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## DOES THE ATTACK ON SAUDI OIL PRODUCTION SUGGEST THAT WE MAY SOON SEE ANOTHER WORLD OIL CRISIS?

**The Attack and Restoration of Saudi Production:** The 14 September attack on Saudi Arabia's oil infrastructure was a stark reminder that the over-supplied global oil market consumers have enjoyed since 2014 continues to have significant supply risks. The damage suffered at Abqaiq and nearby fields knocked out more than half of Saudi production capacity and also dented Saudi Arabia's long-held reputation as a reliable supplier of oil. Nonetheless, production has been quickly restored. Ibrahim Al-Buainain, the chief executive officer of trading arm of Saudi Aramco said that they have restored full oil production and capacity to the levels they were at its pre-attack level of about 9.7 million barrels per day as of Sept. 25 and even "a little higher" to replenish inventories. Before it was apparent that production would be restored so quickly, markets reacted quite mildly to the attack especially compared to past disruptions of a similar or even much lesser magnitude.

**Market Response:** When markets opened on Monday, 16 September after the weekend attack, the price of Brent oil rose as much as 20% with the initial fear of more prolonged supply disruption (prices reached \$72 a barrel) but then closed at \$69 and later on slumped back to \$64. The U.S. benchmark, West Texas Intermediate, increased 16% reaching \$63 a barrel before declining on the 16th of Sept. This price response was much lower than those resulting from past supply disruptions. Past price spikes were much larger often causing



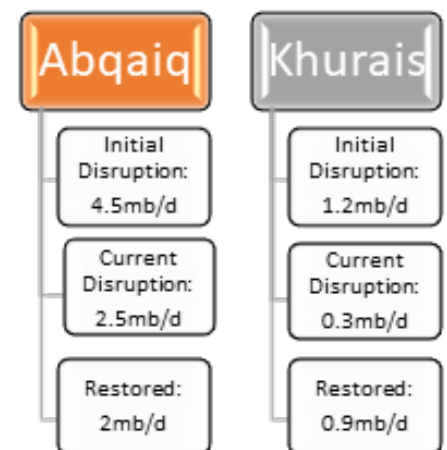
SOURCE: FT

relatively high historic real oil prices and typically causing a significant decrease in real worldwide GDP growth. While the circumstances involving this disruption did not signal a continuing outage as it was clear that Aramco would be able to bring the damaged units back online, the geopolitical risks of increased regional conflict could have been a major concern to markets.

The attack has not only underscored the vulnerability of the world's top oil exporter's infrastructure, but regional tensions could worsen and further threaten the Mid-East oil supply lifeline (especially to Europe and Asia), nonetheless, markets do not appear to have added a larger risk premium to oil futures. Part of the comfort may come from the assurance by the International Energy Agency states that, "We are in contact with Saudi authorities as well as major producers and consumer nations. For now, markets are well supplied with ample commercial stocks." The IEA strategic petroleum stocks, especially those in the U.S., Japan and Germany as well as Chinese

stocks provide a large insurance policy that can keep global oil prices at reasonable levels for an extended period of time.

Nonetheless, the airborne attack was aimed at Kingdom's largest oil fields, the Hijra Khurais, producing 1.3 mb/d and the Abqaiq oil facility, one of the most important oil facilities in the world with a capacity of 7 mb/d. The world biggest oil fields, namely: Ghawar, Shaybah and Khurais crude production come to Abqaiq oil facility before being sent to the customers around the world. Abqaiq is a complex facility that is not only



responsible for processing over half of Saudi Arabia's oil production but also produces 700,000 b/d of NGL's (2018 data). The quick restoration of Abqaiq's operations and Saudi productions should not diminish concerns that Middle East processing centers and choke points remain vulnerable to disruption due to unforeseen circumstances and restoration of supplies could take longer.

