

LIFE AFTER COVID-19

مؤسسة دبي للمستقبل
DUBAI FUTURE FOUNDATION



FUTURE TRENDS

TACKLING CLIMATE CHANGE





INSIGHTS IN BRIEF



COVID-19 has drastically reduced greenhouse gas emissions as well as air pollution, but these effects are temporary.



The world's economies are expected to shrink this year, yet we will have the chance to rebuild them in a more sustainable way.



We can direct COVID-19 economic stimulus packages toward initiatives which not only rescue economies, but address climate change as well.



In addition to reducing emissions, we need to begin removing excess greenhouse gases if we are to prevent a climate crisis.



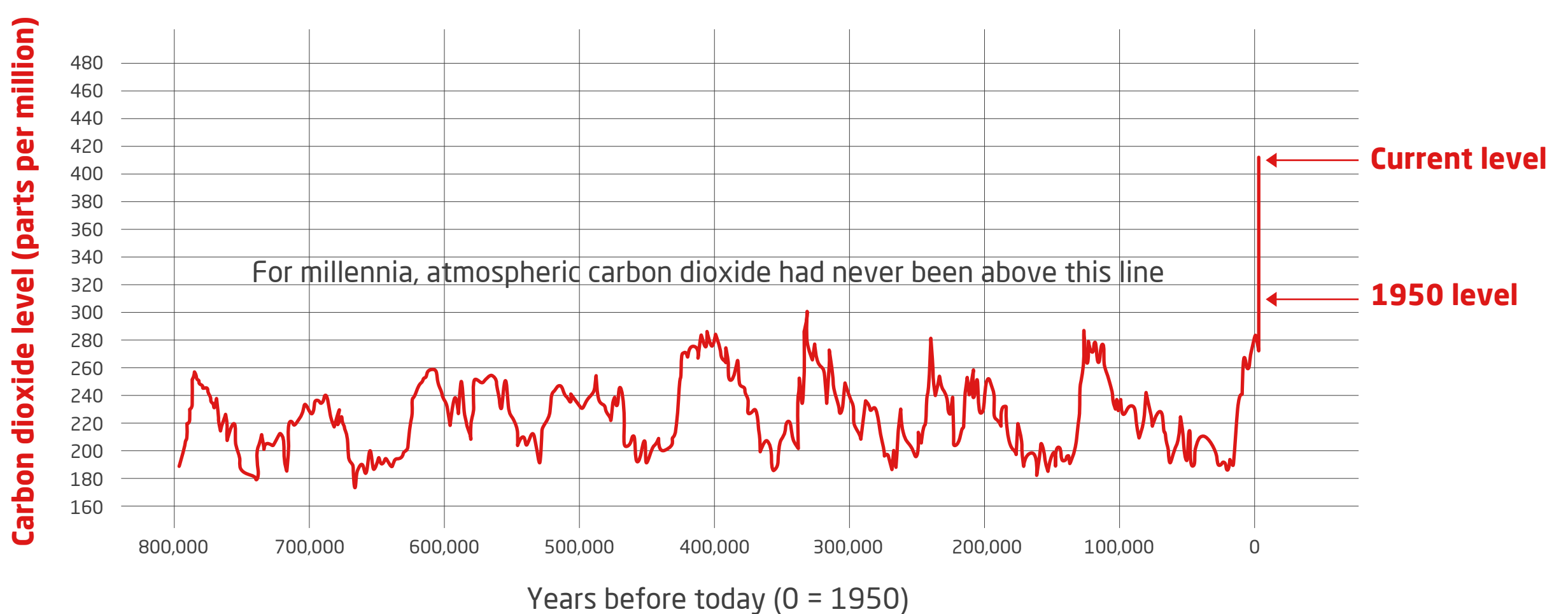
CURRENT SITUATION

The late 18th century marked the beginning of the First Industrial Revolution. This was an inflection point for the human race, introducing mechanical production and allowing us to overcome the limitations of muscle power. It was followed by more waves of change, sometimes described as further industrial revolutions: the second making mass production possible; the third being the digital revolution of computing and the internet; and the fourth, now underway, seeing the convergence of physical and digital technologies. Humanity prospered, with the world's population growing from 1 billion to 7.7 billion in a little over 200 years¹. It all started with James Watt's development of steam power. This ability to convert fossil fuels into mechanical energy enabled innovations such as factories, electricity, and internal combustion engines, to name just a few. However, the process of converting fossil fuels into energy also has by-products in the form of greenhouse gases (GHGs), which trap the sun's heat in our atmosphere. GHGs also occur naturally and are an essential part of our planet's ecosystem, but too great a volume of them can cause it to overheat. Furthermore, GHGs accumulate over time. When a GHG such as carbon dioxide is released into the atmosphere from activities such as the burning of fossil fuels, approximately 25% is absorbed by land plants and trees, 30% is absorbed into the oceans, and 45% remains in the atmosphere where it can remain unabsorbed for thousands of years.²

¹ Our World in Data - "World Population Growth" May 2019

² The Earth Observatory, NASA - "Effects of Changing the Carbon Cycle" June 2011

Scientists measure the concentration of carbon dioxide in the atmosphere in terms of parts per million, or ppm. Until the First Industrial Revolution, for around 650,000 years, the concentration of carbon dioxide in the atmosphere fluctuated between 180 to 300 ppm. As successive industrial revolutions gathered pace, so too did our emissions, in part because no price was placed on them. Carbon dioxide concentrations kept accumulating, and rose from 285 ppm in 1850, to 414 ppm as of April 2020³. Likewise, global temperatures increased by 1 degree Celsius since 1850⁴.



