EKN:s and SEK:s scientific Climate Council: Reflections from COP28 and the role of fossil- and hydrogen gas – *February 6th 2024*

About EKN's and SEK's scientific climate council

The Climate Council is an advisory expert body aimed at guiding the Swedish export credit system in its efforts to adapt its operations to align with the 1.5-degree goal of the Paris Agreement. The Climate Council serves as a support in terms of knowledge and a discussion partner for EKN and SEK regarding principle-based positions.

The Climate Council's meetings are held under Chatham House Rule. Meeting minutes aim to convey and summarize the council's main messages to EKN and SEK.

Participants on February 6, 2024 (physical meeting)

The Climate Council: Anna Krook-Riekkola, Max Åhman, Måns Nilsson, Tomas Kåberger.

EKN: Anna-Karin Jatko, Peter Tuving, Karin Wessman

SEK: Magnus Montan, Teresa Hamilton Burman, Maria Simonson

Agenda for the Climate Council's seventh meeting:

- ***The energy transition - significance of the agreements at COP28 for the global energy transition?***
    - ***Reflections*** *from COP28 and* ***outcomes*** *of the conference.*
    - *The agreement to* ***"transition away"*** *from fossil fuels – its practical significance and* ***potential consequences for various projects*** *within the energy transition.*

- ***Over two years have passed since the Climate Council's discussion regarding the respective roles of fossil- and hydrogen gas in the energy transition and in industrial usage. An updated perspective from the Climate Council regarding:***
    - ***The role of fossil gas*** *in a transition consistent with the Paris Agreement's 1.5-degree goal?*
    - ***The role of hydrogen gas:*** *Is it realistic to assume that hydrogen gas will be available in a manner that can replace fossil gas within the timeframe required to maintain the 1.5-degree goal? An update regarding its availability and usage in various projects?*

The energy transition - significance of the agreements at COP28 for the global energy transition?

Reflections from COP28 and outcomes of the conference

Key meeting arena for companies globally in light of increased awareness regarding business opportunities and responsibilities:

- COP as a meeting platform enables discussions among companies from different countries and industries, which otherwise might not occur, regarding climate transition related issues.
- An increasing number of companies participate, indicating that the business sector is becoming increasingly aware that the climate transition concerns them. The significant turnout of companies at COP28 also attests that the transition is underway - companies consider it important to be present to understand what is happening and to take advantage of business opportunities linked to the transition.

The role of oil states in the global cooperation connected to the transition

- The fact that COP28 was held in Dubai and that the Minister of Industry of the United Arab Emirates – Ahmed Al Jaber – who is also the CEO of Abu Dhabi National Oil Company, chaired the meeting sparked discussion and was considered controversial. However, this chairmanship should still be seen as an important step, as a full global transition cannot happen without the involvement of oil-producing countries. It is significant that also oil-producing countries have committed to "transition away from" fossil fuels.
- There are, however, mixed messages being conveyed from several oil-producing countries. On the one hand, several of these countries are investing heavily – and sometimes seemingly without a plan - in renewable energy. At the same time, many state-linked companies continue to invest in oil production and petrochemical industries, etc. While this constitutes an ambiguous behaviour, it is however also something one would expect to see during a transition period.

The agreement to "transition away" from fossil fuels – its practical significance and potential consequences for various projects within the energy transition

Abbreviations and definitions:

- The Methane Pledge: Presented by the EU and USA in November 2021 (COP26), it aims to reduce methane gas emissions in all sectors by 30% by 2030 compared to 2020 levels.
- LeadIT: Leadership Group for the Industry Transition, a partnership between Sweden and India for the transition of heavy industry.
- IEA: International Energy Agency.

The agreement includes a commitment to "transition away" - the beginning of the end of the fossil era

- The method for how to transition away from fossil fuels by fossil-fuel states is still left somewhat "open" - whether through investments in renewables, energy efficiency, etc. Nevertheless, there are important dynamics of change to be noted in the discussions and outcomes from COP28 – and it is evident that we are now at the "twilight" of the fossil era.

Nuclear power tends to be overestimated while the growth of renewable energy may exceed forecasts – it is highly profitable to replace fossil fuels with renewables in Africa and Asia

- The goal in the agreement text to triple renewable energy capacity by 2050 is actually not a very ambitious goal, as the IEA forecasts suggest the capacity may potentially grow even more. 2023 was a fantastic year for renewable investments, with over 200 GW invested in solar energy in China alone.