**World Economy and Oil Prices:**

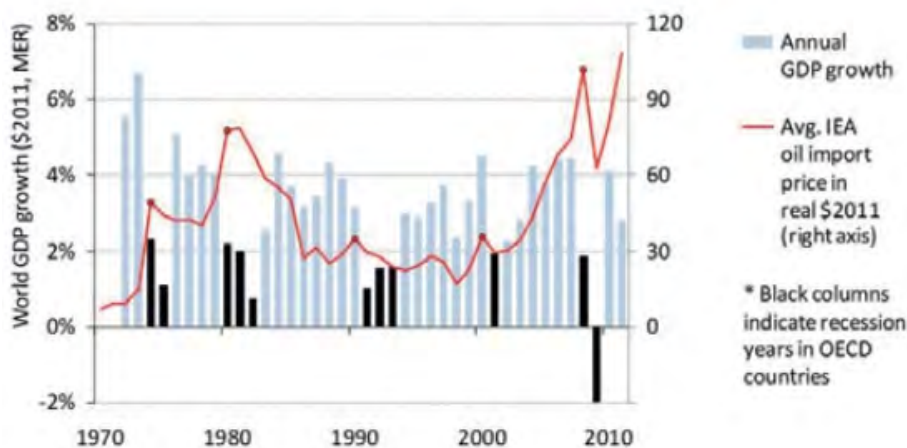
Ever since oil prices collapsed after the energy crises of the 1970s, academics have been divided on the relationship between oil prices and world economies. However, some academic studies show that sharp

oil price increases from unplanned oil disruptions have hurt the global economy. This was the case in major events that took place in 1973, 1979 and 1990, which each caused a sharp decline in oil supply that, in turn, “spiked” oil prices that, in turn,

higher levels than resulted from recent events. If you compare the price consequences of the recent outage to the similar-sized loss of Iraqi and Kuwaiti oil in 1990/1991, it is clear that they are vastly different. The recent oil price increase was much less and returned to normal levels almost immediately. In August 1990, oil prices rose steadily over two months following the invasion of Kuwait and did not begin to moderate, and then decline, until the expulsion of Iraqi forces from Kuwait was a forgone conclusion. Compared to 1990/1991. The recent Saudi supply disruption did not cause an oil “price spike” and the recent “price bubble” is likely to have a negligible impact on the world economy.

**Lessons:** The fortuitous small response of oil prices to the recent Abqaiq attack and quick restoration of Saudi production capacity should not diminish concerns about the vulnerability of the world economies to potential interruptions oil supply. Nor should it diminish the importance of the IEA strategic petroleum stocks. IEA strategic petroleum stocks are the world’s primary economic defense against such eventualities.

International crude oil prices and global GDP growth



**SOURCE:** IEA

decreased world GDP. For instance, after the 1973 oil embargo, the world GDP growth declined by almost 4%. The oil price spike following the 1979 Iranian Revolution preceded a 2% decline in the world GDP. Likewise, after a sharp increase in oil price

during the Gulf War in 1990, the world GDP dropped from 3% to 1% compared to the previous year.

As can be seen from the attached IEA chart, the price increases from these oil supply interruptions was much sharper and reached much

**Sources:**

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## TURKEY AND IRAQ DISCUSS CONSTRUCTION OF NEW OIL AND ELECTRICITY CONNECTIONS

Turkey and Iraq discussed the construction of a new oil pipeline and electricity power line during the latest official visit of Turkey's Minister of Energy and Natural Resources Fatih Dönmez to Baghdad.

Following his meeting with Iraq's Oil Minister Thamer Ghadhban, Dönmez said to reporters that they stressed northern Iraqi oil reserves could access to international markets via a new pipeline running parallel with the existing Kirkuk-Ceyhan oil pipeline which runs to the Ceyhan Oil Terminal located in Turkey's Mediterranean region.<sup>1</sup>

"The Iraq-Turkey oil pipeline is in a position to take on the big task of carrying oil resources not only in the north of Iraq but also to other regions in the market. They [Iraq officials] spoke about new projects, and we welcome them," Dönmez said.<sup>2</sup>

Defining this meeting as a follow-up of the meeting between Iraqi Prime Minister Adil Abdul-Mahdi and Turkish President Recep Tayyip Erdogan in May, Iraqi Oil Minister Thamer Abbas Ghadhban said: "During the meeting, we told the minister about Iraqi Oil Ministry's intention to construct a new oil pipeline to carry Iraq's crude oil from Kirkuk to the Turkish border on the old route, with the Iraqi government's



approval. This pipeline will carry oil resources both from the north and south of Iraq and be linked to the Basra-Aqaba pipeline"

Minister Dönmez also said that the close partnership between two countries could be further built on for electricity as well. "There was a limited amount of trade between Turkey and Iraq in electricity. We want to expand this trade further. As Turkey, we are ready to provide the necessary support for Iraq's electricity infrastructure, including in construction and equipment," he added.

