

PLATO Society

After Glasgow: Challenges Confronting the Paris Agreement and Multilateral Climate Action in the 2020's

February 25-April 1, 2022

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Today's Meeting

1. **Summary of Week Two**
2. **Today's topic: energy, technology, and finance (the Paris System's "energy challenge")**

March 4th Meeting

- **The “emissions gap”**
- **Spurring mitigation in the 2020’s**
 - **National governments:**
 - **Net-zero pledges**
 - **Market mechanisms**
 - **Private sector: business organizations**
 - **Net-zero pledges: accountability**
 - **Voluntary carbon markets and “offsets”**

Voluntary carbon markets (the use of “offsets”)

- To help with their net zero pledges, many companies turn to offsets and voluntary carbon markets
- This has triggered a boom in the voluntary carbon offset market : market value of over \$1 billion in 2021, and expected to reach \$50 billion in 2030

“Offsets”

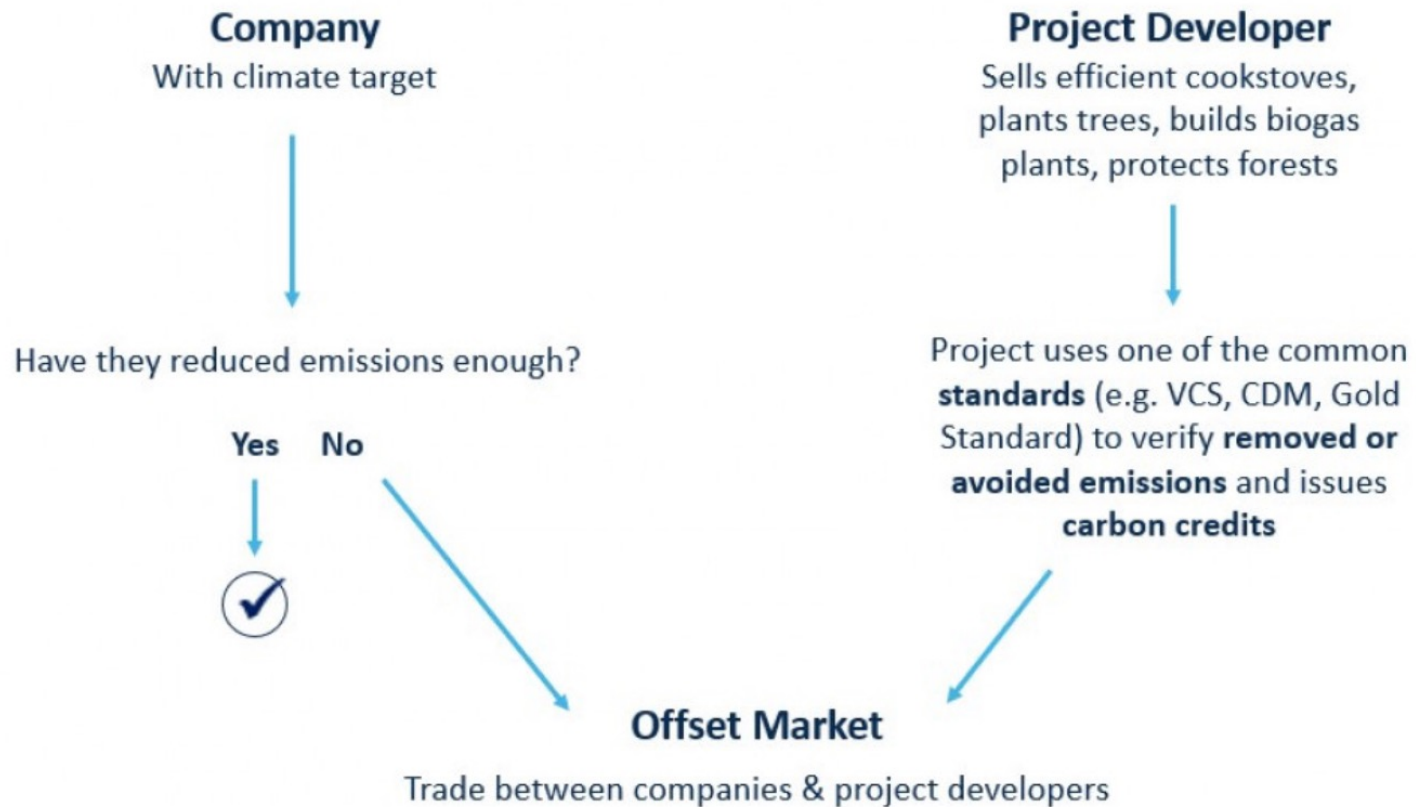
- An “offset”: a company pays for the cost of someone else’s climate-friendly project (e.g., forestry, or wind or solar farms).
- Often the project is in another country
- The buyer will receive a “credit” for doing so
- It then will include the resulting emissions reductions toward its net-zero pledge

