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“Pathways To a Clean, Stable and Sustainable Energy Future”

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The recently concluded 44th IAEE International Conference in Riyadh, Kingdom of Saudi Arabia, discussed multiple avenues toward exploring the most efficient pathways to a clean, stable, and sustainable energy future. The Conference, held for the first time in MENA, underscored the critical messages of ensuring stable energy markets, continued investments in fossil fuel sources, and increasing investments in diversified renewable energy sources toward ensuring an orderly energy transition to a sustainable net-zero future.

Although renewables accounted for over 80% of all new power-generating capacity in 2021, they still comprise only about 4% of today's energy mix.¹ Despite the significant advances in alternative energy sources like renewables, fossil fuels, including oil, coal, and natural gas, continue to supply around 80% of the world's energy.² The decarbonization of existing fuel will be key to achieving the goals of the Paris Agreement, to reach net-zero greenhouse gas emissions and deliver on governments' commitments, as those sources will be part of the global energy in 2050 and beyond. Therefore, it is critical that investment in hydrocarbons continues to ensure energy security and energy access to a vast majority on the planet who struggle with energy poverty, and helps propel the engine of global economic growth while mitigating emissions from those sources. However, energy markets are being impacted by policy uncertainty, leading to policy risk feeding into price volatility. These risks are exacerbated by political moves toward resource nationalism and reduced access to global markets, reversing the previous globalization policy. To achieve an orderly global energy transition, we need to ensure that there are no disruptions in the energy supply and address these challenges.

Therefore, it is essential to take a sensible macro view of the challenges that we are facing. The projections show that global energy demand will increase by 30% by 2050 due to the expanding global population, estimated to grow from 8 billion to 9.8 billion people. This surge in demand will have far-reaching implications for the world's energy infrastructure as governments and businesses strive to meet the needs of a rapidly increasing population. The population in the MENA region alone will almost double in the next 50 years, according to the Population Reference Bureau, and 90% of the GCC's residents will live in cities by 2050. We are responsible to billions of people worldwide to ensure they have access to the energy they need.

Given that there are forecasts that an additional 400 million people globally will gain access to electricity in the next 15 years, feeding into an increased need for

a stable, ongoing, and reliable supply of energy, the recent and growing polarization of the climate debate is not helpful because this is not a binary issue; it's taking place in an increasingly interconnected world with multiple aspects globally. As we address this issue, we must balance industry, government, and academic approaches, ensuring that the broadest possible range of views and reliable data is incorporated in policy, discussion, and action. Conventional energy must be utilized with alternative energy sources while prioritizing reduced emissions to meet the growing global energy demand and achieve net-zero emissions goals.

Policymakers recognize that the energy transition will take time as well as substantial financial and technological investments. They are engaging in a pragmatic conversation on a natural energy transition: ambitious but also practical, with a long-term goal to restrict emissions but not progress. The economic and environmental development security of the world must be balanced. The adoption of renewable energy and other low-carbon sources has the potential to provide long-lasting energy security, but we are not there yet. There has been a significant drop in the cost of renewables, now cheaper than coal, for decades considered the cheapest source of electricity. While solar became 89% cheaper and wind 70%, coal's electricity price declined by only 2%.³

The impact of the Covid-19 global pandemic persists in upended demand for energy. Central banks, which were earlier profligate during the pandemic with financial stimulus packages to boost consumption and spending to stabilize demand-hit pandemic economies, are now coming face to face with increased inflation and are seeking to shrink their balance sheets and raise interest rates. These moves will have repercussions on project financing and costs across the board, further fuelling inflationary trends globally. Mobilizing the finance and resources needed to enable a sustainable, reliable, and stable energy transition and accelerating the deployment of modern renewable energy and battery storage, CCUS, clean hydrogen, energy efficiency, and even electric vehicles have become increasingly important. For developing countries, the increasing role of financing in the energy transition is critical, primarily as they often do not have access to developed markets domestically. Increasingly complex and structured green finance products often inhibit their ability to finance energy transition projects, making them lag in deploying energy transition technologies. This increases pressures on these countries to develop low-cost adaptation pathways which are

accessible, equitable, and have a focus on generating profits to increase investor attractiveness.

We cannot, however, talk about energy without talking about trade. The effects of the Covid-19 pandemic and the ongoing conflict between Russia and Ukraine have entirely changed the energy landscape. It raises the critical issue of how trade and global energy requirements are intrinsically linked. The world was already facing a profound energy-supply crunch as economies began to bounce back from the Covid-19 pandemic. The Russia-Ukraine conflict made a tight market even tighter and forced countries to reassess their urgent near-term strategic energy needs. By banning Russian oil and gas, we have raised the cost of doing business for the simple reason that trade is about cost efficiency. Trade is vital to ensuring energy security and the foundation of initiatives and plans to utilize low emissions. The undeniable reality is that energy security and climate action are inextricably linked, and one cannot exist without the other. It is a simple fact that if people's essential energy needs are not met, economic growth will be hindered, thus stifling meaningful climate action. Trade also profoundly affects any initiatives seen as part of the journey toward meeting net-zero goals. For example, sales of electric vehicles (EVs) globally doubled in 2021 from the previous year to a new record of 6.9 million. This is good news, but as the electrification of various modes of transportation becomes more widespread, the limitations of this approach will become increasingly apparent.