Turkish official delegation was consisting of Deputy Ministers Alparslan Bayraktar and Abdullah Tancan, along with Safa Uslu, Director General of Foreign Relations and International Projects, and Tahsin Yazar, Advisor to the Minister of Treasury and Finance.

Iraq-Turkey Pipeline (ITP), also known as the Kirkuk-Ceyhan, is Iraq's largest pipeline, allowing the country to export oil from two major oil fields near Kirkuk to the Mediterranean port of Ceyhan. The 1,000-kilometer pipeline is owned jointly by the two countries and governed by a 1973 agreement.

Following the new production potential from Tawke and Taq Taq fields in northern Iraq, the Kurdish Regional Government (KRG) began to sell its first ITP-supplied crude oil to Turkish state-owned BOTAS by May 2014. Exporting the oil produced in northern Iraq from Ceyhan port raised a conflict between Ankara and Baghdad, and the Iraqi government commenced a lawsuit in arbitration at the International Chamber of Commerce's International Court of Arbitration (ICA) in Paris. Final hearings are set for September 28, followed by a ruling within 90 days afterward, per ICA procedure.<sup>3</sup>

The final resolution of the ICA is monitored closely by authorities as it may have an impact on the future of Iraqi oil exports.

Iraq's oil exports continued to increase in July, averaging 4,007 million barrels per day (bpd), up from 3,946 million bpd in the previous month.

Turkey imported 6.6 million tons of crude oil -17.8% of the total crude imports- from Iraq in 2018, according to the Annual Petroleum Market Report released by the Energy Market Regulatory Authority.

<sup>1</sup> Ministry of Energy and Natural resources, (August 28, 2019) Irak – Türkiye Arasında Yeni Petrol Hattı Gündemde

<sup>2</sup> Anadolu Agency, (August 11, 2019) Turkey, Iraq discuss construction of new oil pipeline.

<sup>3</sup> Justsecurity.org, (August 22, 2019) The Iraq-Turkey Pipeline dispute: Opportunity in an Arbitration

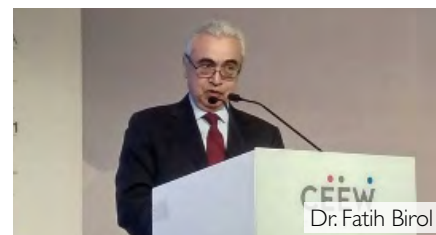
## IEA'S EXECUTIVE DIRECTOR DR. FATIH BIROL VISITED INDIA TO DISCUSS ENERGY PRIORITIES

Dr. Fatih Birol, Executive Director of the International Energy Agency and the Honorary Chairman of IICEC, paid an official visit to India to meet with high-level officials. Joined the IEA as an Association Country in 2017, India this year became the first Association Country to participate in an IEA Governing Board meeting.<sup>6</sup>

Besides various ministerial meetings in order to discuss the energy priorities of the recently elected government, Dr. Birol also delivered a keynote speech on the theme of energy transitions at the Energy Horizons Conference, organized by the policy research organization Council for

Energy, Water and Environment (CEEW). During the conference, the IEA and CEEW also released their latest joint report entitled "Clean Energy Investment Trends 2019: Evolving Risk Perceptions for India's Grid-Connected Renewable Power Projects." Analyzing the renewable energy investment climate in India in light of the risk perceptions of debt financiers towards solar photovoltaic (PV) and wind projects, the report may be downloaded on the IEA's website.<sup>7</sup>

During the visit, a Memorandum of Understanding (MoU) was signed between the IEA and the



Energy & Resources Institute (TERI), another prominent policy research organization, which aims to strengthen cooperation between the two organizations in some key issues. "The IEA has a very strong and positive relationship with India, which we hope to strengthen in the future," Dr. Birol said. "We work with India on many different fronts, including the government's important efforts to improve energy access across the country, and are supporting the country in its energy transition, which is one of the most significant for the global energy system."

## SAUDI ARAMCO AIMS TO BUY RELIANCE STAKE AS EARNINGS DROPPED BY 12%

Saudi Aramco signed a Letter of Intent to take a 20% stake in the refining and chemicals business of India's Reliance Industries Ltd. as a part of the company's long-term diversification strategies, while lower oil prices caused its earnings to drop by 12% in the first half of the year.

