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REACHING NET ZERO TOGETHER:

ENERGY TRANSITION CHALLENGES AND OPPORTUNITIES

On the Road to Net Zero – Hydrogen
and Other Paths

Presenters



Felipe Alice
Houston, TX



Olivier Chambord
London & Paris



Kirstin E. Gibbs
Washington, D.C.



Jennifer Josefson
Moscow & London



Hao Su
Beijing



Tsugu Watanabe
Tokyo

Morgan Lewis

Agenda

- Importer Discussion
- Exporter Discussion
- Fossil Fuel Exporter but Power and Refined Products Importer
- United States – The New Administration
- Q&A



Importer Discussion

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European Union

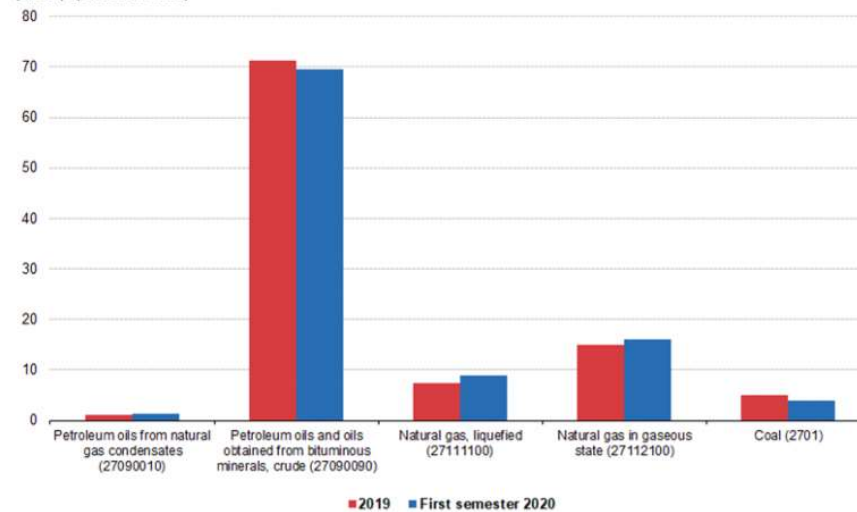
Olivier Chambord

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EU very much an importer: 69% of energy product imports are crude oil, followed by gas 16%

Share of each product in extra EU-27 imports in energy, 2019 and first semester 2020

(share (% of trade in value))



Source: Eurostat database (Comext) and Eurostat estimates

eurostat 

EU Key Strategies

- Recently, in July 2020, the European Commission (EC) adopted two **key strategies**:
 - European Union's (EU) Energy System Integration Strategy
 - Hydrogen Strategy for a Climate-Neutral Europe
- Each strategy is set out as a Commission communication. Although **nonbinding**, the EC uses Communications as instruments to identify **key issues** in policy areas and to set out the direction of future policies – so very much a roadmap set out by the EC, really does point to the direction of travel.

European Union's (EU) Energy System Integration Strategy

– Key Takeaways

- Promotes a **more holistic approach to planning and operation** of the EU's energy system across multiple energy carriers, infrastructure and consumption sectors
- Promotes a more **circular energy system** - with a **focus on energy efficiency** (think combined heat & power plants, reuse of waste)
- Promotes **greater direct electrification** of end-use sectors (think EV for transport, electric furnaces in certain industries)
- Promotes **use of renewable and low-carbon fuels, including hydrogen**, for end-use applications where direct heating or electrification are not feasible, not efficient or have higher costs.