With this rising demand for electric vehicles comes a growing need for raw materials, manufactured materials, and energy sources. This mainly includes battery metals such as lithium, manganese, nickel, and cobalt. The Democratic Republic of the Congo has nearly half of the world's cobalt reserves needed to achieve economic goals, including EV usage, so a new trade structure is required to facilitate the movement of these critical minerals. Likewise, global lithium production surpassed 100,000 tonnes for the first time in 2021, quadrupling from 2010. Roughly 90% of lithium came from just three countries – Australia, Chile, and China – and we now see a supply gap with a limited production and refining capacity. Meanwhile, 39% of manganese comes from South Africa, so again, there is a precarious supply and demand issue surrounding trade and the availability of components required for EVs.

To overcome this, we need to improve the resilience of supply chains for different minerals and an overarching international framework for dialogue and policy coordination among producers and consumers. The case of EVs is one example, but it applies to everything, making it incredibly difficult to transition from fossil fuels to renewables. In contrast, investments in renewable deployment could become expensive due to trade and supply issues. The criticality of these aspects will increasingly impact investments in the decarbonization of sectors such as transport. Policymakers are increasingly focusing on growing the penetration of electric vehicles in public transport and providing sustainable transport options to consumers. A crucial part of the

transportation paradigm is the increasing focus on sustainable and resilient cities becoming more relevant as the pressures of urbanization increase exponentially. We need a pragmatic, inclusive, holistic approach to the energy transition and security. We should be realistic, pursue this vital challenge, and avoid a crowd-out effect. This, however, is easier said than done. Especially as countries seek to focus on energy transition as a commercial opportunity rather than to collaborate, and collaborate equitably, a framework approach that helps governments work together to tackle such global problems could help ensure that the gains of such cooperation are available to a broader population.

A circular carbon economy with a robust framework for managing and reducing emissions is an excellent place to start – a closed-loop system involving the 4Rs: reduce, reuse, recycle, and remove. The Kingdom of Saudi Arabia, including Aramco, are among those who have adopted the circular carbon economy framework to reduce their carbon footprints. The industry can also embrace technology, including artificial intelligence and big data, to minimize emissions by monitoring company energy consumption and to optimize operations, improving seismic processing and analysis, optimizing crude oil recovery methods, and enhancing oil well productivity. Many of the innovations and technology we see as part of that transition process already come from the major oil and gas producers. The world's legacy energy companies are not only a key part of the energy transition but will also lead it. Through this holistic and multi-faceted approach, the immediate and long-term impacts will be transformative, given that oil will remain vital for global sustainability for decades. Not only because it's the primary source of global energy and many thousands of daily items we rely upon.

Petrochemicals derived from oil and natural gas make manufacturing over 6,000 everyday products and high-tech devices possible. Primary petrochemicals — including ethylene, propylene, acetylene, benzene, toluene, and natural gas constituents like methane, propane, and ethane — are the feedstock chemicals needed to produce many items we use and depend upon every day.⁴ Products that rely on the oil and gas industry range from mobile phones, laptops, detergents, refrigerants, and asphalt to contact lenses, insect repellents, toothbrushes, and shampoo. Polyester is a synthetic petroleum fiber incorporated into 60% of clothing worldwide. It has played a key part in clothing since the early 1950s, making a rapid transition back to cotton and wool clothing impossible. The oil and gas industry continues to shoulder a huge responsibility. The key to its future is to ensure that we control emissions rather than divestments and ensure continued investments in traditional energy sources. The expectation is that as renewables and low-carbon options become increasingly available, they will replace conventional energy sources and, in some cases, provide energy to those who have never had it. But even in a future net-zero emissions world, energy security and everyday life require that oil and gas be part of the mix. The energy mix also has to diversify to meet the increasing

demands of a growing population. These include solutions like nuclear energy, with the potential development of Small Modular Reactors (SMRs).

The energy industry continues to innovate and develop solutions as we transition from fossil fuel as quickly as possible, with multiple projects and initiatives financed by companies that previously only supplied oil and gas. Conventional fossil fuel energy – supported by lower emissions and mitigation and adaptation strategies – still has an essential role to play and needs to work alongside alternative energy to meet the rising global energy demand while continuing to work on delivering on net-zero ambitions. The world must not undermine energy security, erode economic stability, and slow down critical investments in the energy transition. The global energy transition is perhaps

the most important project that humanity has ever undertaken. However, while alternative energy sources are developed, implemented, and expanded, we cannot relinquish our responsibility to secure affordable, essential oil and gas. We'll need it for decades, so we must ensure we obtain it sustainably.

Footnotes

¹ <https://www.project-syndicate.org/commentary/realistic-energy-transition-oil-gas-renewables-by-sultan-al-jaber-2022-08>

² <https://ourworldindata.org/energy-mix>

³ <https://www.arabnews.com/node/1826641/world>

⁴ <https://www.energy.gov/sites/prod/files/2019/11/f68/Products%20Made%20From%20Oil%20and%20Natural%20Gas%20Infographic.pdf>