"In downstream we will further profitably diversify our operations and increase petrochemicals production," Khalid Al-Dabbagh, Senior Vice President of Finance, strategy, and development, said in his interview with Bloomberg.<sup>4</sup> While he said that the possible agreement with Reliance is in very early stage,

he stressed that the timing of the IPO will be eventually decided by the Saudi government.

Although Aramco's profit decreased to \$46.9 billion in the first half of this year, down from \$53 billion for the same period last year, the company still ranked as the most profitable in the world compared with Apple's \$31.5 billion and Royal Dutch Shell's \$8.8 billion in the same period. "Despite lower oil prices, we continued to deliver solid earnings and strong free cash flow underpinned by our consistent operational performance, cost management and fiscal discipline," CEO Amin Nasser said

in a statement.<sup>5</sup>

The company's total revenue for the same period slightly decreased to \$163.88 billion [from \$167.68 billion last year], when the average selling price fell to \$66 a barrel [from \$69 last year]. While Aramco keeps its production stable around 10 million barrels of oil equivalent a day, it recently focuses to increase its refining and chemicals capacity. Reliance deal will enable Aramco to secure up to 500,000 bpd crude supply contract in Indian market as the energy giant did in other key markets.

<sup>4</sup> Bloomberg, (August 12, 2019) Aramco plans to buy Reliance refining stake as earnings drop

<sup>5</sup> Reuters, (August 12, 2019) Saudi Aramco aims to buy Reliance stake, reports lower earnings

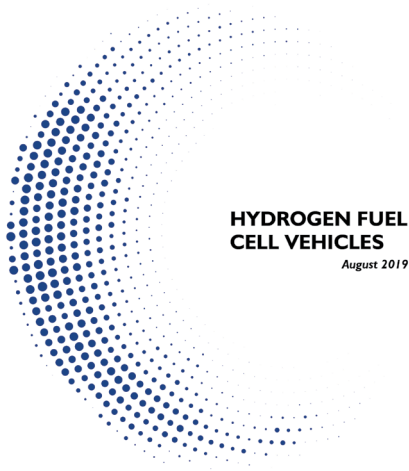
<sup>6</sup> IEA, (July 24, 2019) Executive Director makes official visit to India.

<sup>7</sup> IEA, (July 19, 2019) Clean Energy Investment Trends 2019.

## TWO NEW IICEC ENERGY AND CLIMATE RESEARCH PAPERS RELEASED



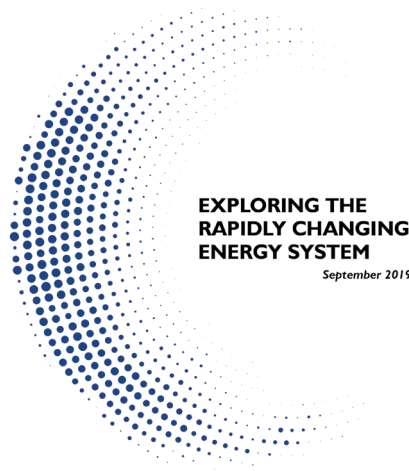
IICEC ENERGY AND CLIMATE RESEARCH PAPER



**Mehmet Doğan Üçök**  
Sabanci University



IICEC ENERGY AND CLIMATE RESEARCH PAPER



**Emre Gençer**  
MIT Energy Initiative | Massachusetts Institute of Technology, Cambridge, MA USA

IICEC invites you to discover HFCVs by clicking [here](#), and our Rapidly Changing Energy System by clicking [here](#).

A new IICEC Energy and Climate Research Paper on “Hydrogen Fuel Cell Vehicles” by Mehmet Doğan Üçök (IICEC) was recently released. Battery electric vehicles (BEVs) are also analyzed and compared to hydrogen fuel cell vehicles (HFCVs). The commercial challenges of HFCVs, are outlined along with the government initiatives to help overcome them. An emission comparison under a variety of refueling assumptions reveals that

a hydrogen vehicle is not always the low-emission choice but, with the right commercialization strategy, HFCVs can provide a wide variety of transportation services with very low full-fuel cycle greenhouse gas emissions.

A second paper on “Exploring the Rapidly Changing Energy System” by Emre Gençer (MIT Energy Initiative) has also been published. This paper provides an overview of technologies

to provide deep emission cuts in the power sector and the use of hydrogen for deep decarbonization. For example, the paper shows that hybridization of natural gas fired power plants can provide several benefits including: an improved match between power production and use profiles, reduced capital costs for transmission and distribution and more cost-effective integration of intermittent renewable energy.

