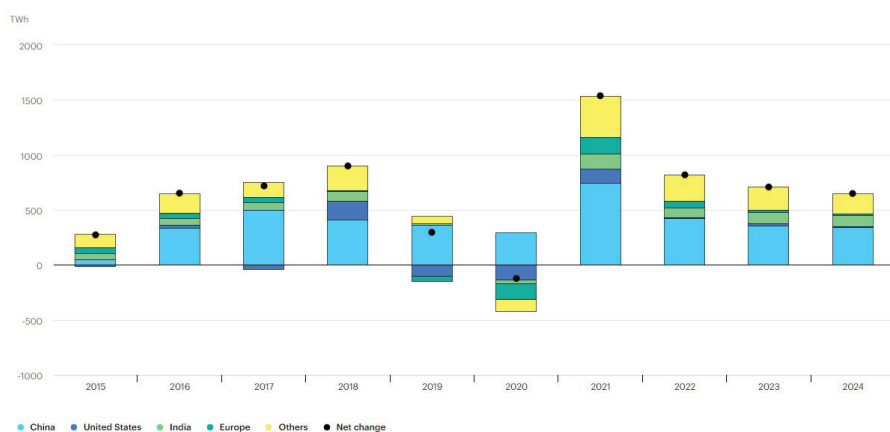


Figure 5. Annual Changes in Electricity Demand by Region (2015-2024, TWh)

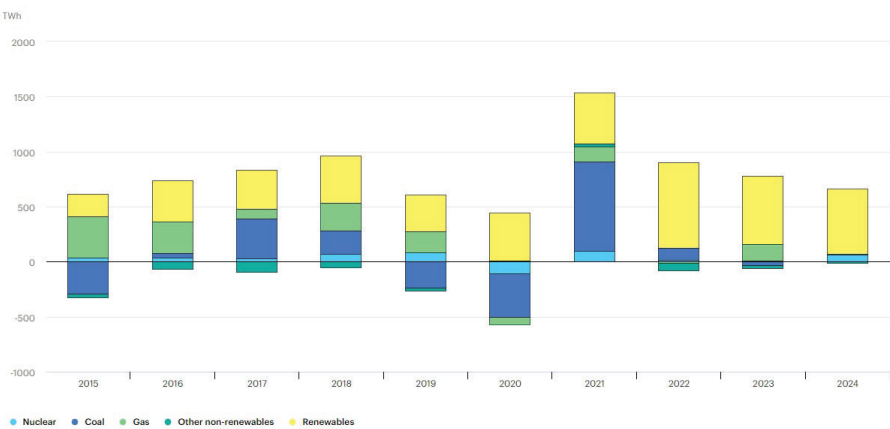


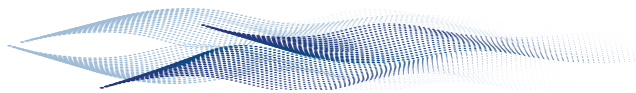
Figure 6. Annual Changes in Electricity Generation by Source (2015-2024, TWh)



Figure 7. Emissions Intensity and Change in Emissions from Electricity Generation (2015-2024)

political tensions,” Dr. Fatih Birol, IEA’s Executive Director, remarked. “Policy makers should be taking action now to soften the impacts on the most vulnerable and address the underlying causes. Higher investment in low-carbon energy

technologies including renewables, energy efficiency, and nuclear power alongside an expansion of robust and smart electricity grids can help us get out of today’s difficulties,” Dr. Birol added.



The IEA anticipates that growing renewables by 8%/year on average will match around 90% of net demand growth from 2022-2024. The IEA expects that fossil fuel-based generation will mostly stagnate over the next three years, while nuclear-based generation is forecast to grow by around 1%/year (Figure 6).

Record High Emissions in Power Generation

Total electricity-related CO2 emissions rose by 7% in 2021 (Figure 7). The IEA underlines that current policy settings are insufficient to cut emissions in line with the Net

Zero Emissions by 2050 Scenario. "Not only does this highlight how far off track we currently are from a pathway to net-zero emissions by 2050, but it also underscores the massive changes needed for the electricity sector to fulfill its critical role in decarbonizing the broader energy system," Dr. Birol stated.