Hydrogen Strategy

- Hydrogen Strategy for a Climate-Neutral Europe - cost of electrolyzers having been reduced by 60% in the last 10 years, are expected to be half of their current costs by 2030
 - In the **first phase**, install at least **6 GW** of renewable hydrogen electrolyzers in the EU by **2024**, production of up to **1 million tonnes** of renewable hydrogen.
 - In the **second phase**, install at least **40 GW** of renewable hydrogen electrolyzers in the EU by **2030**, resulting in the production of up to **10 million tonnes** of renewable hydrogen.
 - In the **third phase**, move to the deployment of large-scale projects so that **all hydrogen is “green hydrogen”** and **25% of all renewable power is used in the production of hydrogen by 2050**. In this phase, the use of hydrogen would extend to the production of synthetic fuels used in aviation and shipping, as well as in industrial applications.
 - **Development of a required framework**, promotion of research and innovation in hydrogen technologies (such as the launch of a 100 MW electrolyser and a “Green Airports and Ports” call for proposals this year)

EU Plans to Implement Strategies - Ambitious Goals

1. EU Green New Deal

- Europe to become the first climate-neutral continent by **2050** through deep decarbonization of all sectors of the economy;
- and greater reductions in greenhouse gas emission by **2030**,
- while promoting job growth and green technology.

2. The European Green Deal Investment Plan:

- Financing: mobilizing at least **€1 trillion** for sustainable investments announced over the **next decade**.
- Enabling: providing further incentives to generate public and private investment.

EU Plans to Implement Strategies – Ambitious Goals

- EU has or will have a further tools
 - **The Just Transition Mechanism:** In addition to the European Green Deal Investment Plan that focuses on all regions of the EU, this mechanism provides **targeted support to help mobilise at least €100 billion over the period 2021-2027 in the most affected regions, establishment of A Just Transition Fund**, which will receive **€7.5 billion of fresh EU funds**.
 - A dedicated **just transition scheme under InvestEU to mobilise up to €45 billion of investments**. It will seek to attract private investments, including in sustainable energy and transport that benefit those regions and help their economies find new sources of growth.
 - **A public sector loan facility with the European Investment Bank** backed by the EU budget to mobilize **between €25 and €30 billion of investments**. It will be used for **loans to the public sector**, for instance for investments in district heating networks and renovation of buildings.

EU Plans – Main Takeaways

2. **Next Generation EU Plan** (toward fostering EU recovery from the COVID-19 pandemic)

- COVID-19 response – transformed energy sector to play an essential role in achieving environmental goals and rebuilding Europe in the aftermath of the COVID-19 crisis.
- European Agricultural Fund for Rural Development will be reinforced by €15 billion to support rural areas in making the structural changes necessary in line with the European Green Deal.

EU Instruments/Framework – What to Expect

- Patchwork of regulations (directly applicable)
- Patchwork of directives (requires to member state implementation)
- Patchwork of domestic initiatives and legal and regulatory regimes and incentives
- Examples and recent developments
 - review of the Renewable Energy Directive and Energy Efficiency Directive (June 2021)
 - revision of the Industrial Emissions Directive (2021)
 - revision of the Regulation for the Trans-European Transport network (TEN-T) (by 2021)
 - revise CO2 emission standards for cars and vans (June 2021)
 - develop a regulatory framework for the certification of carbon removals to monitor and verify the authenticity of carbon removals (by 2023)

Conclusions on European Union

- Very ambitious goals – execution remains to be seen but big financing goals have been announced
- No single unified approach to date on applicable framework – siloed sector-by-sector approach with differences among member states...
- ...but will that change with the Energy System Integration Strategy?
- Finally, one certainty: expect energy policies and regulations to continue to evolve substantially - developers, funders, and investors in renewable energy will need to keep pace with this shifting terrain.

Japan

Tsugu Watanabe

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Japan's Current Energy Profile

- Dependency on Imported Fossil Fuels
 - 94% of primary energy supply is imported
 - 39.5% oil, 27.3% coal, and 23.3% natural gas (2015)
- Dependency on Middle East
 - 87% of the oil-based automobile fuels are from the Middle East
 - Oil-based fuels account for 97% of automobile fuels
- Energy Self-sufficiency Rate in 6% to 7% Range
 - Adversely affected by nuclear plant shutdowns after the 2011 Great East Japan Earthquake (Fukushima); second-lowest among OECD countries
 - Renewable energy accounts for only 15% of Japan's total power generation (FY 2016)