## SOCAR AND BP TO CONSTRUCT MERCURY PETROCHEMICAL COMPLEX IN ALIAGA

SOCAR Turkey Energy announced that it would break ground on the construction of a new petrochemical complex in Turkey’s Aegean province of Izmir early next year. The final investment decision of the \$1.8 billion project is expected to be taken in the last quarter of 2019, and the complex is projected to be commissioned

before the end of 2023.

SOCAR Turkey CEO Zaur Gahramanov said that the new complex, which will be called Mercury, will be built next to the Petkim petrochemical complex and the STAR Refinery in the Aliaga district of Izmir under a joint venture (JV) with BP on an equal footing. Underlining

the synergy to be created thanks to the proximity of Petkim, STAR and Mercury, Gahramanov said that the high value-added petrochemical production in the new complex will allow Turkey to cover the current account deficit of \$6 billion.

SOCAR and BP signed a Heads of Agreement last December to evaluate

the creation of a JV that would build and operate a new petrochemicals complex in Turkey. The facility would produce 1.25 million tons per annum (tpa) of purified terephthalic acid (PTA), 840,000 tpa paraxylene (PX) and 340,000 tpa benzene, according to BP's press release.<sup>8</sup>

Founded in 2008, SOCAR Turkey is the biggest foreign direct investor of Turkey with its total investment

volume of 19.5 billion USD since 2008. The company's investment portfolio in Turkey includes STAR Refinery, Petkim petrochemical complex, Petlim Container Terminal and Trans-Anatolian Natural Gas Pipeline (TANAP).

SOCAR Turkey's latest move seems to be compatible with the long-term strategies of Azerbaijan. As the country has been recently

focusing on petrochemicals to hedge its economy against fluctuating oil prices, three new petrochemical plants recently opened in the country with the ultimate aim to become a petrochemicals exporter.

"Rapid development of the petrochemicals sector will help us to support economic growth if the oil price falls," said SOCAR vice president Suleyman Gasimov.<sup>9</sup>

## TURKEY'S ELECTRICITY IMPORT BILL DOWN OVER 55% IN 1H19

Turkey's electricity import bill for the January-June period of 2019 decreased to \$13.53 million, down by 55.14% from \$30.16 million for the same period of 2018, according to the official data released by the Turkish Statistical Institute (TurkStat).<sup>10</sup>

While Turkey's transmission system operator TEIAS' report shows that the total installed capacity reached

90.84 GW as of August 1, the electricity import in the first half of 2019 reached 332.12 million kWh, compared to 780.86 million kWh in the first half of 2018.<sup>11</sup>

Turkey bought electricity from five countries -Azerbaijan, Bulgaria, Czechia, Georgia, and Greece- over this period. Bulgaria held the biggest share with 232.34 million

kWh electricity importation for which Turkey paid \$9.95 million in return. Bulgaria was followed by Georgia with 12.69 million kWh of imports valuing \$2.95 million.

June saw the highest electricity imports in the first half of 2019 when Turkey imported 78.63 million kWh of electricity and paid \$2.47 million in total.

## CLIMATE CRISIS REDUCING LAND'S ABILITY TO SUSTAIN HUMANITY, SAYS IPCC

The Intergovernmental Panel on Climate Change (IPCC) argued that the climate change radically reduces the ability of the land to sustain humanity.<sup>12</sup> According to the organization's latest report entitled Summary for Policymakers of the Special Report on Climate Change and Land, global heating will cause unprecedented climate conditions at lower latitudes, including growth in hunger, migration and conflict.

As the report claims that the humanity now faces a "stark choice

between a vicious or virtuous circle", it lists allowing soils and forests to regenerate and store carbon as well as cutting meat consumption by people and food waste as the major actions to tackle the climate crisis. Burning of fossil fuels should end as well to avoid "irreversible loss in land ecosystem services required for food, health, and habitable settlements", the report says.

Identifying the destruction of forests, huge cattle herds and overuse of chemical fertilizers as the key factors

for greenhouse gas emissions, the report asserts the rising temperatures as the major reason behind deserts to spread, particularly in Asia and Africa. The most challenging issue in the report is that soil is being lost more than 100 times faster than it is being formed in ploughed areas, and lost 10 to 20 times faster even on fields that are not tilled. The report strongly suggests ending deforestation and enabling new forests to grow, reforming farming subsidies, supporting small farmers and breeding more resilient crops.