Verifying “Quality” Offsets

- The use of an external quality standard provider. It will check the purported emission reductions achieved.
- It will issue credits to the project’s developer, which the developed then can sell to corporate purchasers.

Voluntary Carbon Market

How does the voluntary carbon market (VCM) work?



Voluntary carbon markets & offsets: accountability questions

- **Proposals for uniform disclosure rules, and for uniform accounting systems**
- **The proposal of UN Secretary-General Guterres: an expert group to scrutinize net zero claims using the voluntary carbon markets**

Today's Material:

- **The “Paris System’s Energy Challenge”**
- **Energy policy is central to the Paris System’s mitigation goals**

The Paris System Goals: The Matter of Urgency

- Once again, the recurring question of urgency in climate change discourse
- March 11, 2022 NYT (a developer of LNG projects): "Since the consequences of climate are going to be 30 or 40 years down the road, people are going to focus a lot more on what is happening now. As they should....We can come back to climate."
- On the other hand, the title of the NYT article is "Energy Crunch Spurs Push for Fossil Fuels, but Climate Clock is Ticking."

The International Energy Agency (IEA)

- Several times today, I will cite reports of an organization widely recognized as authoritative on global energy matters: the International Energy Agency (IEA)

The International Energy Agency (IEA)

- An intergovernmental research organization, under the auspices of the OECD (Organization for Economic Cooperation and Development)
- Created in 1973, in the midst of the energy crisis, to provide information and policy guidance to the OECD
- Influential with governments and investors (e.g., its annual “World Energy Outlook”)

The Paris System's Energy Challenge: Introduction

- Combustion of fossil fuels is the leading cause of GHG emissions
- Energy-related GHG emissions continue to rise
- Current energy policies of many Parties and much private sector finance are not in alignment with the Paris System's collective goal: a clean energy transition toward net zero 2050

Global Energy Consumption: Most From Fossil Fuels

- **84% from combustion of fossil fuels (in 2019). By source:**
 - **Oil: 33%**
 - **Coal: 27%**
 - **Natural (“methane” or “fossil”) gas: 24%**
- **The remaining consumption (16%) from hydropower (6%), nuclear power (4%), wind and solar (3%), and others**
 - **By 2021, wind and solar combined: 5%**

Most Global Emissions: From Fossil Fuels

- **Global carbon dioxide emissions in 2021 by source:**
 - **Coal: 44%**
 - **Oil: 34%**
 - **Gas: 21%**
- **Global Greenhouse Gas (GHG) emissions by source, 2019:**
 - **Fossil fuels: 76%**
 - **All other sources: 24%**

2021: Rising Energy-related GHG Emissions

- Two recent International Energy Agency (IEA) reports in 2022: March 8th and February 23rd

IEA: Rising GHG Emissions in 2021

- Overall GHG emissions from energy rose to their highest ever level in 2021
- The world economy rebounded strongly from the Covid-19 crisis and relied heavily on coal to power that growth
- Coal accounted for over 40% of the overall growth in global carbon dioxide emissions in 2021

IEA: GHG Emissions in 2021 From China

- The rebound of global carbon dioxide emissions above pre-pandemic levels has largely been driven by China
- China's rise in carbon dioxide emissions largely the result of a sharp increase in electricity demand that leaned heavily on coal power
- This, despite the fact that China also had its largest ever increase in renewable power output in 2021

IEA: Carbon Dioxide Emissions in 2021 From India

- **CO2 emissions in India rebounded strongly in 2021 to rise above 2019 levels, driven by growth in coal use for electricity generation. Coal-fired generation reached an all-time high in India, jumping 13% above its 2020 level.**

IEA Methane Report (2/23/2022)

- The energy sector accounts for around 40% of methane emissions from human activity
- Global methane emissions from the energy sector are 70% greater than the amount national governments have officially reported

IEA Methane Report (cont.)