Hydrogen Strategy

- Japan has long focused on hydrogen as a potential energy source, forming in 2013 a Hydrogen and Fuel Cells Strategy Council composed of representatives from industry, academia, and government
- In his maiden policy speech, Prime Minister Suga in October 2020 declared a “carbon neutral” objective by 2050
- Government’s Basic Hydrogen Strategy contains 10 elements
 1. Achieving low-cost hydrogen procurement and supply
 2. Developing international hydrogen supply chains
 3. Expanded use of renewable-energy-produced hydrogen in Japan
 4. Use in power generation
 5. Use in mobility/transportation
 6. Use in industrial processes and heat utilization
 7. Use of fuel cell technologies

Hydrogen Strategy (continued)/Achievements

8. Utilizing innovative technologies
 9. International expansion/standardization
 10. Promotion of understanding among citizens/regional cooperation
- Technological Prowess
 - Japan has completed hydrogen-related display projects/products
 - **Fukushima Hydrogen Energy Research Field (FH2R)** completed February 2020; largest hydrogen-producing facility (10MW) using renewable energy (solar)
 - Second-generation hydrogen-power **Toyota** car, **Mirai**, went on sale in December 2020; still pricey at \$58,000 after subsidies, but Toyota is aiming to produce 30,000 cars per year
 - **Hydrogen Energy Supply Chain (HESC)** to produce, liquefy, and ship to Japan hydrogen produced from brown coal in Australia. Kawasaki Heavy Industries and J-Power are two of the players involved, with Kawasaki completing the liquid hydrogen vessel (*Hydrogen Frontier*) in December 2019 as well as building storage tanks in Kobe.

But yet ...

- Lack of clarity on steps to green growth objectives
 - In January 2021, Toyota criticized lack of specifics in Japan's December 2020 "green growth strategy," which includes hydrogen
 - In November 2020, Sony and other Japanese companies complained about the difficulty of purchasing renewable energy in Japan, to meet customer ESG goals
- Breaking away from fossil fuels is a difficult task
 - Reliance on fossil fuels remains high compared to other developed countries, increasing from 81% in 2010 to 87% in 2017, primarily because of Fukushima
 - Pre-Fukushima, close to one third of Japan's electric power needs came from nuclear; post-Fukushima, less than 20% of nuclear reactors are operating
 - At the Madrid COP25 meetings in December 2019, Japan was widely criticized for its continued fossil fuel dependence

But There Is Also Hope ...

- Achieving a global “hydrogen society”
 - As part of its Basic Hydrogen Strategy, Japan has supported international collaborations at both the governmental and private-sector levels to promote hydrogen energy
 - Japan hosted the first global hydrogen ministerial meeting in October 2018
 - Japan has played an important role in proposing international hydrogen standards to promote safety and performance testing methods
 - Private-sector ESG concerns and carbon-neutral goals of other developed countries will likely result in pressure on the Japanese government to hasten change
- Investment Opportunities
 - Lack of current detailed plans for transition to a hydrogen society may make international investment opportunities into Japan a moving target, but, in light of Japan’s status as a current energy importer that has no choice but to change, there will likely be many possibilities for nimble investors

China

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China's Existing Energy Structure

- The world's largest energy producer and consumer
- Heavy reliance on coal
- Top oil and gas importer
- Significant growth of clean energy but low proportion of consumption

China's Energy Transition Plan to Reach Net Zero

- Reaching peak carbon dioxide emissions before 2030
- Achieving carbon neutrality before 2060
- 14th Five-Year Plan

Key Features in China's Energy Transition Plan

- Comprehensive reforms extending from energy supply to energy consumption
- Upgrading energy technologies through innovation
- Maintaining energy security
- Opening the energy sector further to the world

Case study: Hydrogen energy in China

Taming the Dragon: Opportunities and Challenges Facing Foreign Investors Involved in China's Energy Transition

- Steady expansion of international oil companies and multinational companies in China
- Implementation of the economic stimulus plan to respond to COVID-19
- Heavy regulation over energy sector
- Enhanced scrutiny over foreign investment into China