Crude Oil Prices Remain Above \$80/b

The price of the Brent and West Texas Intermediate (WTI) benchmarks respectively rose 55% and 62% in 2021. Major drivers behind these increases were economic recoveries, extensive Covid-19 vaccination measures in advanced and emerging countries, and loosening pandemic-related travel restrictions. Global production increased more slowly than demand rebounded in 2021, triggering price rallies throughout the year. The slower increase in production was mostly attributable to OPEC+ crude oil production cuts that started in late 2020. The spot price of Brent crude started 2021 at 50\$/b and increased to 86\$/b in late October before declining during the final weeks of the year 2021. The annual average price of over 70\$/b was the highest recorded over the past three years (Figure 8).

Global oil markets began 2022 with the decision of OPEC+ on 4 January to add another 400,000 b/d of supply in February, as it has done each month since August 2021. However, several other dynamics – Kazakhstan unrest, Libyan outages, spare capacity, as well as an OPEC+ report claiming that the impact of the Omicron variant on the oil market would be mild and temporary – resulted in Brent crude trading over \$80/b. While Kazakhstan produces about 1.6 million b/d, Libya’s output fell to 729,000 b/d, down from more than 1.3 million b/d from last year, owing to maintenance works and oilfield shutdowns.

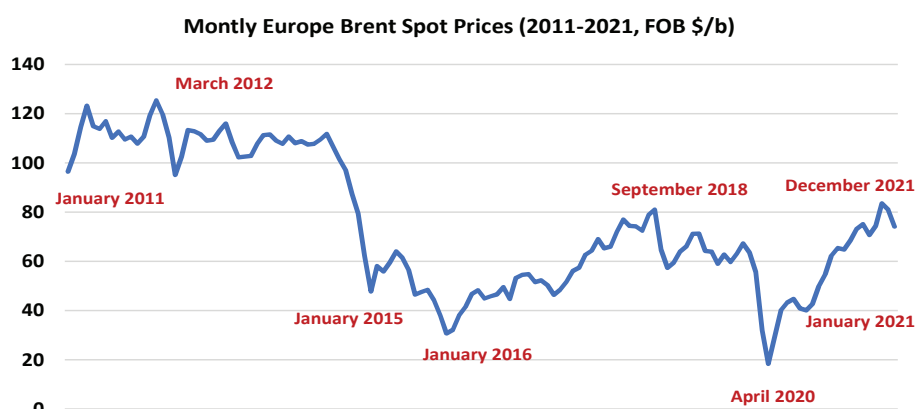


Figure 8. Europe Brent Spot Price FOB (January 2011 – December 2021)

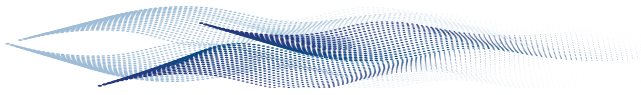
Reproduced by IICEC. Reference: U.S. DOE EIA Website

The U.S. Energy Information Administration (EIA) revised its forecast for the annual average Brent price for 2022 by 7% to \$75/b. The EIA forecasts that global oil consumption will increase by 3.6 million b/d in 2022 reaching 100.5 million b/d and by 1.8 million b/d in 2023 reaching 102.3 million

b/d. While OPEC’s crude oil production averaged 26.3 million b/d in 2021, up 0.7 million b/d from 2020, the EIA expects OPEC production to average 28.8 million b/d in 2022. The EIA anticipates that crude oil output in the United States will be 11.8 million b/d in 2022, up from 11.1 million b/d in 2021.

IEA’s Oil Market Report, January 2022

“While the steady rise in supply could see a significant surplus materialize in 1Q22 and going forward, available data suggest that 2022 is starting off with global oil inventories well below pre-pandemic levels. A growing discrepancy between observed and calculated stock changes suggests demand could be higher or supply lower than reported or assumed. Moreover, higher output would also result in lower OPEC+ spare capacity. By the second half of the year, effective spare capacity (excluding Iranian crude shut in by sanctions) could shrink from around 5 mb/d currently to below 3 mb/d – most of it held by Saudi Arabia and the United Arab Emirates. If demand continues to grow strongly or supply disappoints, the low level of stocks and shrinking spare capacity mean that oil markets could be in for another volatile year in 2022.”



Actions to Increase the Utilization of Turkey's Renewable Energy Resources Remain Key for a More Sustainable Power Future

Throughout a dry year with drastic reductions in hydro power output, non-hydro renewables increased their contribution in meeting Turkey's electricity demand and enhancing energy security. Wind power contributed to almost 10% of total generation, and solar was second only to wind with over a 4% share followed by geothermal at 3%. Hydro generation decreased from 78.1 TWh in 2020 to 55.7 TWh, whereas non-hydro renewables combined reached an output of 62.7 TWh, up from 51.5 TWh in 2020. Non-hydro renewables combined contributed to about one-fifth of total power supply in 2021.