- Major reductions can be achieved with known technologies and with tried and tested policies that have been proven to work effectively.
- If all methane leaks from fossil fuel operations in 2021 had been captured and sold, natural gas markets would have been supplied with the equivalent of all the gas used in Europe's power sector

IEA: the Global Methane Pledge

- Of the five countries with the largest methane emissions from their energy sectors, the U.S. is the only one to sign.
- If all major emitters would sign: “Cutting global methane emissions from human activities by 30% by the end of this decade would have the same effect on global warming by 2050 as shifting the entire transport sector to net zero CO₂ emissions.”

Paris System Parties and the Energy Challenge

- The clean energy transition to net zero 2050 will be extremely expensive
 - A Jan., 2022 study (McKinsey Consultants): \$9.2 trillion a year to 2050 (total: \$275 trillion worth of investments)
- In the Paris System, countries have discretion to choose their mitigation targets and policies

The Clean Energy Transition: Technological Innovation

- Major advances in technological innovation are available for governmental policy support
- E.g., renewable sources (solar, wind, hydropower), nuclear, green hydrogen, electric vehicles (but lithium other raw materials?)
 - Costs often going down, as well
- Another topic of considerable discussion and debate: carbon capture and/or direct air capture

Carbon Capture, Use, and Storage (CCUS)

1 Capture

CO₂ capture separates CO₂ from gas, before it is emitted, using a chemical solvent. The captured CO₂ is separated from the solvent and compressed into a liquid form for transport.

2 Transport

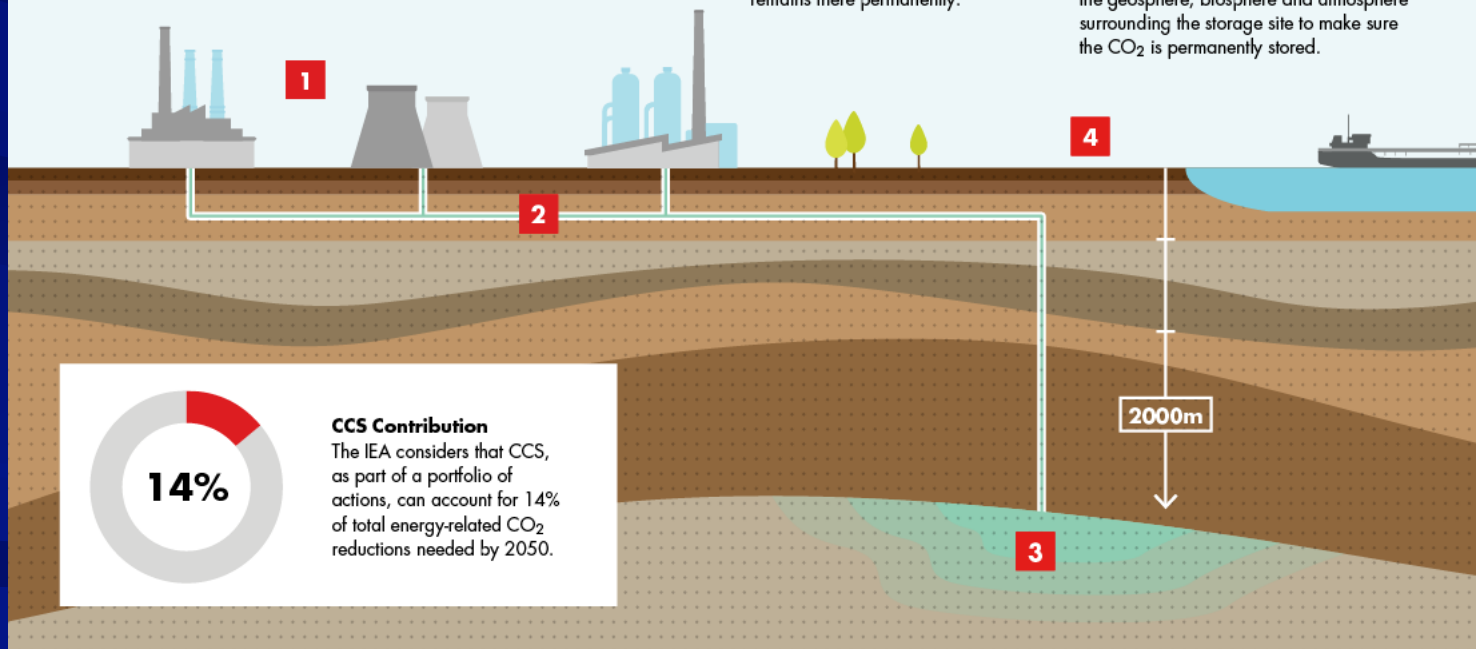
CO₂ is generally pumped along a pipeline, taking the CO₂ from the industrial site where it has been produced, to its storage site which may be onshore or offshore.