Exporter Discussion

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Middle East/Russia

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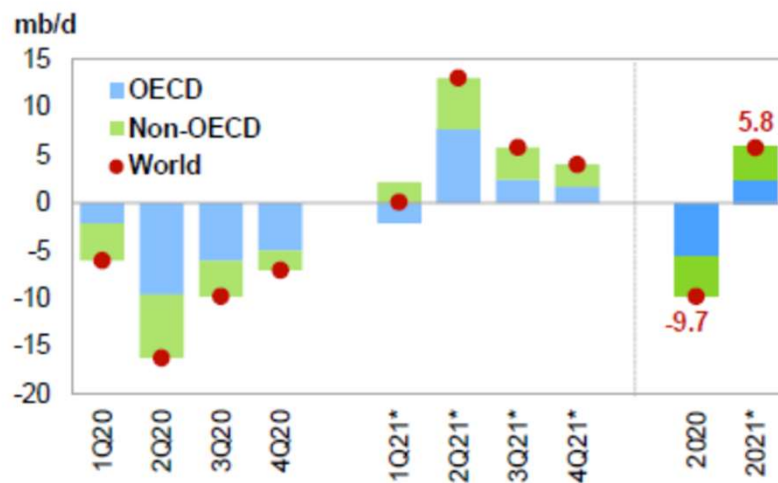
Top 10 Oil Producers in 2020

- United States: 19.51 million bpd
- Saudi Arabia: 11.81 million bpd
- Russia: 11.49 million bpd
- Canada: 5.50 million bpd
- China: 4.89 million bpd
- Iraq: 4.74 million bpd
- United Arab Emirates (UAE): 4.01 million bpd
- Brazil: 3.67 million bpd
- Iran: 3.19 million bpd
- Kuwait: 2.94 million bpd

This list shows the amount of barrels per day (bpd) produced per country as at 25 June 2020. Oil production figures change regularly. (Source: EIA)

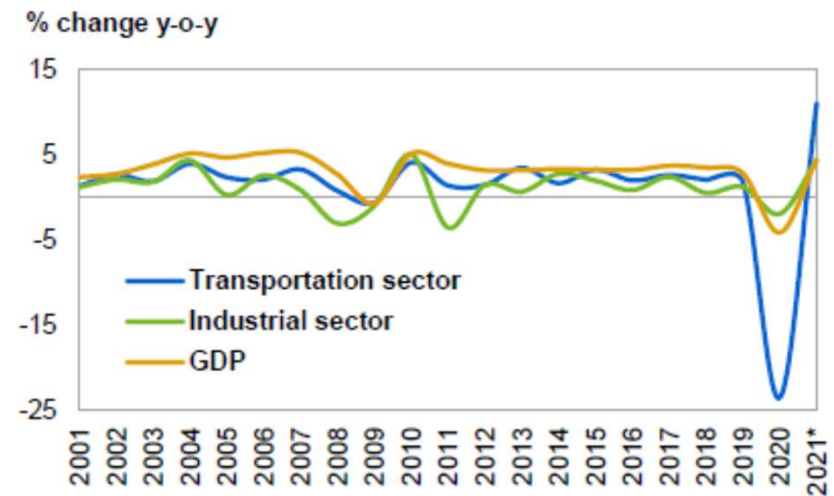
2020 Low Demand, Will 2021 be Different?

