Documentation

A need to mend the bend? Industry decarbonization and market stability in the years ahead

Takeaways from a Workshop in Brussels, 9 December 2024

KOPERNIKUS Ariadne PROJEKTE
The Future of Our Energy

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A need to mend the bend? Industry decarbonization and market stability in the years ahead

Take-aways from a closed-door workshop held in Brussels on 9 December 2024, organized as part of the Ariadne Project

In February 2024, the Financial Times pointedly diagnosed that the EU's "carbon price crash looks like serious market myopia".[1] It is widely expected though that in the future ETS prices will move upwards (again) from their current level of around 60-70 EUR/t. However, it is unclear when exactly the market will become structurally bullish again, and how strong the upward bend will be in consequence.

On 9 December 2024, for the third consecutive year, the Ariadne project hosted a workshop that convened experts from five organisations that operate carbon market models – academic institutions as well as carbon market analysts (see Figure 1), to compare their projections for the evolution of EU-ETS prices through 2030 and beyond, the deviations between them and the underlying causes. The goal of the 2024 event, however, was not only to take stock of price projections for EU emissions allowances (EUA) as in previous years, but to specifically take a closer look at industry decarbonisation.

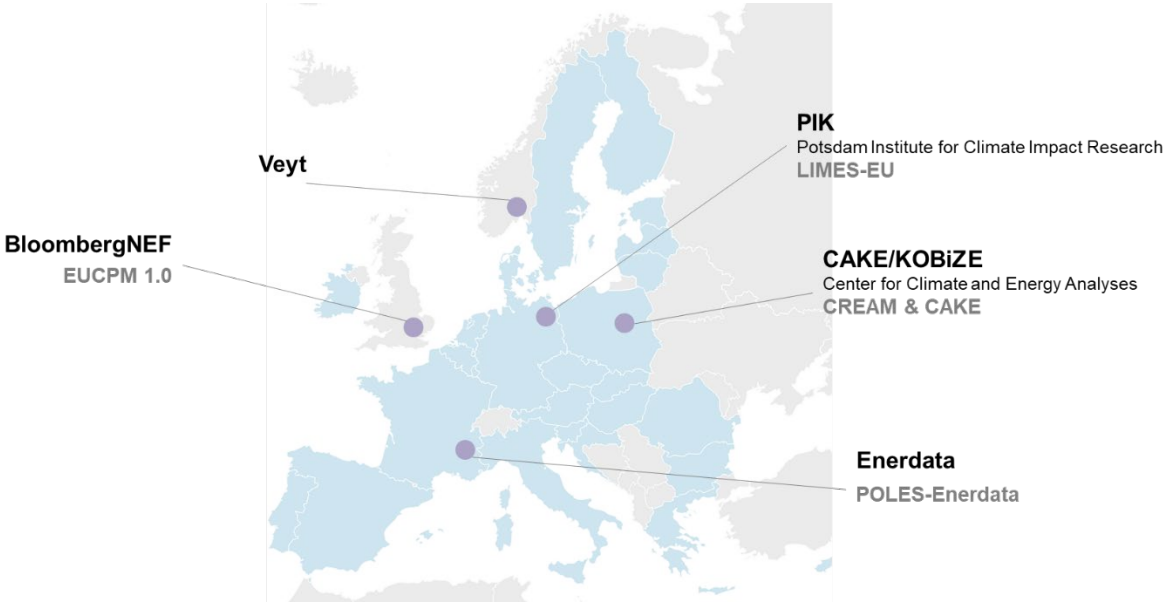

Figure 1. Participating organizations and models.

[1] https://www.ft.com/content/c01f737d-58df-4efa-9a29-9e708598b026

At the 2023 workshop, participants had identified demand by industry as a main driver for future price evolution – in turn determined by industrial output, decarbonization activities and related hedging pressure, and transition to the Carbon Border Adjustment Mechanism (CBAM). Yet many of these factors remain highly uncertain even in the short term. What is more, the prospect of the cap going down to zero soon after 2040 and a potential proposal to even tighten cap in the context of the EU's Commission proposal for a 2040 target shines a spotlight on several "elephants in the room". If not properly addressed, these issues may raise the question of the credibility of the cap among stakeholders – and if considered to lack credibility, depress prices and lead to a vicious circle.