3 Storage

CO₂ is injected deep underground into the microscopic spaces in porous rocks. A layer of impermeable rock, called a cap rock, lies directly above the porous rocks ensuring that the CO₂ remains there permanently.

4 Measuring, monitoring & verification (MMV)

Monitoring of storage sites takes place within the storage reservoir, as well as at the injection well, where sensors can detect small changes in pressure or CO₂ levels. In addition, a number of monitoring technologies can be incorporated within the geosphere, biosphere and atmosphere surrounding the storage site to make sure the CO₂ is permanently stored.



Direct CO₂ Capture From the Atmosphere



Carbon/Carbon Dioxide Capture

- **Concerns about cost, environmental impacts (including storage); however, possible commercial uses**
 - **Commercial uses: fuels, chemicals, building materials, enhancement of the yields of biological processes.**

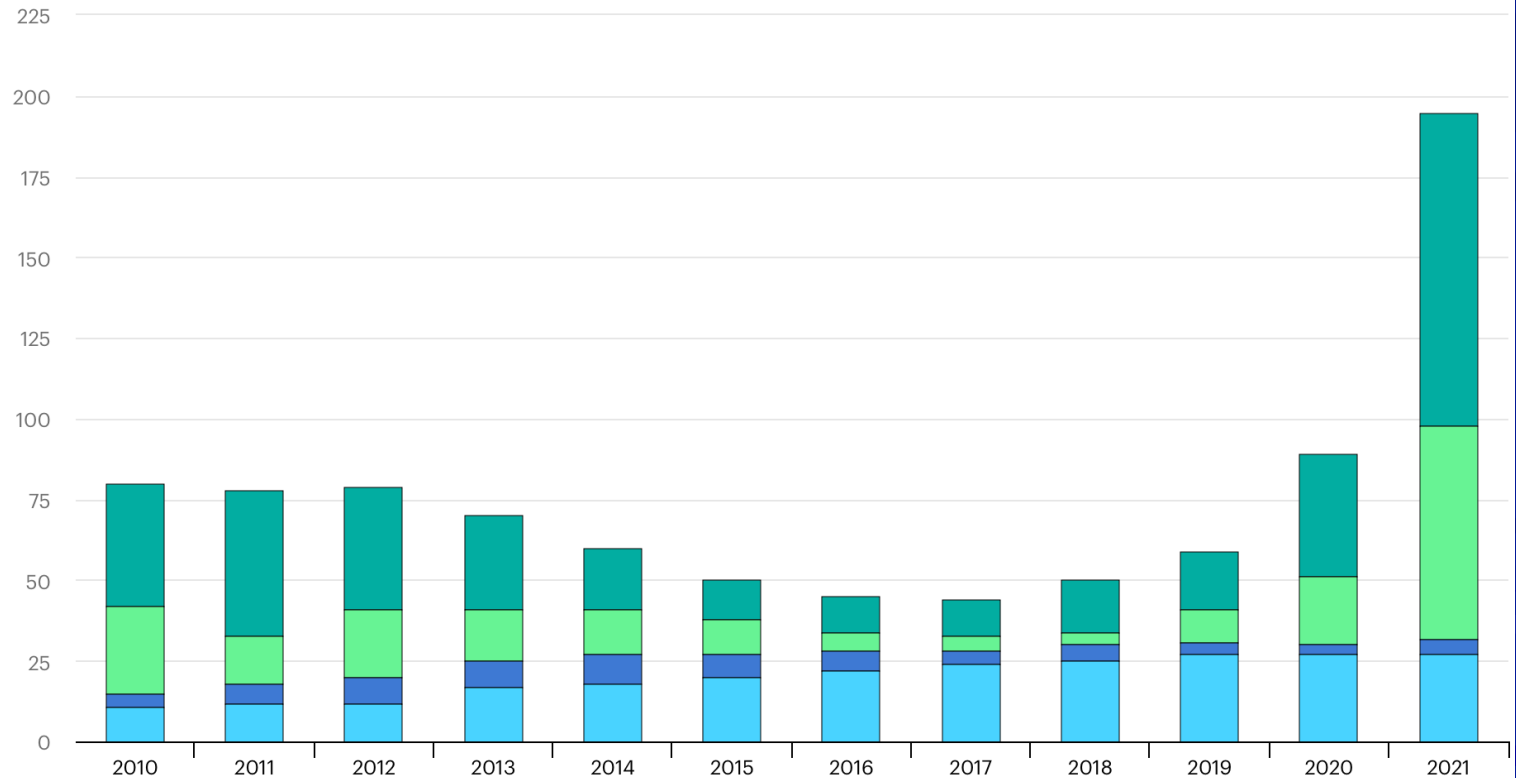
Carbon Capture, Use, and Storage: 1/2022 IEA Report