Graph 1: Global oil demand growth by region



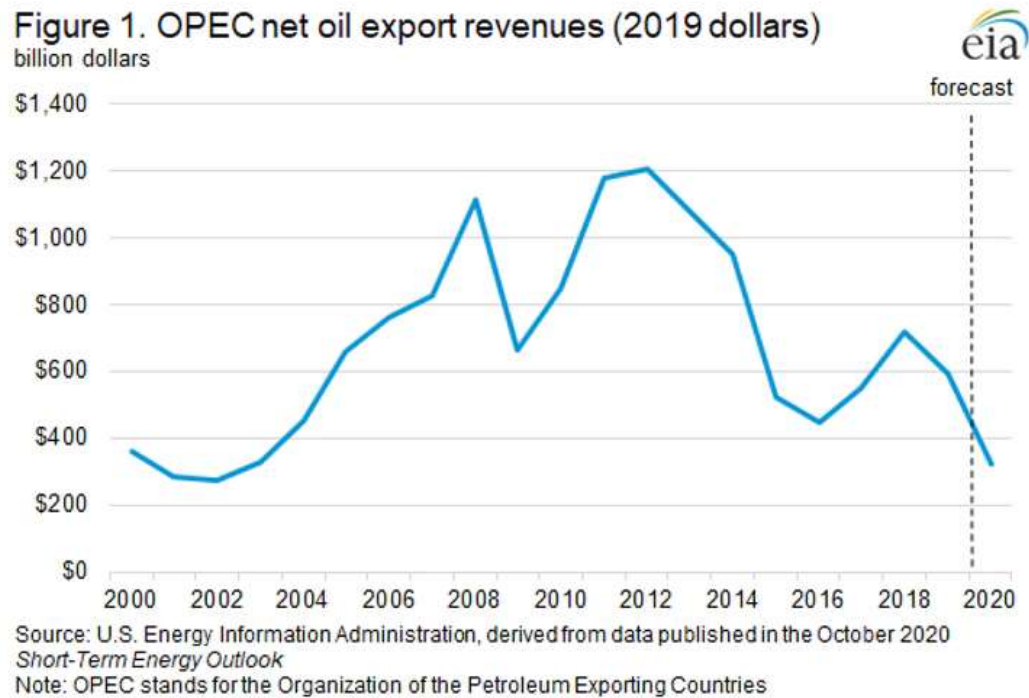
Note: * 2021 = Forecast. Source: OPEC.

Graph 2: Global GDP and sectorial oil demand



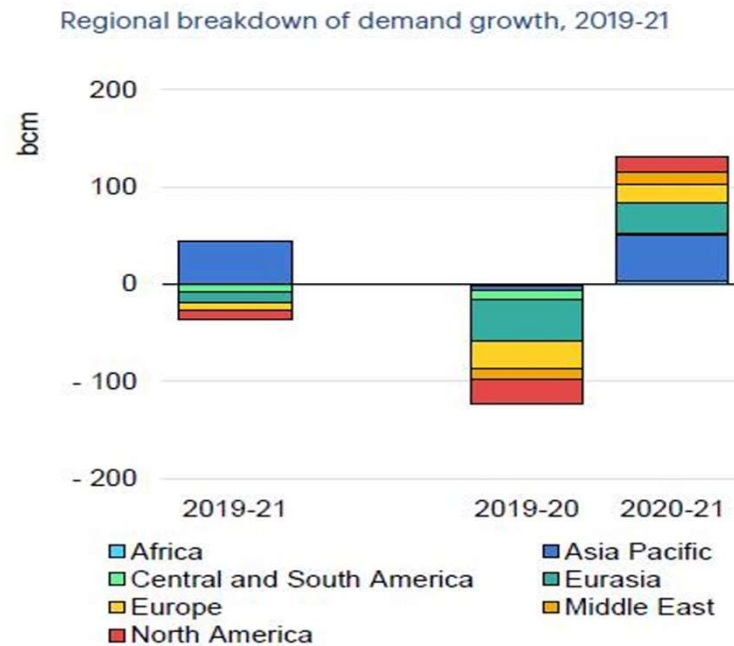
Note: * 2021 = Forecast. Source: OPEC.

2020 Revenue Loss



...but Oil Is Not the Only Story

natural gas



International Energy Agency.

The Map to Energy Transition

There are many road maps

- Russia
- Saudi Arabia
- UAE
- Qatar



Energy Transition for the Export Countries

What will it look like?

- Energy efficiency
- Increased gasification, natural gas replacing coal and oil
- LNG export, including “green” LNG
- Expansion of renewables (solar, wind, tidal, biomass – biomethane, pellets, small hydro)
- CCUS (including for EOR)
- Offsets (including reforestation/natural sinks investment projects)
- Hydrogen (blue, green, yellow, turquoise?)