<sup>8</sup> BP, (December 20, 2018) SOCAR and BP explore the creation of a new petrochemicals joint venture in Turkey

<sup>9</sup> Reuters, (August 6, 2019) Azerbaijan targets petrochemicals in push to reduce reliance on oil and gas

<sup>10</sup> Anadolu Agency, (August 1, 2019) Turkey's electricity import bill down over 55% in 1H19.

<sup>11</sup> TEIAS, (August 1, 2019) Installed Capacity Report

<sup>12</sup> IPCC, (August 8, 2019) Summary for Policymakers of the Special Report on Climate Change and Land (SRCCL)



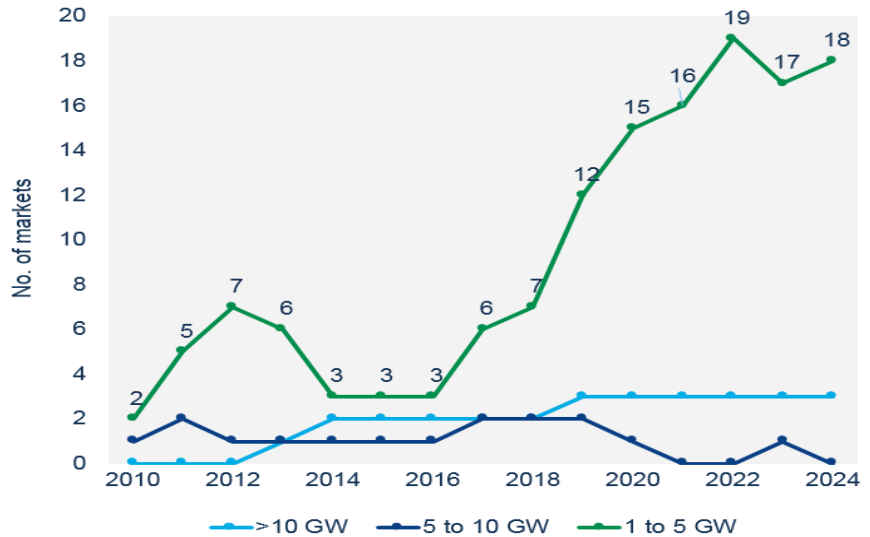
## GLOBAL SOLAR PV INSTALLATIONS SET TO HIT RECORD IN 2019

The latest research released by the global natural resources consultancy Wood Mackenzie says that the global solar photovoltaic (PV) installations will reach a new high of 114.5 GW in 2019, 17.5% higher than the previous year.

Global Solar Outlook forecasts annual solar installations to increase up to 125 GW per year by the early 2020s. “The Chinese market peaked at 53 GW in 2017, driven by generous feed-in tariffs. A move towards more competitive procurement of solar PV will lead to more sustainable annual additions of 30-40 GW,” Tom Heggarty, senior research analyst, said.

As the report claims that the auctions will remain the driver of growth in

No. of markets by annual installations



Graphic 3: Number of Markets by Annual Installations<sup>13</sup>

many global PV markets, it forecasts 90 GW of solar PV projects to be

awarded through auctions in 2019, up from 81 GW in 2018.

## SHELL CONSIDERS SOLAR PANELS TO POWER ITS REFINERY IN SINGAPORE

Oil and gas supermajor Royal Dutch Shell is plans to install solar panels at its Pulau Bukom refinery in Singapore. Pulau Bukom is one of Shell’s most important oil refining and petrochemicals production sites globally and serves as a hub for selling refined oil products in Asia Pacific. As the site is Shell’s largest wholly-owned refinery in terms of crude distillation capacity of 500,000 bpd, it also includes an ethylene cracker complex with the capacity to



produce up to a million tons a year and a Butadiene Extraction Unit capable of producing 155,000 tons annually.

Shell recently increased its storage

capacity at Pulau Bukom, enabling it “to buy more oil when market conditions are attractive,” Robin Mooldijk, Executive Vice President for Manufacturing, said.<sup>14</sup>

<sup>13</sup> Wood Mackenzie, (July 25, 2019) Global Solar PV Market Outlook Update: Q2 2019

<sup>14</sup> Shell, (June 6, 2019) Shell completes storage expansion at Singapore refinery

In line with the company's energy efficiency and carbon footprint strategies, Shell also plans to install solar PV power generation systems at three of its sites in Singapore, namely Tuas, Jurong Island, and Pandan.<sup>15</sup>

"At our sites, we are deploying solutions from Shell New Energies, and are actively pursuing opportunities to trial next-generation advanced manufacturing and clean

energy technologies. It is our goal to make the transition towards a low-carbon future possible, for our operations and our customers," Aw Kah Peng, Chairman, Shell Companies in Singapore, said in a statement.