At the end of 2024, the EU carbon market is thus facing continued uncertainty from different sources – political, geopolitical, economic and technological. The policy framework *should* be clear, as the main choices for the future of the EU carbon market have been decided in the Fit-for-55 package and have been put into EU law. Yet to market participants, it is still sinking in what types of changes these policy frameworks will require, including structural changes of the EU economy and its energy systems.

The existing EU ETS (ETS1) will presumably stop issuing allowances by 2044 (when extrapolating current stationary and aviation caps), the upcoming ETS2—which covers road transport, buildings and those industries not included in the ETS1—will also reach net-zero around the same time; both may eventually enter into net-negative terrain. Reaching these goals requires that the cap will have to decline at a rate of above 4% for the EU ETS and even 5% for ETS2. This equals a pace of emission reductions that the EU has so far only managed during times of crisis but has not achieved in periods of economic growth.

While this is not news, there is increasing scepticism among market participants about whether the announced can be sustained politically, i.e. whether the commitment is indeed credible, or bound to be revoked. It may be argued that the increase in carbon prices witnessed between 2018 and 2022 was due not only to new elements in the EU ETS taking effect—such as allowances being taken out of the market and taken to the market stability reserve —but also to increased political credibility, as major factors were aligned during this period: political leadership from the Commission, public pressure

from civil society, support across key Member States but also from large parts of the private sector. As a result, EUA prices increased substantially during between 2018 and 2022 (See Figure 1). However, with the raising energy costs while the Fit for 55 package was being implemented simultaneously, that same political credibility is under threat due to the economic, geopolitical, political, and social challenges the EU faces at the start of the new legislative period.

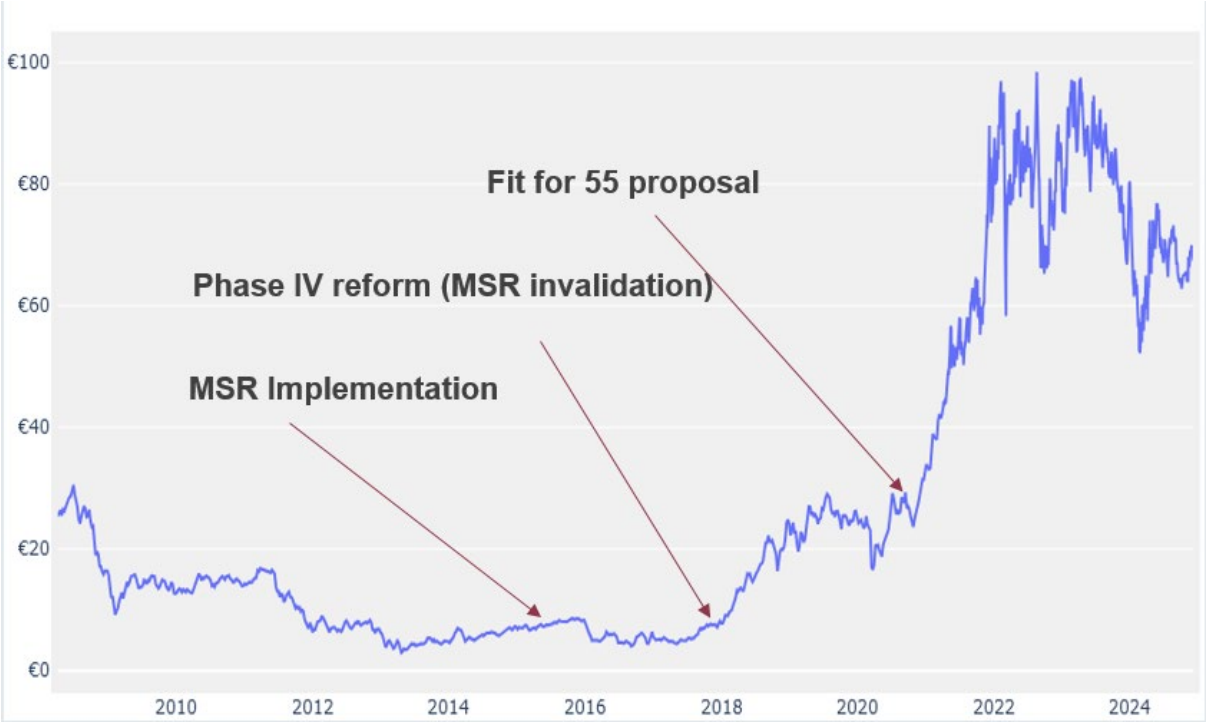

Figure 2. EUA prices evolution and key reforms implemented. Source: Sandbag Carbon Price Viewer