Fossil Fuel Exporter but Power and Refined Products Importer

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Latin America

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Different Constraints, Development Stages, and Energy Needs

- Brazil
- Chile
- Central America and the Caribbean
- Mexico

Brazil

- Power matrix is 83% renewable – historically heavily reliant on hydropower
- 1980s Ethanol Program
- Significant power outages caused by recurring droughts
- Considerable developments in wind
- Significant recent solar power plant developments (2017)
- LNG/natural gas main baseload alternative
 - Consumption curve
 - New regulatory framework

Chile

- Power energy matrix:
 - 2020 – hydroelectric (28%), solar PV (11%), wind (9%), biomass (1.8%) and geothermal (0.2%), and oil (11%), gas (19%), coal (20%) or petroleum derivatives (11%).
- Chilean Government Decarbonization Program

Mexico

- Natural gas already displacing oil and coal
- Wind gaining importance vis-à-vis hydropower
- Energy reform
- Recent regulatory changes affecting private investment

Central America and Caribbean

- Caribbean:
 - Heavily dependent on oil/diesel – more than 80% of power matrix
- Central America
 - Similar outlook
- Potential alternatives
 - LNG
 - Renewables

Africa

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Africa – Challenges and Renewables Opportunities

- Well-established opportunities in the northern and southern tips of the continent
- Example: Maghreb – Morocco: well established regulatory framework and track record – hydro, solar, wind, 52% renewables in 2030, Morocco also has power cable link to Europe.
- Example: South Africa – the example at the other end of the continent: regulatory framework and track record – firm feed in tariff mechanism, role of ESKOM as offtaker.

Africa – Challenges and Renewables Opportunities

- More early stage and challenging in other regions.
- In Sub-Saharan Africa, energy poverty is rampant: around 600 million people don't have access to electricity. 90% of the population in rural areas relies on fuelwood, charcoal, and animal waste for heating and cooking.
- Sub-Saharan Africa: geography counts – further away from key demand centers, lack of transportation infrastructure – contrary to Morocco.
- More work required on regulatory framework and incentives.
- Country risks – instability of fiscal and legal terms in some countries, security issues

Further Growth Opportunities but Continuing Challenges

1. Connections to Europe present opportunities – number of initiatives

- To mention a few: Africa-Europe Green Energy Initiative, Africa renewable energy initiative (AREI) aims at speeding up the transition to renewables in Africa (24 projects funded and €488 million in investments)
- For the period 2014-2020, EU has earmarked €2.7 billion (of a total budget of €3.7 billion) for sustainable energy actions in Sub-Saharan Africa, with the aim to:
 - provide access to energy to about 30 million people
 - increase renewable energy generation by about 5 gigawatt
 - contribute to the fight against climate change by saving about 11 million tonnes of CO₂e/year

Further Growth Opportunities but Continuing Challenges

- Example of such opportunities is in the EU Hydrogen Strategy that envisages investments in EU hydrogen supply chain: Example of increasing cooperation between EU and African states can be found in the partnership agreement signed between Morocco and Germany on 10 June, 2020 to develop the production of green hydrogen in Morocco.
- Continuing Challenges:
 - Environmental argument for hydrocarbons substitution less compelling (limited Africa greenhouse gas emissions, recognition in Paris agreement)
 - Many countries are hydrocarbon producers – coexistence rather than replacement realistic outcome in short to medium term?



United States - The New Administration

Kirstin Gibbs

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The First Month

- Campaign Promises Upheld
 - Rejoining the Paris Climate Accord – what comes next?
 - Canceling Keystone XL – what does that really mean for the project?
- What do the Executive Orders tell us about Energy Transition during the next four years?
 - Climate consideration to be “essential element” of US foreign policy and national security
 - Whole-of-government approach to national policy on climate-related issues
 - Promote clean energy industries and job creation
 - Environmental justice

Impact on Oil and Gas Development on Public Lands and in Offshore Water

- Freeze on new permits pending comprehensive review of leasing program
- Review to consider climate impacts and whether royalties to be adjusted to account for impacts
- What is the impact?
 - Not immediate
 - Less than 25% for oil and even less for natural gas
- Is a fracking ban still possible?
 - What about the energy veteran?
- Hardest-hit states in United States may put political pressure on new Administration

The Role of Agencies and States

- Increasing role of agencies to promote climate agenda
 - Gridlock on the Hill likely
 - Senator Manchin plays key role
 - Is FERC the “secret weapon” ?
- State utility decarbonization plans
 - Not just a coastal issue
 - Employ new sources of “clean” natural gas
 - RNG
 - Carbon capture and sequestration
- Uptick in questions around safety of natural gas in the states

Now Might Not Be a Great Time to Be in the Pipeline Business ...