Source: NASA

The consequences of temperature rises are devastating, including extreme weather conditions, food supply disruptions, and rising sea levels. The World Bank has stated that the MENA region is one of the most vulnerable places to rising sea levels. In Egypt, for example, Alexandria, a city of 5 million people, is sinking⁵. In Morocco, a drought in 2015 led to the loss of more than half of the wheat harvest and a 1.5 per cent drop in the country's GDP⁶. Over the past decade alone, global losses from natural disasters have amounted to \$3 trillion⁷. Aside from the impact on temperatures, the increasing carbon dioxide levels are also making our oceans more acidic. The list of downsides is alarming, and the expert Intergovernmental Panel on Climate Change has reported that unless carbon dioxide emissions are reduced by 45% from 2010 levels by 2030⁸, we will not be able to avoid consequences that would irreversibly compromise human livelihoods.

³ SeaLevel.info, NASA, Global Monitoring Laboratory (Mauna Loa Observatory)

⁴ The Met Office

⁵ World Economic Forum - "How the Middle East is suffering on the front lines of climate change" April 2019

⁶ United Nations - "Middle East and North Africa region taking action to combat climate change" November 2016

⁷ Reuters - "Last decade most expensive for natural disasters: report" January 2020

⁸ IPCC, 2018: Global Warming of 1.5°C, Summary for Policymakers

The level of GHGs in the atmosphere is roughly the same all over the world, regardless of the source of emissions. This makes climate change a global problem, requiring a global solution. The world came together to fight climate change by creating the UN Framework Convention on Climate Change (UNFCCC), committing to some emissions reductions in 1997 through the Kyoto Protocol, and many more in 2015 through the Paris Agreement. 189 parties from around the world have ratified the Paris Agreement⁹, agreeing to an aim of holding the increase in global temperatures to well below 2 degrees Celsius above pre-industrial levels and pursuing efforts to limit it to 1.5 degrees.¹⁰



The sources responsible for GHG emissions that drive climate change are often also responsible for releasing air pollutants that affect human health, such as nitrogen oxides and carbon monoxide. Vehicles, power generating plants, building heating systems, agriculture, waste incineration and industry are all major sources of ambient air pollution that causes an estimated 4.2 million deaths per year.¹¹

