



## CERAWeek 2023

Key highlights - Houston, March 6 - 10

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### Geopolitics

“The cooperation between US and China would help but is not necessary. The IRA is based on competition.” (Dr. Ernest Moniz, CEO Energy Futures Initiative)



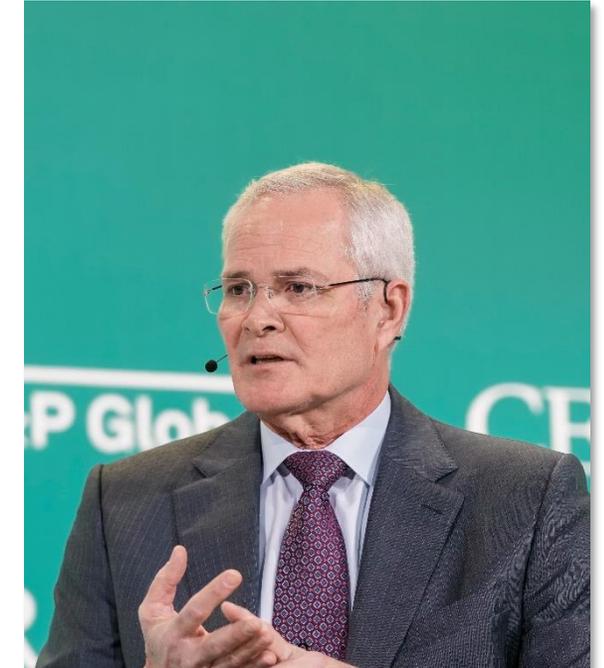
### Energy transition

“The US is the most attractive place for clean energy investments with the IRA. We are now irresistible.” (Jennifer Granholm, US Secretary of Energy)



### Technologies

“We are living in a disruptive era. Solar was the first disruptive technology, showing the world the energy transition is viable.” (Marco Alverá, CEO TES H2)



### O&G industry

“Our strategy is based on doing both, investing in O&G and emission reduction. It is not a matter of “or”, but “and”.” (Darren Woods, CEO ExxonMobil)



Photos by CERAWeek

### Global energy crisis – one year on

- Sanctions were successfully implemented based on the sense of urgency among Western allies
- The US LNG was critical to guarantee the security of the global and European energy systems
- Despite the odds, Europe has made significant progress in reducing its reliance on Russian gas in 2022
- However, external conditions (e.g. severe winter, Chinese economic recovery) could make 2023 even harder

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### European energy independency and short-term implications

- Europe doesn't expect to reverse its energy relationship with Russia, considered an undesired stakeholder
- Therefore, diversification of gas suppliers and energy sources remain urgent for the region in the medium-term
- The gas market is drastically changing (e.g. flows, prices), while structural changes in the oil market are uncertain
- The Chinese market will not replace the volume of European gas imports from Russia due to its characteristics

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### New geopolitics based on secure and resilient supply chains

- China's dominance over renewables value chains may lead to a new global energy dependency
- Collaboration among Western governments should drive new energy policies and investments
- US-China relationship will not change in the medium-term, but competition could accelerate the energy transition
- Future energy ecosystems should avoid overdependence on one specific technology route or country



“The LNG market is critical and saved Europe in the winter. However, China will increase substantially its imports in 2023.” (Wael Sawan, CEO Shell)



“I do not believe in a shift back to Asia (LNG exports). We have now a more diverse set of clients.” (Jack Fusco, CEO Cheniere Energy)



“The year of 2022 was the confirmation of the relevance of gas in the energy future. In my opinion, it was a happy year” (Greg Ebel, CEO Enbridge)



“I believe financial resources will not flow to Russia in the near future. At least while Putin in charge.” (Michael LaMotte, Senior Managing Director Guggenheim Securities)



“Europe always talked about demand, but never properly addressed supply. Now, we have the urgency to diversify our energy sources, as well as gas suppliers.” (Claudio Descalzi, CEO Eni)



“The price cap on oil was only one measure that the EU has implemented. We must continue our work in 2023, working in consensus with other EU countries.” (Paula Pinho, Director of Energy EU)



“We cannot rely on China for our future. We are thinking more about the things that we must build, than about the things that we should shut down.” (John Podesta, Senior Advisor to The White House)