- First Keystone, then Dakota Access ... the hits keep coming for crude and products lines
 - Revamp NWP 12
 - Army Corp role
- FERC will play a key role in permitting new gas pipelines
 - New certificate policy issued. Greater focus on:
 - GHG analysis
 - How to determine need
 - Exercise of eminent domain and landowner interest
 - Environmental justice

So What About LNG?

- Will the United States continue to be a significant exporter of natural gas?
 - Demand
 - Politics – domestic and international will both play a role
- LNG export facilities looking to “clean up” their image
 - G2 Net Zero LNG
 - Using technology to capture 4 million tons of CO₂ during the liquefaction process; reduce methane leaks from well pads through pipeline to terminal

Cannot Overlook the Possibility of a Hydrogen Solution

- If you build it, will they come?
 - Is the hype for real? No supply or demand today
 - When will it be scalable?
 - Need full value chain
- Moving hydrogen by pipeline
 - It is possible
 - Need for regulations? Will FERC play a role?
 - What about a commingled stream?



Biographies

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Biography



Felipe Alice

Houston, TX

+1.713.890.5763

felipe.alice@morganlewis.com

Felipe Alice's practice focuses on energy transactions and infrastructure projects relating to energy and corporate issues. Representing diverse clients, his work involves complex contracts, corporate restructurings, project finance, international data privacy issues, and real estate transactions. Additionally, Felipe is part of the cross-practice global workforce team that provides clients with integrated cross-border counseling and strategic planning on issues related to labor, employment, benefits, and immigration. Felipe's first language is Portuguese, and he is fluent in English and Spanish.

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Biography



Olivier Chambord

London

+44.20.3201.5641

Paris

+33.1.53.30.44.61

olivier.chambord@morganlewis.com

Olivier Chambord is an accomplished corporate transactional lawyer who focusses his practice on leading international transactions and projects for clients in the oil and gas, petrochemical, mining, and natural resource sectors, while also counselling clients in a broader range of industries in French corporate matters. In Europe, he handles a variety of matters ranging from cutting-edge energy transactions, including one of the few acquisitions of unconventional upstream oil and gas assets in the UK, to corporate transactions and commercial contracts.

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Biography



Kirstin Gibbs

Washington, D.C.

+1.202.739.5026

kirstin.gibbs@morganlewis.com

Kirstin Gibbs, co-leader of the firm's energy industry team, as well as a leader of the climate change and sustainability working group, represents pipelines, producers, traders, marketers, utilities, and end users, on a host of issues. She handles transactional matters related to the development of new oil and gas infrastructure and regularly provides assistance with negotiation of midstream transportation and storage agreements, complex asset management agreements, and commodity transactions. Kirstin also counsels global clients interested in addressing climate change and sustainability initiatives by investing in clean energy technologies, including renewable natural gas and hydrogen, and decarbonizing their operations.

Biography



Jennifer Josefson

Moscow

+7.495.212.2535

London

+44.20.3201.5429

jennifer.josefson@morganlewis.com

Jennifer Josefson represents clients across the spectrum of energy industries including oil, gas, liquefied natural gas, petrochemical, power, and renewables. Her practice focuses on international, cross-border transactions and projects in Russia, Central Asia, the Middle East, and Africa. Jennifer regularly advises on M&A, joint ventures, joint operating agreements, power purchase agreements, concessions, production sharing agreements, farm-ins, supply, and service agreements. She also handles the commercial agreements regularly used by energy companies for revenue generation, raw materials and feedstock inputs and facilities operations and maintenance.