Last month, Shell's Chief Executive Ben van Beurden said that the world reducing emissions to net-zero "is the only way to go" and called on businesses to work together to

move faster in addressing climate change.<sup>16</sup> "The whole world has to get to that point. Now some people say the whole world needs to get there by 2070, and some people say 'no, you have to get there by 2050'. But whatever timeframe you pick, getting to net zero will require an absolutely unprecedented level of coordinated action. And I believe governments will need to do a lot and will need a lot of help as well," he said.

## AUSTRALIA PLEDGES A NEW DONATION PACKAGE TO PACIFIC ISLANDS FOR RENEWABLE PROJECTS

Australia will donate A\$500 million (\$339 million) to Pacific Islands for renewable energy projects and to help its neighbors prepare for the impact of climate change, Prime Minister Scott Morrison announced. "The Pacific is our home, which we share as a family of nations. We're here to work with our Pacific partners to confront the potential challenges they face in the years ahead," he said in a statement before his trip to Tuvalu for the Pacific Islands Forum.

Pacific Island leaders have recently declared a climate emergency due to rising sea levels and other climate-related crises that have forced some residents to move to higher



ground, and also called for stronger action by Australia which refused to strengthen emission targets in order to protect its coal mining industry.

While Australia officially committed A\$3 billion cheap loans and grants for Pacific Islands, the country's Minister for the Pacific, Alex Hawke, said that they will not agree to a communique demanding tougher climate goals. "Australia's position on coal is we

won't have a communique where coal and coal-fired generation, or phasing it out now, is a realistic proposition," he said.

In June, Australia approved a major new coal mine in the state of Queensland by India's Adani Enterprises that is expected to produce 8-10 million tons of thermal coal each year.

<sup>15</sup> Shell, (August 5, 2019) Shell uses solar to help power three Singapore sites

<sup>16</sup> BusinessGreen, (July 4, 2019) Shell boss: Net zero is 'the only way to go'

## PORTUGAL'S SOLAR ENERGY AUCTION BREAKS WORLD RECORD

Portugal's latest auction of solar energy broke a world record, with one of the 24 licenses on offer selling for 14.76 euros per MWh, the Secretary of State for Energy Joao Galamba said.

Galamba described the figure, which is far below the auction's ceiling price of 45/MWh, as a new world record. The tariff was assigned to the largest tender winner, a 150 MW project the state secretary would not identify and which competed under the auction's first of two modalities, featuring a fixed price. According to him, contracts under this first category featured an average tariff of 20.33/MWh. Galamba linked the 14.76/MWh milestone to the fierce competition witnessed for some of the 22 lots that were put up for auction. "There were batches where we had more than 20 contenders," he said.

The auction granted solar winners a total of 1.15 GW in contracts, slightly lower than the volume it was meant to tender and just around a tenth of the 10 GW that solar developers put forward when bidding opened this summer. Galamba declared that



there were 13 winners, without giving any names. "This auction shows that the energy transition, to which the government is committed, not only can strongly accelerate investment and the penetration of renewables in Portugal, but it can be done at very low prices," he added.

The tender awarded 862 MW of the 1.15 GW total through the first modality, intended to offer 15-year fixed-price PPA to players. The remaining 288 MW was contracted under a second batch, where developments are made to pay in return for the right to produce at market prices, also for 15 years. Under this second route, the average contribution agreed by developers reached 21.35/MWh. The highest

and lowest payment among auction winners came in at a respective 26.75 and 5.1 for every MWh produced, the Secretary added.

"We believe the conditions are there to commit participants to real investments. Winners have to pay 50,000/MW in guarantees and are forbidden to sell their license to another party," Galamba stressed, adding that firms must complete their projects within three years.

The government aims to increase the country's installed capacity from 572MW in 2018 up to 1.6 GW in 2021 and 8.1 GW-9.9 GW in 2030. The next tender will be held for a 700 MW second solar tender and a separate auction for energy storage, both in the first quarter of 2020.

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