Although key decisions have been made under Fit for 55, there are still many moving parts in the process – including the potential inclusion of new activities in the EU ETS, and the 2026 review of the EU ETS. Against this background of political, socio-economic, and technological uncertainty, price projections for the EU ETS are yet more uncertain than they have been in the past. Still, certain key developments can be identified that have the potential to decide the fate, feasibility, and expected price range of the EU ETS as it progresses towards net-zero emissions. These developments will be discussed in greater detail in the following:

- The progress in the **transformation of industry**.
- Future developments in **energy markets** and their impact on relative prices of fuels.

- The **dynamics of the EU ETS**, its different elements, and **their interactions**.
- The **increased political uncertainty** affecting the system.
- The **timing and scaling up** of carbon removal technologies and their integration into the ETS architecture.

Industry transformation

For industry transformation and its effects on the ETS, a basic premise is that reduction activity in the ETS is increasingly shifting from power to industry. Already now, industrial emitters and activities account for **half of the emissions** that remain in the system. As a result, industrial abatement will increasingly become the **price-setting marginal abatement option** that determines the overall EU ETS price. When and how exactly this shift from power to industry as price-setter occurs depends on several assumptions, and represents a major sensitivity in different efforts to model trajectories of the carbon price. The question of whether industrial emitters will progress towards reducing emissions depends on:

- **Technological developments and investments into abatement technologies**, including infrastructure, permitting, new/changed business models etc.
- The **rollout and success of support policies**, such as **carbon contracts for difference**, which can significantly drive down abatement costs in industry.

The carbon market alone will not suffice to create the necessary demand for low-carbon products. Additional policies are needed, including as lead markets for green steel, green cement, and other low-carbon products. Yet at the same time, this creates a **risk of delayed investments** as industrials adopt a **wait-and-see approach**, either in the expectation of more generous support instruments in the future or waiting for competitors to trial novel technologies before committing themselves.

Such as the last two years, participants[2] responded to a questionnaire and provided a short model fact sheet, information about EUA prices and industry decarbonisation in

[2] Veyt only reported EUA prices.

their default 'Green Deal/FF55 COM" scenario. The scenarios for the future development of industrial emissions diverge significantly between different modelling approaches. Industry has already seen a **strong decrease in emissions**, with industrial emissions in the EU falling by about **25% since 2018**, driven partly by the surging carbon price, but also by increasing energy prices and a weaker economy. Looking forward, views on 2030 industry emissions vary widely – depending among other things on the volume and impact of policies that support industry decarbonisation. Thus, as shown in Figure 3 some modelers project emissions in the range of **300 to 400 $MtCO_2$**, while others anticipate emissions in the range of **450 to 600 $MtCO_2$**.