Despite these figures, strong increase in power demand together with lowered hydro output resulted in greater use of natural gas-fired plants. The highest annual increase occurred in natural gas-fired plants with 108.3 TWh of output, which represents 33% of total gross generation, compared to 70.9 TWh and 23% in 2020. Policies, investments, and technologies to increase the utilization rates of renewable energy resources remain key for a more balanced power generation portfolio with energy security, climate, and sustainability benefits and can fuel strong electrification prospects across end user sectors.

Turkey to Add at Least 1.5 GW Wind Capacity Annually as Sector Enters Era of 10+ GW

Turkey's installed wind capacity exceeded 10 GW in 2021, up from 9.1 GW by the end of 2020. Wind power plants generated 31.3 TWh in 2021.

Minister Fatih Dönmez: "Turkey Increased Local Manufacturing Rate in Wind Energy to 65%"

Energy and Natural Resources Minister Fatih Dönmez revealed that Turkey aims to increase the manufacturing of its domestic wind turbine parts through its 16 national producers and plans to increase the industry's share in exports. "Turkey already reached a 65% domestic production rate in this industry, employing approximately 15,000 people to produce wind turbine parts, including rotor blades, turbine towers, and others. We are now exporting wind energy equipment to forty-five countries throughout six continents," Dönmez underlined.

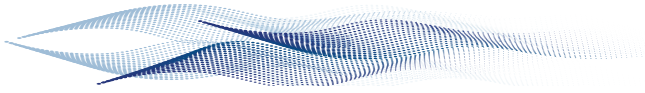


This represents a 26% increase over 2020 compared to an 8% increase in total gross power generation in 2021.



Ebru Arıcı, the Chair of Turkish Wind Energy Association (TWEA) revealed that the country will add around 1,500 MW of wind power to the national grid in 2022, on the sidelines of the TÜREK+10GW Conference.

"10,000 MW is a real milestone for us. We are pleased to achieve such success for our country. We need to keep the wind industry dynamic with further growth. Announcing a 1,000 MW per year target is not sufficient as this sector has the ability to realize at least 1,500 MW or more annually." Arıcı added. "Wind is one of the areas that can give us the fastest response in clean energy, which will enhance the competitiveness of our industries and exporters. Therefore, the more we can progress to realize the country's 100 GW potential in wind, the more Turkey will benefit. Therefore, continued capacity additions and investment sustainability are vital elements in our agenda," she underlined. The TWEA Chair also pointed out that Turkey has 1,400 MW of wind capacity in the permitting stage.



China Advances in Global Nuclear Race with the First Commercial Onshore Small Modular Reactor



Source: Bloomberg (China Huaneng Group Co.'s 200 MW SMR)

China Huaneng Group Co. (CHNG), one of the largest state-owned power generation companies in China, announced that its 200-MW Small Modular Reactor (SMR) is connected to the grid in Shandong province as the first commercial onshore SMR in the country.

The 200-MW SMR is roughly a fifth of the size of Hualong One, also known as the ACP1000, China's first homegrown reactor design, which was approved by the International Atomic Energy Agency (IAEA) in 2016. While the small size allows for greater scalability as well as reduced operations and deployment costs, this SMR is also the world's first commercial pebble-bed modular high-temperature gas-cooled reactor (PBMR). It uses helium as the coolant.

China National Nuclear Corporation (CNNC) also constructed a multi-purpose 125 MWe pressurized water reactor (PWR), Linglong One or the ACP100, in Hainan province. Designed for electricity production, heating, steam production, and

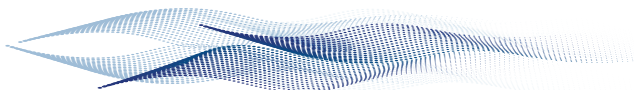
seawater desalination, the ACP100 will be capable of producing 1 TWh/yr. Power plants comprising two to six ACP100 reactors are designed to have a 60-year operating lifetime.

China currently ranks third in the global nuclear reactor portfolio after the United States and France. China has 51 nuclear power units in operation and 19 under construction. China plans to invest \$440 billion in new nuclear power plants over the next 15 years, which would allow the country to overtake the United States as the world's top nuclear power generator.