⁹ UNFCCC <https://unfccc.int/process/the-paris-agreement/status-of-ratification>

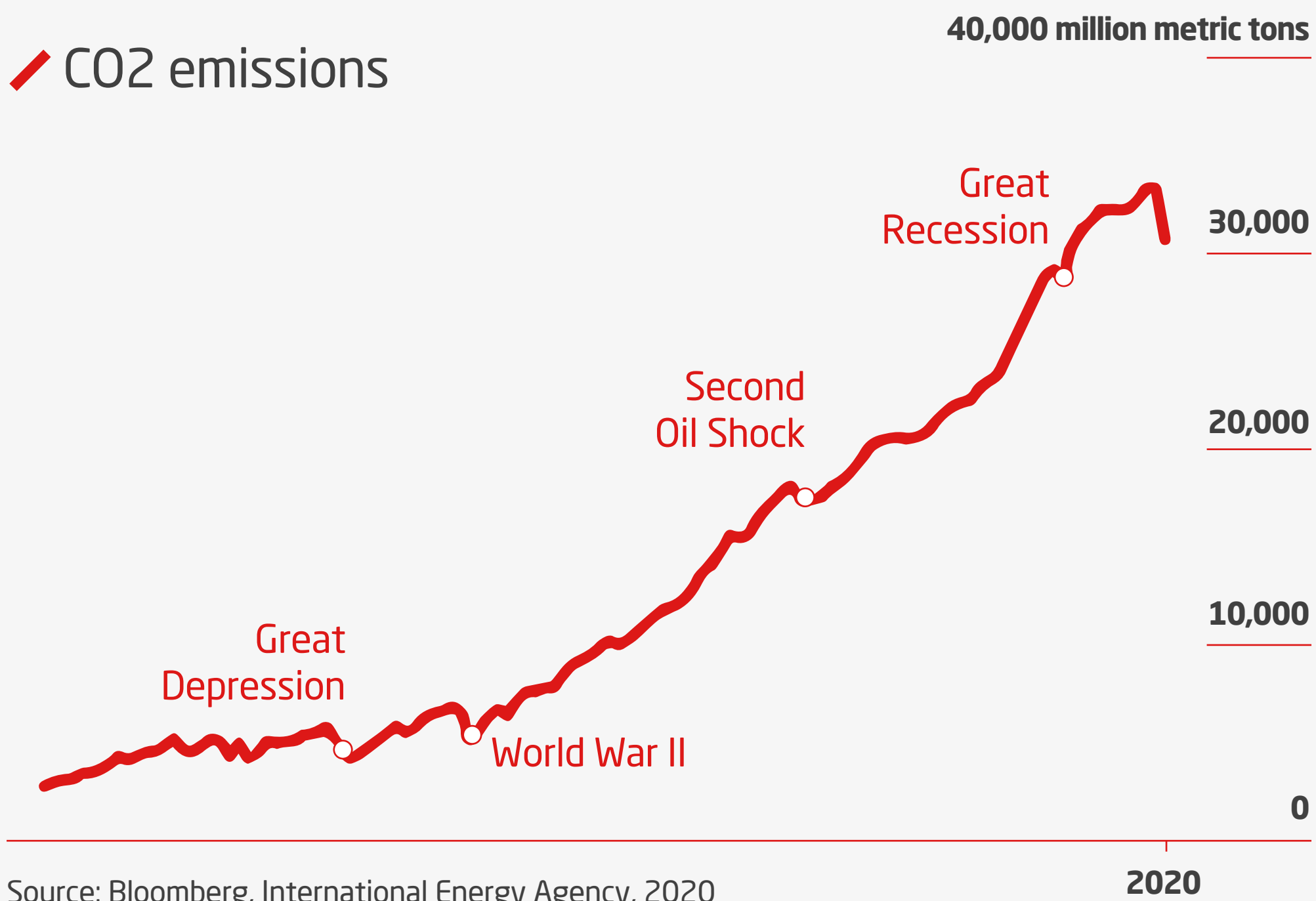
¹⁰ UNFCCC Paris Agreement <https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf>

¹¹ <https://www.who.int/health-topics/air-pollution>

The COVID-19 outbreak has suddenly and drastically changed our lives. Flights have been grounded, businesses have shut down, and people are staying home. As a result, global carbon dioxide emissions are set to decline 8% in 2020¹². Air pollution has also dropped significantly. In Abu Dhabi, there has been a 62 percent reduction in nitrogen dioxide levels during the pandemic¹³. Even in some of the most polluted cities in the world the skies have literally turned blue.