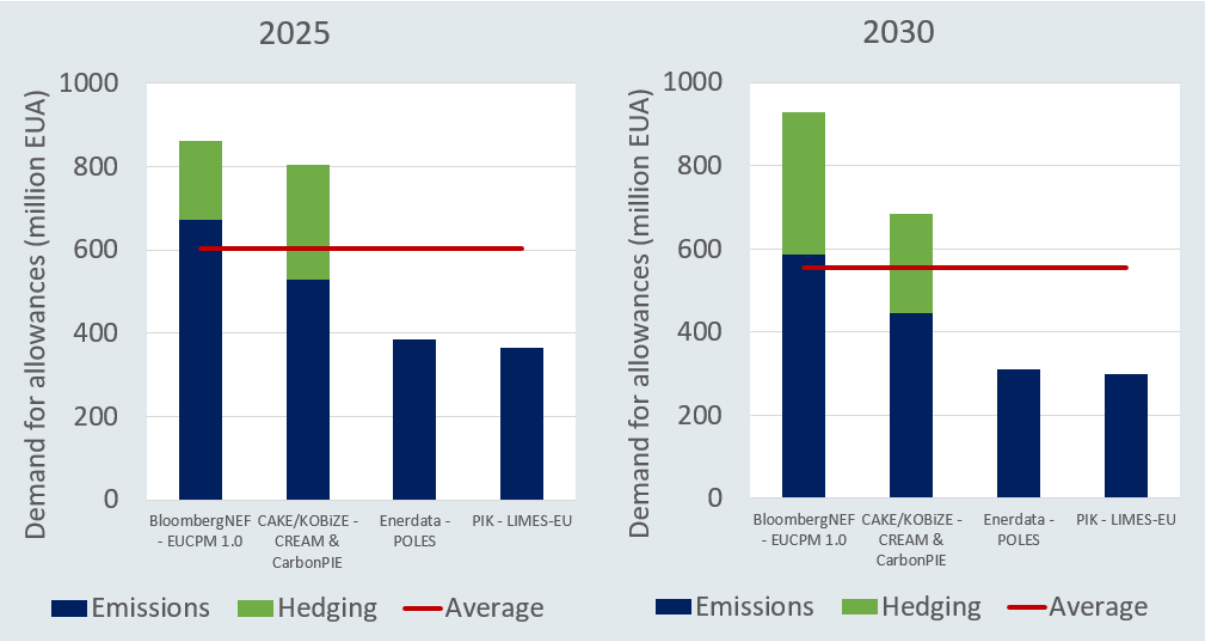

Figure 3. Projected emissions by the surveyed organisations.

Another important question is the extent to which industrial emitters will demand allowances for **hedging purposes**. Currently, hedging emissions is not very common among industrials, yet this behaviour may change in the future, driven by higher carbon prices. However, in comparison to the power sector, data on hedging activities by EU ETS industry actors remains scarce, and several participants called for improved reporting by those entities.

Energy markets

Regarding global and European energy markets and their impact on the decarbonization effort, there is growing concern about a **potential rebound in the use of fossil fuels**. Several scenarios could contribute to this development. For instance, a second Trump administration might emphasize the production of cheap fossil fuels, while political pressures could arise in Europe to allow cheap Russian gas back into the EU market, depending on how the Russia's war against Ukraine unfolds. In the medium to longer term, as the EU and other regions move beyond peak demand for fossil fuels, the prices of these fuels could enter a period of decline.

At the geopolitical level, different regions are adopting contrasting strategies to these scenarios. While many fossil fuel producers - including the US under Trump – appear to gamble on a future of fossil fuels, others including the EU and China are placing their bets on electrifying key energy uses and reducing dependency on fossils in their economies. At the same time, expectations about the role of hydrogen in the future energy system have become more sober, with greater emphasis now placed on the direct electrification of end uses, including transport, buildings, and industrial heat.

Yet the prospect for direct electrification hinges on electricity prices – and these remain a highly sensitive issue. The Draghi report repeatedly stressed their importance for the competitiveness of the EU industry. Any measures that would lead to increased electricity prices are likely to face significant political resistance. Although the expansion of renewable electricity has a dampening effect on power prices, this **progress** is not happening quickly enough and is further **hampered by the structural setup of European electricity markets**. Further, there is also a feedback loop between the use of fossil gas and electrification. Falling fossil fuel prices—whether due to cheap US imports, the return of Russian gas to world markets, or declining global demand—could result in lower prices for fossil gas. This would directly compete with electrification efforts, particularly in applications such as low-temperature heat for buildings and industry.

ETS dynamics

Regarding the functioning of the **EU Emissions Trading System**, there are several key parameters to consider.

- In the **short term**, the **market stability reserve (MSR)** will remain active until around **2028** by taking allowances off the market. After **2030**, allowances may begin to be released back into the market from the MSR. Yet the size of the reserve is capped at approximately **400 million EUA**, with a release rate of about **100 million EUA per year**, limiting its potential effect on the market. In particular, the annual release volume is significantly lower than the **expected shortfall of allowances** and also much smaller than the roughly **3 billion EUA** of EU allowances that have already been invalidated from the market stability reserve.
- Further developments in the EU Emissions Trading Rulebook are already planned, with the upcoming review of the Emissions Trading Directive and the Market Stability Reserve, scheduled for **2026**. In this context, there will be considerations to expand the EU ETS to new activities, such as **waste management**, and to extend its scope to include **departing flights**. Additionally, a **spatial extension** of the EU ETS to the **Western Balkan countries** is conceivable, as well as a link to the UK ETS.