- The purchasing interest of the US and Europe regarding Chinese solar panels is limited. Thus, there will be a large supply and consequent price pressure on Chinese solar panels globally to other regions. This is expected to benefit Africa and Asia greatly, where it is estimated to become very profitable to replace fossil fuels.

From theoretical roadmaps to project realization and increased export collaborations - with India, among others

- Swedish Prime Minister Ulf Kristersson and Indian Prime Minister Narendra Modi presented an enhanced partnership at COP28 regarding the LeadIT collaboration and efforts to transition heavy industry.
- Through the partnership, India will receive funds to build up its capacity in the form of research offices, delegation trips, technology exchanges, etc., with the aim of enabling innovation initiatives.
- Within the framework of LeadIT, India aims to progress from roadmaps to increased export collaborations and project realization, something that Sweden needs to deliver on. It is relevant for EKN and SEK to monitor developments in this area moving forward.
- In parallel with the Swedish-Indian cooperation, there is a collaboration between the UK and Brazil (also under the LeadIT umbrella). The German Climate Club, where Sweden is also a member, has also gained momentum, but India is not a member there. It is relevant for EKN and SEK to monitor developments in this area moving forward.

The World Bank is making significant investments in methane-reducing projects in waste management, agriculture, etc.

- More projects related to the Methane Pledge (established during COP26) are likely to emerge. The World Bank announced during COP28 that they will invest in this area with a range of projects including agriculture, waste management, etc. Other financiers are also coordinating efforts in this field.

- Sweden is one of the countries supporting the Methane Pledge. The World Bank has clearly expressed its interest in collaborating with Sweden in this area, including engaging in dialogue with Sida (the Swedish International Development Cooperation Agency). This dialogue is potentially relevant for EKN and SEK to monitor, given the government's intention to increasingly integrate aid and trade.

An updated perspective from the Climate Council regarding the respective roles of fossil- and hydrogen gas in the energy transition and in industrial usage:

The role of fossil gas in a transition consistent with the Paris Agreement's 1.5-degree goal

Abbreviations and definitions:

- IRA: Inflation Reduction Act

Key developments since 2021: Pricing dynamics, Russia's invasion of Ukraine, and USA's IRA

- There are significant inflationary “leaps” in most price curves, and the monetary value must be recalibrated when comparing with historical prices. It is evident, however, that coal and gas have become considerably more expensive relative to other energy sources.
- The prices of oil, gas, and coal are now at significantly higher levels than they were before the volatile – in terms of price - years of 2021-2022. Coal and gas are approximately 50% more expensive today than they were around the turn of 2018/2019. This creates economic conditions f or an accelerated transition.
- The altered price levels of fossil fuels are reflected in the assumptions underlying the IEA's scenarios, which now show a new outlook compared to previous scenarios when the IEA underestimated the growth pace of renewable fuels. Overall, many researchers have historically been more cautious in their price assumptions regarding renewable fuels compared to fossil fuels, to avoid forecasting overly optimistic scenarios.
- The IEA's "Netzero by 2050" scenario analysis from the spring of 2021 (the time of the previous Climate Council meeting when this topic was discussed) remains valid in 2024, i.e.: in order to achieve the climate goals, there should be no new investments in fossil extraction. The IEA analysis shows that energy demand, which is expected to increase significantly in regions where people are emerging from poverty, can still be met primarily through an increase in renewable energy.
- The IEA continues along the path they started in 2021, where achieving the climate goals (here: climate neutrality by 2050) is the reference scenario, and alternative scenarios explore what happens if countries do not take action to transition at the pace required in the reference scenario. This differs from previous years when the reference scenario has been a business-as-usual scenario, assuming today's policies and driving forces remain constant throughout the entire scenario period. Thus, the focus now is on the desired path of development.
- In addition to price changes, Russia's invasion of the Ukraine in 2022 has affected attitudes towards gas, oil, coal, and uranium, which the EU previously imported from Russia to a large extent. Russia's invasion of Ukraine has shown the importance of a European energy transition away from fossil gas and Russian energy dependence. The IRA with its enormous investment volumes constitutes a disturbance to European ambitions for new corporate investments in Europe. The IRA may remain untouched even if Trump wins the presidential election in 2024 since approximately 80% of the economic benefits from the IRA are estimated to accrue to Republican states.
- Europe has, however, pursued effective policies regarding battery manufacturing and is now ahead of the USA in this market. Sweden, in turn, has claimed a relatively large share of European battery manufacturing. Meanwhile, countries like Canada are beginning to court battery manufacturers with favourable economic conditions.