Emissions Blip

Global emissions will decline to 30.6 billion metric tons this year



Yet, these falls are likely to be temporary, with minimal impact on our climate’s long-term prospects. Although the world is expected to emit 2.6 billion metric tons less this year than last, we will still be adding a forecast total of 30.6 billion tons of carbon dioxide to our atmosphere¹⁴. Furthermore, the current emissions levels are not representative of future levels after COVID-19. Although certain changes we have experienced during the pandemic may remain to a certain extent - changes such as working from home and shopping online - emission levels are expected to rise again as economic activity is resumed.

¹² IEA - “Global Energy Review 2020” April 2020

¹³ The National - “Coronavirus: Air quality in Abu Dhabi continues to improve due to restrictions” May 2020

¹⁴ Bloomberg - “The Pandemic Delivers Small Wins for the Climate” May 2020

OPPORTUNITY

The COVID-19 crisis is expected to shrink global economies this year¹⁵, and it will take some time to return to growth. Once we do, and as the world rebuilds itself, the question we need to address is what kind of world we want to build? Do we want to go back to the way things were? Or do we want to do things differently, seize opportunities and build a better world? This is an urgent matter because around the world, governments are pouring trillions of dollars in stimulus measures into their economies to keep them afloat. The United States is introducing new tax breaks expected to total about \$650 billion¹⁶. Regionally, Saudi Arabia is supporting its private sector through a \$48 billion stimulus¹⁷, and the UAE is providing AED 126.5 billion (\$34.4 billion) in stimulus measures¹⁸. These funds can be directed toward initiatives which not only rescue economies but also address climate change. The two are not mutually exclusive, at least not anymore. For example, in most parts of the world, including the Middle East, renewables are now the lowest-cost source of new power generation¹⁹, and are likely to be even more cost-effective when costs to the environment are taken into account.

Saudi Arabia is supporting its private sector through a
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(**\$34.4 billion**)