Depending on the assumptions chosen, the different models arrive at different trajectories for the future carbon price. All models achieve that the Fit-for-55 goals are achieved in 2030, yet they differ in key respects. This concerns, for instance, the anticipation of market actors: while most models assume limited foresight (i.e., actors only anticipate technological and regulatory developments in the next years), some still assume perfect foresight. This assumption as well as other model features such as the approach, time granularity and assumptions on the future cap have substantial effect on the price trajectory. Still, the EUA price remains rather stable leading to prices steadily rising and ranging from 120 to 200 Euro in 2030.

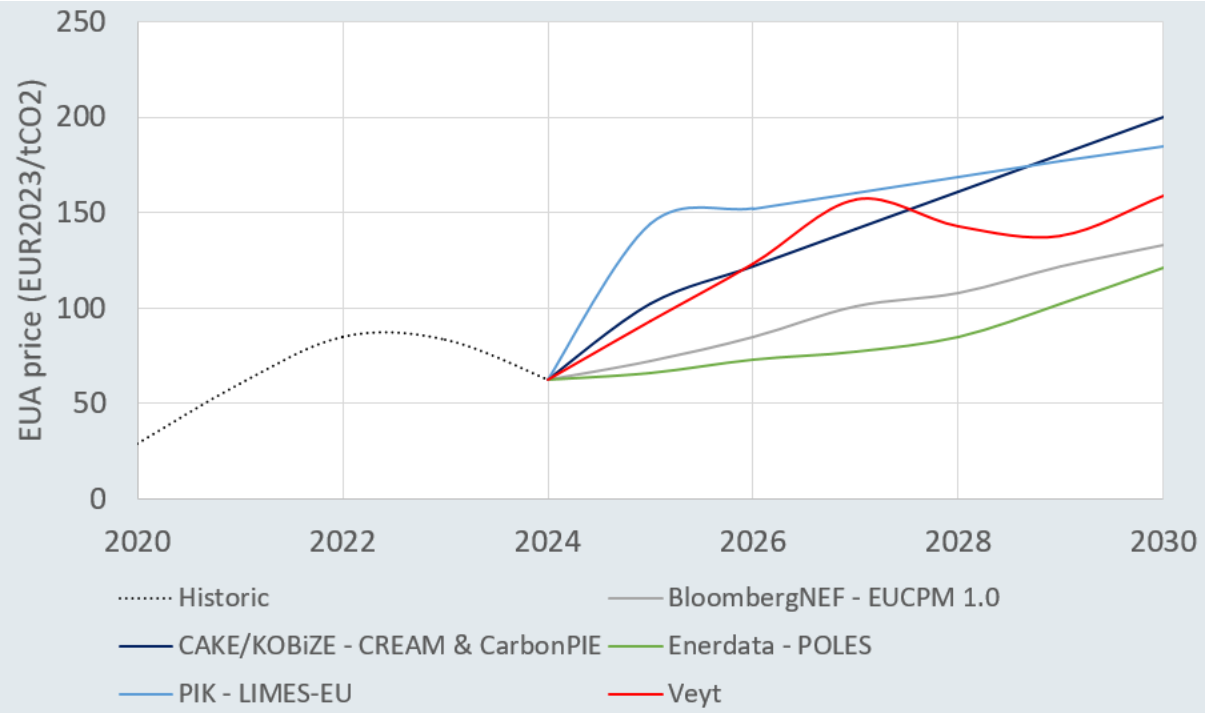

Figure 4. Projected EUA prices until 2030 by the surveyed organisations.

Policy uncertainty

In terms of **political developments**, to provide a credible commitment the EU must **stay the course** and remains firm on past decisions, both regarding targets and the instruments to achieve them. The EU is entering a period where **climate policy** may become less attractive both within the EU and globally, potentially leading to **political pushback** against various elements of the EU climate acquis – as can already be observed for vehicle emission standards. In light of national election results and a deteriorating economy, more such pushback can be expected.

To avoid yet greater policy uncertainty, tt is therefore important that the EU remains **steadfast and committed** to its climate goals and instruments, particularly the **EU Emissions Trading System**. To justify investments in **low-carbon alternatives**, emitters—especially in industry—require a firm and credible expectation of a **high carbon price** in the future. In the **short run**, however, the EU should not overreact to the ups and downs of the carbon price. The **counter-cyclical nature** of the emissions trading system has always been a feature, not a bug. In the current challenging economic environment, a limited period of **lower carbon prices** should therefore not be a major concern.