New fossil-based baseload power is not a sustainable climate transition solution

- In many countries, fossil gas is well-known to decision-makers, with proven distribution systems, etc., while renewable systems are new and require more advanced, new digital solutions. This can to some extent explain why fossil gas has often been "marketed" as a transition solution, despite its significant overall climate impact due to methane leakage, etc.
- Given the price developments of renewable energy sources such as solar power, it is increasingly difficult to see how projects with fossil gas as baseload power - such as investing in fossil cogeneration plants for district heating - could be considered to be financially sustainable solutions in an alternative analysis.
- Baseload power combined with a large share of weather-dependent power production could lead to long periods of very low electricity prices, reducing profitability for producers. Rather than baseload power, what is needed is flexible power- production and usage.
    - District heating can potentially contribute to flexibility, partly by using electricity (to produce district heating) during periods of surplus, and partly through heat storage (it is easier to

store heat than electricity), allowing heat to be drawn from the storage during periods of power shortfall.
    - There is also a need for adjustable thermal production, such as biogas or other types of biomass. Biomass can be stored. This can be connected to the district heating network but can equally stand alone, as well.

Stranded assets – already a reality

- Economic effects of stranded assets can already be observed but are sometimes concealed in aggregate net results. Significant write-downs are occurring, particularly in energy sectors such as nuclear power and coal (traditional baseload power). The five largest coal mining companies in the USA have filed for bankruptcy. Refineries working entirely with fossil fuels will be shut down.
- There are vast amounts of fossil fuels remaining that could become very cheap, e.g. in countries like Iraq where fossil gas is located near the surface and easy to extract. However, oil sands and deep-sea oil are more inaccessible as they require new investments in order to be extracted. As demand for gas decreases, the price level may potentially decrease.

The role of hydrogen gas: Is it realistic to assume that hydrogen gas will be available in a manner that can replace fossil gas within the timeframe required to maintain the 1.5-degree goal? An update regarding its availability and usage in various projects

Abbreviations and definitions:

- Fossil hydrogen gas: Hydrogen gas produced from fossil gas, but where carbon capture may have been used to capture a large portion of the emissions.
- Fossil-free hydrogen gas: Hydrogen gas produced using electricity from renewable sources.

Important to understand how the hydrogen gas is produced and what its intended usage is

- In Sweden, hydrogen gas is primarily regarded to be an input commodity to the steel industry and, to some extent, for the production of liquid fuels. The logistics value chain around fossil-free hydrogen production is currently being developed. There is still uncertainty as to what the most efficient means of distributing hydrogen gas is (pipelines, ships, trucks, power lines). Power lines involve placing the production of hydrogen gas close to the hydrogen gas user.
- Converting electricity to hydrogen gas and then using the hydrogen gas for electricity production in hydrogen power plants is associated with such significant energy losses that it is (as of today) not profitable.
- Importing hydrogen gas is often not profitable due to expensive and complicated transports. From an economic as well as an energy security perspective, it is advantageous to produce hydrogen gas where it will be used.
- Countries like Saudi Arabia have plans for fossil-free production of hydrogen gas, but most likely also have plans for the production of fossil hydrogen gas.
- Countries like Norway are likely to try to sell (fossil) hydrogen gas instead of fossil gas as demand for fossil gas decreases. It is important to know how the hydrogen gas was produced in the first place, for the change of fuels to have any significance from an emissions perspective.

Limitations of hydrogen gas

- As for the role of hydrogen gas as a source of balancing power, it is important to consider at which demand it is balancing the supply against. It must be tailored to each country and the country's specific needs. If the need pertains to daily electricity outages, there are better solutions; for instance, batteries work better than solutions involving hydrogen gas. Hydrogen gas was previously

believed to be a potential seasonal solution for electricity storage, but this has not proven to be the most effective solution.

• Hydrogen gas can act as a flexible electricity consumer, but not as a flexible electricity producer. When the electricity price is high, no hydrogen gas is produced; instead, consumption is reduced.

Investments in hydrogen gas suitable for certain types of industries

- Investments in hydrogen gas are guided by considerations such as how it will be transported (in liquid form, as methanol or ammonia, e.g., are easier than in gaseous form), where it will be produced (in relation to where electricity is available), costs, distance, safety, etc. Engineers generally think about costs, but in some countries, investments will be driven more by the country's desire to industrialize.
- At present, hydrogen gas will play a crucial role in the transition of a few industries, among them iron- and steel manufacturing, fuel for long-distance shipping and the production of fertilizers.
- Fossil-free hydrogen gas undoubtedly has a significant role to play in the transition, but at the same time, investments in the production of hydrogen gas have been somewhat lower than expected, likely because it requires a considerable amount of electricity.