- Strengthened climate goals and new investment incentives are delivering unprecedented momentum for CCUS, with plans for more than 100 new facilities announced in 2021. CCUS will play an important role in meeting net zero targets
- CCUS projects are now operating or under development in 25 countries around the world, with the United States and Europe accounting for three-quarters of the projects in development.

Global Commercial CCUS Facilities Operating and in Development

Global pipeline of commercial CCUS facilities operating and in development, 2010-2021

Number of facilities



IPCC on Direct Air Capture: August, 2021

- The Intergovernmental Panel on Climate Change (IPCC) report:
- If an "overshoot" happens, direct air capture (or "carbon dioxide removal") will be needed to bring global temperatures back down.
- Direct air capture "has the potential to remove CO₂ from the atmosphere and durably store it in reservoirs"

The Clean Energy Transition: Paris System Documents

- Texts demonstrating support for clean energy
- Intended to send signals to the private sector (banks, investors)

Paris Agreement (2015)

- **Article 2.1(c)**
- **Calls for strengthening the global response to climate change by:**
 - “Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development”.**

Glasgow Climate Pact (11/20)

- **The collectively-adopted Paris System document to explicitly refer to fossil fuels and to call explicitly for reduced reliance on them**
- **(paraphrasing the text): Parties must accelerate the development and deployment of technologies, and adopt policies, to transition towards low-emission energy systems, to include:**

Glasgow Climate Pact (11/2021) (cont.)

- Rapid increases in clean power generation & energy efficiency measures; and
- “Acceleration of efforts towards the phasedown of unabated coal power and phase-out of inefficient fossil fuel subsidies”

Glasgow Climate Pact (11/2021) (cont.)

- **These steps to be taken “while providing targeted support to the poorest and most vulnerable in line with national circumstances and recognizing the need for support towards a just transition”**

Also at COP26: Two Side Agreements

- “Global Coal to Clean Power Transition Statement” (45 countries); and
- “Statement on International Public Support for the Clean Energy Transition” (39 Countries)

“Global Coal to Clean Power Transition Statement”

- 45 countries, including France, Germany, Italy, Poland, South Korea, the U.K., the EU
- A number of non-Party stakeholders (sub-national governments, NGO's, institutional investors)
- The world's six largest coal consumers (80% of the world's coal) -- China, India, the United States, Russia, Japan, and South Africa – did not sign

Global Coal to Clean Power Transition Statement (cont)

- **Some provisions:**
- **Rapid deployment of clean power generation and energy efficiency measures.”**
- **Target dates: major economies phase out coal in the 2030s, everyone else in the 2040s.**
- **Halt construction of new unabated coal-fired power plants, stop issuing permits, and cease “new direct government support for unabated international coal-fired power generation.”**

“Statement on International Public Support for the Clean Energy Transition”

- **39 signatories: 33 countries (including France, Germany, the U.K., the U.S.); and six banks (including the European Investment Bank) and national development agencies**
- **A pledge to align their international public support toward the clean energy transition and out of unabated fossil fuels**
- **Some provisions:**

“Statement on International Public Support for the Clean Energy Transition”