Rolls-Royce in the UK announced in November 2021 that it had secured a £210-million grant from the government in addition to a £195-million investment from a private consortium. The company announced that its SMR would have 470 MW of capacity, about one-tenth of the size of a conventional nuclear plant, the equivalent footprint of two football pitches. The reactor would meet the power needs of approximately one million homes.

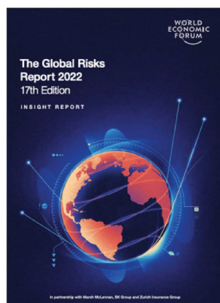
Earlier in June 2021, TerraPower LLC owned by Bill Gates and PacifiCorp owned by Warren Buffet's Berkshire Hathaway announced that they had selected Wyoming to launch the first Sodium reactor project on the site of a retiring coal plant. The project features a 345-MW sodium-cooled fast reactor with molten salt-based technology. The plant is expected to cost about \$1 billion.

SMRs are advanced versions of conventional nuclear power reactors, as their components are factory-assembled and can be transported to any proposed site. While their safety concept often relies more on passive systems, they may also require less frequent refueling cycles. Due to their low-carbon electricity features, many advanced countries now consider SMRs as a key enabler for transition away from fossil fuels in line with net-zero emission targets. According to the IAEA, more than 70 commercial SMR designs have been developed for various purposes including power generation, domestic heating, water desalination, and steam needs for industrial applications.



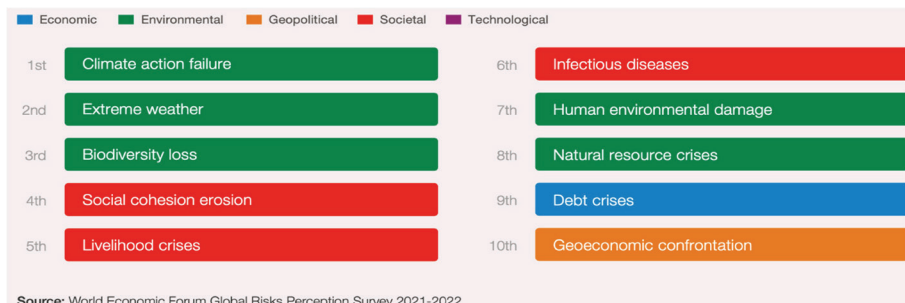
The Global Risks Report 2022 Reveals Climate Action Failure as the Top Risk Facing the World

In its 17th edition, the Global Risks Report identifies critical short-term risks based on the views of over 12,000 country-level leaders from 124 countries, gathered



through the World Economic Forum's Executive Opinion Survey. The risk areas highlighted in the report are aimed at informing national decision-making and providing a perspective on how short-term risks in national priorities may compare with global risks and perspectives. The report proposes thinking beyond the quarterly reporting cycles and creating policies that connect risks to strategies. It demonstrates the need for countries and companies to improve their organizational resilience and learn from the failures and successes of the past two years.

Climate action failure, extreme weather events, and biodiversity loss and ecosystem collapse were the top three major global risks in terms of severity over the next 10 years in the annual Global Risks Perception Survey (GRPS) (Figure 9).



Source: World Economic Forum Global Risks Perception Survey 2021-2022

Figure 9. Top 10 Global Risks for 2022

Respondents to the GRPS 2021–2022 define “climate action failure” as the most critical threat globally with the highest potential to damage both economies and the planet.

The report also warns that as climate change intensifies and some economies recover much faster than others from the Covid-19 pandemic, a disorderly transition could divide societies and a too-slow transition will only create damage and disruption across multiple dimensions over the longer term. It was stated that a lack of coordination in climate action would likely have profound geopolitical implications. It is also suggested that financial systems are rapidly emerging as critical enablers of the transition. However, businesses may be unprepared for transition risks.

The report evokes the idea that without stronger action, the global capacity to mitigate and adapt will be diminished, eventually leading to a “too late” situation with climate change. Complete climate inaction will lead to losses in the range of 4%-18% of global GDP with different impacts across regions. A slower but more orderly transition, which might be more manageable in the short term, is expected to result in the need for deeper and faster changes by 2050. Countries that move faster in the transition will be able to consolidate their national capabilities and clean technology industries and those that move more slowly will lack competitiveness in these prominent areas.

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