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Biography



Hao Su

Beijing

+86.10.5876.3618

hao.su@morganlewis.com

Hao Su advises on a wide range of commercial and corporate transactions, including joint ventures, projects, and mergers and acquisitions (M&A). In particular, Hao has experience advising major Chinese state-owned enterprises (SOEs) on their outbound investments in the United Kingdom and countries in continental Europe, Russia and the CIS, the Middle East, Southeast Asia, Australia, Africa, North America, and South America.

Biography



Tsugu Watanabe

Tokyo

+81.3.4578.2509

tsugu.watanabe@morganlewis.com

Tsugu Watanabe's practice focuses on financing matters with particular emphasis on: project finance and infrastructure transactions; leveraged and asset-based lending financings, including aircraft financings; loan trading; and loan restructurings and refinancings, including in a bankruptcy context.

Webinar Series

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Upcoming webinars in the series:

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- Energy Sustainability for Corporate Clients
- Energy Storage Solutions

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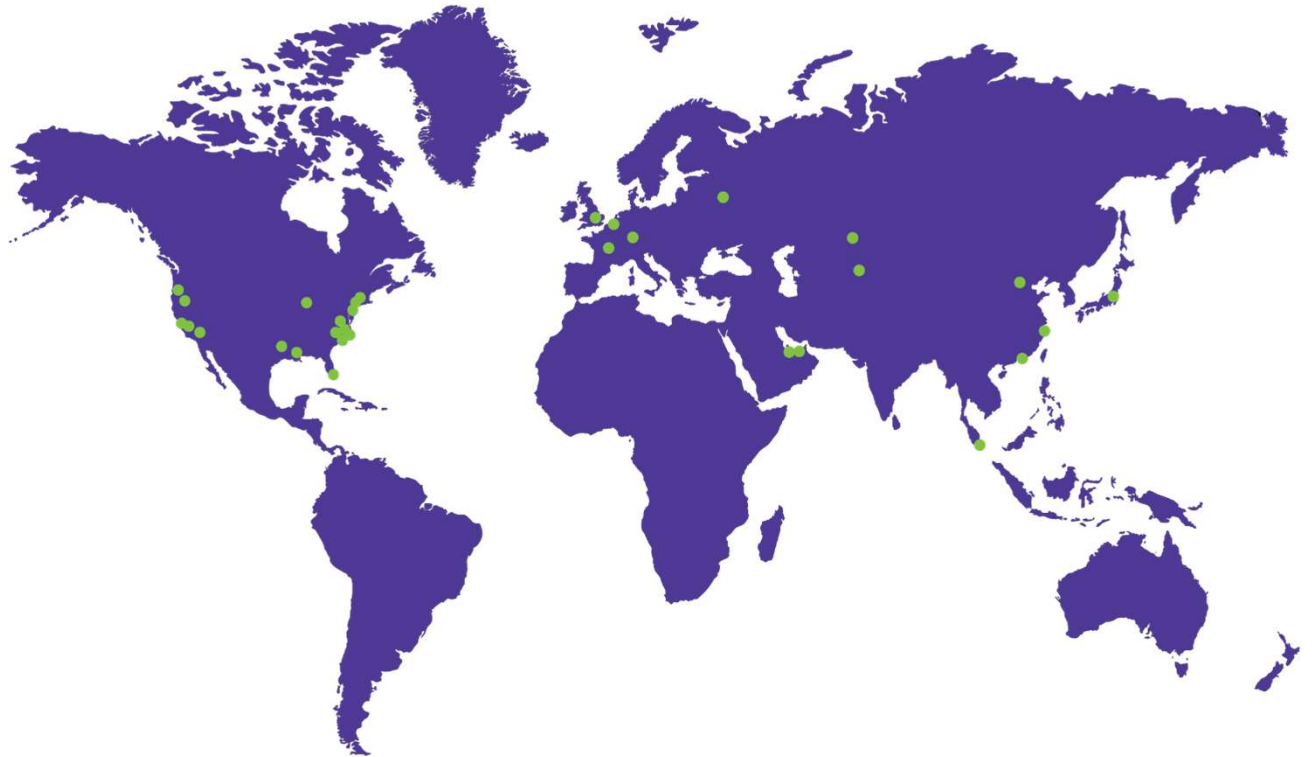
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