- **Prioritize support fully towards the clean energy transition, using our resources to enhance what can be delivered by the private sector.**
- **Encourage other governments, their official export credit agencies, and public finance institutions to implement similar commitments for COP27 (Nov., 2022)**

The 5/2021 IEA Report: Energy and the Net Zero Transition

- Foundation for these policy prescriptions was provided in a remarkably emphatic IEA report
- Its message: major changes in deployment of fossil fuels needed to reach net zero 2050
- The IEA had long been criticized for underestimating renewable energy and overstating the role of fossil fuels

IEA 5/21 Energy and Net Zero Report

- The IEA's first articulated pathway to net zero emissions
- “Net zero means a huge decline in the use of fossil fuels”
- Beyond projects already committed as of 2021, no new oil and gas fields approvals and no new coal mines or mine extensions
- By 2030: phase-out of coal (advanced economies)
- Elimination of fossil fuel subsidies

The Fossil Fuels Challenge

- However, despite widespread deployment of technological innovations, collective Paris System statements of policy, and the IEA warnings, the extraction, transport, processing, and combustion of fossil fuels continues
- The fossil fuels industry continues to operate under favorable governmental policies and to command enormous levels of financial resources to maintain its work

Supporting the Fossil Fuels Industry

- **Public funding: subsidies, development banks, state-owned enterprises (SOE's), artificial prices**
- **Private funding: commercial bank loans, investment bank capital underwriting (facilitating infusions of capital), institutional investors, asset managers**

Public Support:

- **In 2017-2019, G20 governments averaged annual provision of \$584 billion via direct budgetary transfers and other forms of support for the production and consumption of fossil fuels at home and abroad.**
- **10/21: Countries have directed over \$300 billion in new funds toward fossil fuel activities since the beginning of the COVID-19 pandemic — more than they have towards clean energy**

U.N. “Production Gap” Report: October, 2021

- **Production gap: “The disparity between climate goals and fossil fuel extraction plans.”**
- **Advocates the need to address supply and demand of fossil fuels simultaneously**

Production Subsidies

- Production subsidies reduce the costs of production, thereby increasing the profitability of the infrastructure for extracting and transporting fuels, usually via:
 - Direct payments
 - Tax breaks
 - Access to public lands and waters

Consumption Subsidies

- **Make energy products cheaper for end users**
- **Example: fixing the price at the gasoline pump so that it is lower than the market rate**

Why do Governments Support Fossil Fuels in General?

- Depends on the different fossil fuels and the interests of different countries. Each country has its own reasons for subsidizing fossil fuels, often intertwined with its economic policies.

Why do Governments Support Fossil Fuels in General?

- **Benefits of incumbency (fossil fuels the fallback energy sources)**
 - **Entrenched political influence**
 - **Concerns about energy security (ensuring an adequate supply)**
 - **Concerns about reliability**

Why support in general?

- **Concerns about economic impacts:**
 - Will rising energy prices depress economic growth or trigger inflation?
 - In producing countries: export revenues
- **Status of SOE's**
 - Their taxes a major source of revenue
- **“Just transition”:** concerns about job losses in communities that have few alternative employment options

Emerging/Developing Economies

- **Transition from fossil fuels: an impediment to development?**
- **System capacity: policymakers might have less familiarity with renewables than they with fossil fuels**

Oil Production: Why Government Support?

■ Production:

- Domestic concerns: security; reliability (heating); revenue (SOE's)
- External considerations: export revenues; a foreign policy instrument
- In the Paris System: NDC's don't include production

Oil Consumption: Government Support

- **Consumer costs: transportation;
heating**

Gas (natural, fossil, methane) (production & consumption)

- **Governmental support: reasons similar to oil**

Coal: Why Governmental Support?

- **Background: coal's share of the global power (electricity) mix in 2021 was roughly 36%**
- **IEA's findings in a 2021 coal report:**
 - **Global coal demand may well hit a new all-time high in the next two years**
 - **Coal-fired power generation set to reach an all-time high in 2021**
 - **Coal production set to rise to its highest levels ever in 2022**

IEA 2021 Coal Report (cont.)

- **The pledges to reach net zero emissions made by many countries, including China and India, should have very strong implications for coal – but these are not yet visible in our near-term forecast, reflecting the major gap between ambitions and action.**
- **China, Japan, and South Korea also have committed to stop public funding for building new coal power projects abroad, severely limiting the possibilities for expanding coal-fired generation in many countries.**

IEA 2021 Coal Report (cont.)