Overall, the EU is about to enter a period of greater **scarcity in climate policy**, in the light of a weaker economy and competing political priorities. This scarcity applies both to public and private financial resources needed to roll out low-carbon technologies and infrastructure, but it also extends to the political capital and the appetite to dedicate political capital to new policies. In light of this, it seems advisable for the EU to avoid spreading its limited political capital and administrative capacity across too many policy instruments. Instead, the EU should **focus on the key pillars** of its climate and energy policy architecture, including the EU ETS as a central mechanism; new initiatives for an industrial policy geared at competitiveness and climate neutrality; and electricity markets that promotes cost reductions for consumers and supports the broader energy transition.

Scale-up and market integration of carbon removals

In the **medium to longer term**, one of the most central design questions is how to manage the **scale-up of carbon dioxide removal (CDR) technologies**, support their **cost regression and maturity**, and eventually integrate them into the **emissions trading architecture**.

A full integration of **carbon removals** into the **EU ETS** is conceivable, especially when considering options for a **net-negative cap** and emissions trading system. However, such scenarios would likely only take effect in the **2040s**. Until then, the primary challenge is to **support the development of technologies and business models** to let technologies mature and bring down costs. This also includes the possibility of allowing for **technology-differentiated support**, as some of the most promising technologies currently have varying costs and differing expectations for the **cost reductions** they can achieve. Short of a full integration of carbon dioxide removals into the ETS, which appears more promising as a long-term aspiration, short-term options involve **using revenue** from the ETS to **support technology development**.

Still, in order to establish a business case for investing in carbon removal technologies and to incentivize private investment into the sector, it is essential to create an expectation that these technologies will eventually be integrated into the ETS and, as a result,

will have the potential to generate revenue. Given that the removals industry is still in its nascent stages, **feasible funding options include venture capital**. Yet to secure backing from venture capital, the industry must have a clear perspective of selling into compliance markets. This distinction is crucial because VCs tend to **differentiate between market revenue** (even when derived from politically controlled markets), **and state or subsidy revenue**, which is inherently more uncertain, especially in the context of tightening public budgets.

What makes **carbon dioxide removal (CDR)** a particularly promising option is that it is conceivably one of the strongest **flexibility options** that will remain available to emitters (from industry and elsewhere in the **ETS endgame**—the phase where the allowance cap contracts drastically towards **zero**. In this scenario, if industry emitters perceive CDR as a **feasible solution**, they are likely to **invest in these technologies**.

The dynamics of scaling up CDR share similarities with the expansion of renewable energy, which experienced rapid growth and **significant cost reductions**. However, the rollout of renewables also revealed the importance of **addressing non-economic barriers**, such as infrastructure permitting, financing challenges, and the development of robust business models. These lessons are highly relevant for the development and scaling of CDR technologies.

At the same time, the design of policies to scale up CDR raises concerns about political pressures that could compromise the **quality of removals**. Currently, a variety of removal options are available, differing in cost, potential, integrity, and the permanence of carbon storage. This diversity may create political incentives to accept weaker removal solutions into the market to achieve quick wins. However, such compromises could also result in **abatement deterrence**, i.e. a situation where mitigation actions that are technologically feasible and economically justifiable are postponed or abandoned to avoid the political costs of implementing them. Developing a **coherent strategy to scale up CDR** as part of the EU's climate policy architecture will require **balancing ambition with integrity**, and finding the sweet spot for approximation, and eventually integration, of CDR into the EU emissions trading architecture.

Ariadne's thread through the energy transition: The Kopernikus project Ariadne leads the way in a joint learning process with representatives from politics, business and society, exploring options for shaping the energy transition and providing scientific guidance to policy makers along the pathway towards a climate-neutral Germany.

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Who is Ariadne? In Greek mythology, Ariadne's thread enabled the legendary hero Theseus to safely navigate the labyrinth of the Minotaur. This is the guiding principle of the Ariadne energy transition project, in which a consortium of over 25 partners is providing guidance and orientation for shaping the energy transition through excellent research as a joint learning process between science, politics, business and society.
We are Ariadne:

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