“The US and China relationship is one of the most stressed situations nowadays. They are critical for climate change and must act towards energy transition, but will not cooperate soon.” (Jason Bordoff, Founder of the Center on Global Energy Policy)



“Being a first mover allow us to better prepare, structuring our supply chains and influencing the new ecosystem. Nowadays, we know the relevance of having secure and reliable supply chains.” (Juan Rubiolo, Executive Vice-President AES)



### Energy trilemma

- The world needs an orderly energy transition based on secure, affordable, and lower emission energy systems
- In order to be aligned with the net zero pathway, demand side measures will be critical
- The world needs clear milestones and roadmaps towards 2050
- Global investments in the energy transition must ramp-up, including in developing countries

### IRA – the game changer

- The success of the IRA will be directly influenced by the private sector
- The legislation is already affecting companies' decisions, redirecting investments to the US
- However, permitting remains a challenge for O&G projects, as well as for greenfield renewable projects
- Other countries may follow and announce new energy transition programs and funds

### Energy transition challenges for carbon intensive industries – mining and steel

- Countries with significant renewable energy potential are considered “hotspots” for investments
- The decarbonization of hard-to-abate sectors will encompass incremental changes (e.g. electrification) and disruptive technologies (e.g. hydrogen and CCS)
- The steel industry will need to modernize its assets in order to use green hydrogen and other clean technologies
- Electrifying and digitalizing operations are considered initial steps to decarbonize mining activities



“The first step is to do the math, understand the challenge and develop a decarbonization plan. As we grow production, we must reduce emissions at the same time.” (Darren Woods, CEO ExxonMobil)



“Every decision that we do on energy must take into consideration: affordability, national security and environmental impact, which includes emissions.” (Arun Majumdar, Dean Stanford School of Sustainability)



“Affordability should be at the core of any energy policy. When energy is too expensive, we have a backlash.” (Patrick Pouyanné, CEO TotalEnergies)



“With the IRA, we will build a global energy powerhouse with our allies. We have made billions of dollars available for the private sector. Now it is your turn to act.” (Jennifer Granholm, US Secretary of Energy)



“Considering the European perspective, the IRA is an enormous push. It will need to adapt, fast. The EU should consider developing a Complexity Reduction Act.” (Andrew Flanagan, CDO RWE Clean Energy)



“It is an amazing time to be in the energy sector. We must make disruptive transformations over the next 10 years. I know the visionaries are here in this room.” (Jennifer Granholm, US Secretary of Energy)



“For mining, the decarbonization begins with the electrification of trucks. We are also considering biochar and biomass in our processes. After that, we are also looking to reduce shipping emissions. (Marie-Pierre Paquin, Chief Advisor Rio Tinto)



“We have to look back to understand what we must do better and look forward to understand the innovations that are required.” (Emmanouil Kakaras, Executive Vice-President NEXT Energy Business Mitsubishi Heavy Industries EMEA)



“We are on the way with our decarbonization plan. We are developing a hydrogen plant to start operating by 2026.” (Marie Jaroni, Head of Decarbonization thyssenkrupp Europe AG)



### Energy efficiency and electrification - low-hanging fruits

- Data will promote a more efficient energy system, enabling smart management and optimization
- Digitalizing processes can lead to energy savings and emission reductions
- AI and IoT could support companies deploying projects faster and cheaper
- Electrification is a key pillar to reduce emissions from the transport sector and industrial processes

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### Critical technologies for the climate agenda

- Solar business case reinforces that the penetration curve of clean energy technologies can ramp-up quickly
- CCS and DACs will be key to the world's climate ambitions and future of O&G operations
- Carbon intensity (vs. hydrogen colors) should be considered the main criteria to differentiate and value hydrogen
- Solid-state batteries, despite having greater energy density, will demand more critical minerals (ex. x50 lithium)

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### The decade of action – scaling clean energy technologies

- The world needs to deploy at scale and reduce costs of clean energy technologies
- The energy sector has already identified the critical technologies that must be deployed over the next decade
- Repurposing existing infrastructure will reduce investment needs and speed up the energy transition
- The demand for critical minerals will grow exponentially and the diversification of supply chains is a must