- **Asia dominates the global coal market, with China accounting for more than half of global demand, or two-thirds if India is added. These two economies hold the key to future coal demand.**
- **The fate of coal depends on how quickly and effectively countries move to implement their net zero commitments.**
- **The level of coal demand in a net zero economy will depend on deployment of carbon capture technologies**

Coal: Johnson and Sharma on eve of COP26

- In the run-up to COP26, U.K. prime minister Boris Johnson and Alok Sharma, president of COP26, called on countries to “consign coal to history.”
- At COP26 conclusion: the well-known last-minute compromise on coal in the Glasgow Climate Pact

Government Support of Coal: Emerging/Developing Economies

- Electricity demand is typically rising
- Even if coal is more expensive to operate than competing sources, and even if it is cheaper to build a new solar or wind farm than it is to run an existing coal plant, it is difficult to shut down coal facilities: few countries have sufficient spare capacity in their electricity systems to be able to do so.
- Also, jobs in mining, transportation, and power generation

Why do Governments Support Coal? (China, India, Australia)

- Focus on China, India, and Australia
- Collectively, they produce and consume around two-thirds of global coal

China: Coal

- Coal consumption has been a major element in China's development as a leading industrial and economic power in the past 20 years
- Used in electricity generation and industry (steel production, etc.)

China: Coal

- **Coal extraction and consumption are dominated by state-owned coal companies, which have long enjoyed strong influence on local politics through job provision and tax revenues. In China as a whole, more than 3.2 million people have direct coal jobs**
- **In turn, China's governmental structure is quite decentralized, unless the national Communist Party has a unified policy stance**

India: Coal

- Coal is a mainstay of India's energy system
- Accounts for over 50 percent of the country's primary energy consumption and 70 percent of electricity generation
- India's investment in coal has been recent. Over 50% of its coal-fired power plants were built in the last decade.
- Most of these were funded by state-owned banks who have loaned billions for their construction; likely to resist any early closures.

India: Coal (cont.)

- India is the second-largest coal importer after China. Yet, it also has massive coal reserves that it wants to use to provide reliable power.
- This policy is meant to reduce India's reliance on coal imports by increasing domestic production.

India: Coal

- **Coal is a source of jobs and revenues regionally. At least six states in India are dependent on coal for revenues. Nearly 40% of Indian districts are dependent on the coal sector for jobs, revenues, or corporate social responsibility spending projects like building and running schools. The industry provides jobs to four million Indians directly or indirectly**

Australia: Coal

- **Australia relies heavily on commodity exports; it's the world's largest coal exporter, accounting for almost a third of global trade**
- **Among G20 nations, Australia produces the second-most fossil fuels per person (after Saudi Arabia) and five times as much coal per person as the next closest country (South Africa)**
- **China's high demand for Australia's coal has underpinned a long period of economic growth**

Australia: Coal (cont.)

- **An intense domestic political debate over climate change has significant electoral implications, with several swing districts being heavy coal-producing areas.**
- **The government has announced a 2050 net-zero target, which it says will be met largely by technology and offsets, and not significant reductions in coal production or consumption**

The Paris System: Expectations for the Energy Transition

- Overall: shifting governmental support toward clean energy technologies, in considerable part to influence the private sector lending and investment
- Inter-governmental agreements
 - The “Beyond Oil & Gas Alliance” (12 national governments and stakeholders working together to facilitate the managed phase-out of oil and gas production)
 - Initiated at COP26 by Costa Rica and Denmark

The Paris System: Expectations for the Energy Transition (cont.)

- **Another inter-government co-operative agreement:**
 - **South Africa “Just Transition” agreement (South Africa, France, Germany, the U.K., the U.S., and the EU)**
- **Reportedly, at least 53 countries reformed their fossil-fuel subsidies between 2015 and 2020**

The Paris System: Expectations for the Energy Transition (cont.)

- **Government finance: the use of “green bonds” (loans for climate-friendly projects)**
- **SOE’s: State-owned enterprises that support fossil fuels can diversify into renewables (e.g., Ørsted, a Danish state enterprise that converted from a fossil-fuel firm into one of the world’s largest renewable producers)**

Next Week: March 18th

- **Developed country support for emerging/developing economies, with emphasis on finance**