¹⁵ IMF - "World Economic Outlook, April 2020: The Great Lockdown" April 2020

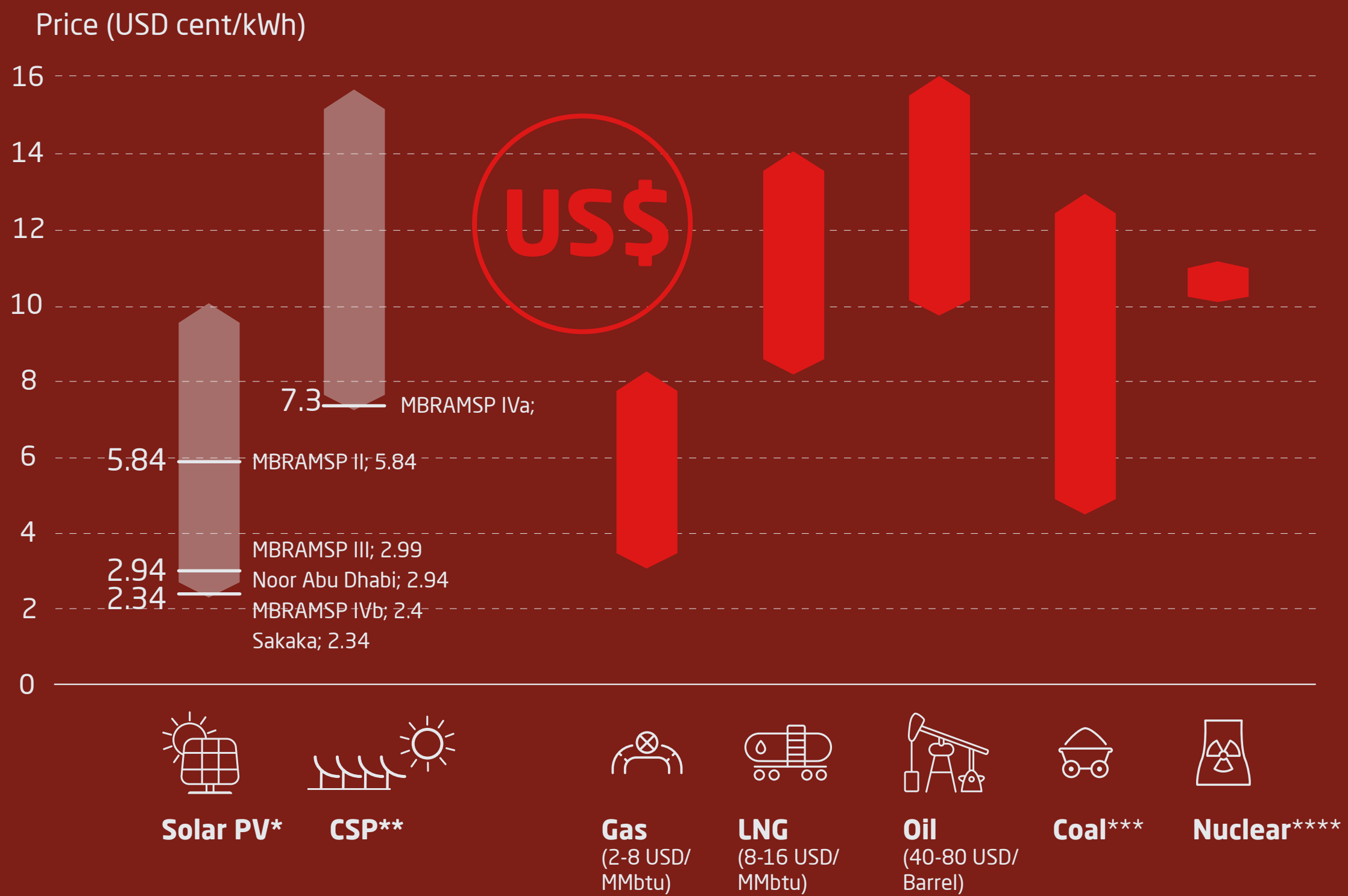
¹⁶ The Wall Street Journal - "Companies Start Reaping Billions in Tax Breaks to Ride Out Economic Slump" May 2020

¹⁷ KPMG - "Government and institution measures in response to COVID-19" May 2020

¹⁸ UAE Government - "Economic support to minimise the impact of COVID-19" May 2020

¹⁹ IRENA (2019), 'Renewable Energy Market Analysis: GCC 2019'. IRENA, Abu Dhabi

PRICE OF UTILITY-SCALE ELECTRICITY GENERATION TECHNOLOGIES IN THE GCC



Sources: IRENA, Derived from Mills, 2018; Channell et al., 2015; Manaar, 2014; Scribblers, 2015.

- * Low = price for 300 MW Sakaka solar PV; and High = a conservative assumption based on project data and expert opinion
- ** Low = price for 700 MW MBRAMSP IVb in Dubai; and High = price for Morocco's Noor II
- *** Low = price for the Hassyan Clean Coal Power Plant; and High = estimate for coal with CCS
- **** Estimated range for nuclear power based on (Mills, 2012) and (Scribblers, 2015)

Decisions we make in emerging from this crisis will significantly impact our future, with long-lasting effects on our economies. Governments are unlikely to have another such opportunity to direct this scale of funding into climate action. In Europe, for example, nations are already working toward a green recovery. The European Commission, which is the executive branch of the European Union, recently unveiled a €750 billion (\$826 billion) stimulus package that it says will put fighting climate change at the heart of the bloc's recovery from the coronavirus pandemic²⁰. German Chancellor Angela Merkel has been emphasizing the need to focus on climate protection when considering COVID-19 stimulus packages²¹, and Iceland has included funding for projects tackling climate change in its second coronavirus economic stimulus package²². Corporations are also voicing their support for a green recovery. A group of more than 150 companies worth \$2.4 trillion are asking policy-makers for a response which is "grounded in bold climate action"²³.