“Data management could reduce carbon intensity from O&G operations drastically in a short period of time. Some technologies, such as IoT, cloud and digital twins, are critical.” (Adam Selipsky, CEO Amazon Web Services)



“Energy efficiency is probably the most critical “technology” for climate change in the short term. However, it is only considered when energy prices are high.” (Barbara Frei, Executive VP Schneider Electric)



“Electrification is the core part of our strategy. We see that the demand for electric vehicles is strong. Hertz aims to have more than 25% of its fleet electric by the end of 2024.” (Stephen Scherr, CEO Hertz)



“The hydrogen rainbow is misleading the world. We should focus on the carbon intensity. Ultimately, the end use must be low carbon.” (Sanjiv Lamba, CEO Linde)



“We cannot achieve climate goals without reducing CO<sub>2</sub> from the air. With DAC we will have the control of our destiny.” (Vicki Hollub, CEO Oxy)



“We want to deliver optimal solutions for our clients. In this sense, storage could have different forms, such as batteries and hydrogen. We must look to the most efficient supply chain.” (Ross Groffman, VP NextEra)



“The world will face a limited supply of critical minerals over the next decade. Substitution cannot offset the growing demand. It is inevitable to face higher prices.” (Richard Adkerson, CEO Freeport)



“Given the urgency of the energy transition, we must consider how to repurpose existing infrastructure and capabilities. At the same time, it is critical to scale up and make more efficient existing assets.” (Dev Sanyal, CEO Varo)



“The demand of critical minerals for the energy transition will ramp up exponentially, also boosted by populational growth. The supply will also be pressured to be ESG compliant.” (Ricardo Monte Alto, Strategy Executive Vale)



### Leadership role of the O&G industry

- The industry has the responsibility, capacity and will to lead the world's decarbonization
- The sector has proven more than once its ability to address global challenges
- Governments and companies must partner to address climate change
- The world needs a collaborative approach, including O&G companies, to address climate challenge

### Expertise and competitive advantages in the energy transition context

- Some technologies (e.g. hydrogen and CCS) will only scale with the expertise of the O&G industry
- The sector is expected to be competitive when it comes to transporting molecules, such as CO<sub>2</sub> and hydrogen
- O&G companies should adapt their strategies faster. This is the decade of action and diversification
- The expertise in establishing partnerships is a critical enabler to develop potential solutions

### New narrative for the O&G industry – “and” conversation (vs. “or”)

- The strategies of O&G companies are being reoriented (once again) to include energy security and transition
- Given the relevance of energy security, investments in competitive O&G projects should remain
- In order to develop robust decarbonization roadmaps, understanding emissions and setting milestones are critical
- Being in a relevant player in the energy transition requires a robust stakeholder engagement



“The energy transition is not something that we can slow down or speed up. Our strategy recognizes the role of oil and gas. We are in a marathon here, so we must be consistent.” (Wael Sawan, CEO Shell)



“The industry must lead the way (climate change). It must recognize that the world has a problem – “Houston, we have a (big) problem”, and failure is not an option.” (Ahmed Al Jaber, President-Designated COP28)



“The IRA will accelerate O&G investments in green infrastructure. But permitting is still a challenge. People don’t want to welcome these projects near their lands.” (Patrick Pouyanné, CEO TotalEnergies)



“In the short term, we will keep focusing on the pre-salt region. However, we will analyze diversification opportunities based on partnerships and competitive advantages.” (Jean Paul Prates, CEO Petrobras)



“Transporting molecules, such as CO<sub>2</sub>, hydrogen and synthetic fuels, will be a great challenge and a great opportunity for the O&G industry.” (Ali Douraghy, Principal Deputy under US Department of Energy)



“I don’t know if analyzing emissions based on scopes 1, 2 and 3 makes sense. We are developing CCS that will reduce global emissions, but should it be considered as scope 3?” (Darren Woods, CEO ExxonMobil)



“We aim to become an integrated energy company, helping the world to solve the energy trilemma.” (Bernard Looney, CEO bp)



“We are facing the biggest challenge of our time, that is supplying energy for a growing population at the same time that we need to reduce its intensity.” (Mike Wirth, CEO Chevron)



“There is no energy security without transition, and no energy transition without security.” (Ditte Juul Jørgensen, Director-General for Energy European Commission)



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