²⁰ Reuters - "Factbox: Key climate spending in EU's 'green recovery' plan" May 2020

²¹ Reuters - "Germany's Merkel wants green recovery from coronavirus crisis" April 2020

²² Matador Network - "Iceland is using its coronavirus stimulus package to fight climate change" May 2020

²³ Bloomberg - "Companies Worth \$2 Trillion Are Calling for a Green Recovery" May 2020

As part of the Paris Agreement, countries are required to submit climate action plans, known as Nationally Determined Contributions, or NDCs. As countries prepare to submit their second round of NDCs in 2020, they should take advantage of reduced costs and COVID-19 economic stimulus measures to provide more aggressive commitments than previously planned. MENA countries are in a particularly advantageous position to do this due to their high levels of Global Horizontal Irradiation (GHI) and Direct Normal Irradiation (DNI), measures related to sunlight which signify suitability for solar power. In addition to solar power, contrary to some common perceptions, MENA countries have very good wind resources as well²⁴.

The pandemic has also highlighted the value of data in responding to crises. Timely and accurate data has allowed countries to allocate healthcare resources where needed, and contact-tracing apps have been able to manage the spread of the virus. In the effort to overcome climate change, there is also room for more accurate data, including that which distinguishes between anthropogenic and natural GHGs. There is an opportunity for further investment into satellite sensors that can provide this data, enabling countries to identify emissions hotspots and verify their emissions reductions with higher accuracy.



²⁴ IRENA (2019), 'Renewable Energy Market Analysis: GCC 2019'. IRENA, Abu Dhabi

THE LONG VIEW

Ultimately, even the most ambitious targets set by the Paris Agreement would see global temperatures rise to at least 1.5 degrees Celsius above pre-industrial levels - an outcome which is becoming an increasingly unlikely best-case scenario. Even in this situation, accumulated carbon dioxide would still increase further.

Therefore, in addition to reducing emissions, we need to begin removing excess greenhouse gases we have built up over the last two centuries. One way to remove carbon dioxide is through afforestation, planting trees where none previously existed, or through reforestation, recovering lost trees. It is also possible to enhance ocean absorption, but this can lead to undesired consequences of its own, such as ocean acidification and affecting marine life. Carbon dioxide removal is one of two main forms of geoengineering solutions being proposed, the other being reducing the amount of the sun's energy reaching the surface of the planet. This can be achieved by injecting sulfate particles into the upper atmosphere or by injecting sea salt into the lower atmosphere to seed or brighten clouds so that they reflect incoming sunlight away from the planet²⁵. However, geoengineering solutions are often dismissed due to the scale of the problem we are facing. For example, we would need to plant more than a billion trees to offset our current level of emissions.

²⁵ NASA Global Climate Change: Vital Signs of the Planet "Just 5 questions: Hacking the planet" April 2014

A promising yet unconventional carbon dioxide removal method would be the use of large scale carbon capture plants. Carbon Capture and Sequestration (CCS) technologies have existed for decades, capturing carbon dioxide emitted by industrial sources on-site, and burying it underground. Recently, however, companies have been able to effectively capture carbon dioxide directly from the atmosphere, regardless of location. This approach, referred to as 'direct air capture', is still in its early stages, but there are startups around the world that have now proven the technology. Bill Gates-backed Carbon Engineering, for example, is in the process of setting up its first full-scale commercial plant, set to capture one million tons of carbon dioxide annually, once complete, by 2023. Each direct air capture plant has the potential to do the work of 40 million trees. The captured carbon dioxide can later be combined with hydrogen to create carbon-neutral fuels which are compatible with existing engines.



Image: Carbon Engineering

LOOKING AHEAD

Short term insights and recommendations (during COVID-19 outbreak)



- **Governments should promote a green recovery from this crisis** by directing economic stimulus packages toward initiatives which rescue economies and address climate change together.
- **Countries should revise previously planned Nationally Determined Contributions (NDCs)**, which are due to be submitted by the end of 2020, providing more aggressive measures.

Short to long term insights and recommendations (during COVID-19 outbreak)



- **In addition to reducing emissions, countries should focus on carbon removal technologies**, and invite the brightest entrepreneurs and innovators to pitch unconventional approaches to removing the buildup of carbon dioxide.