

Cleantech *for* Nordics

Q4 2023: QUARTERLY BRIEFING

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INTRODUCTION

As we wrap up and analyze the year of 2023, the cleantech investment landscape in the Nordics boasts a record-breaking figure of 6,120 M EUR. Northvolt and H2 Green Steel were, unsurprisingly, key contributors to this total, collectively representing more than half of the total investments. Sweden maintains its leadership among Nordic countries in attracting investments, and stands out as an outlier in the broader European investment landscape which has remained stagnant.

Most sectors experienced increased deal activity in 2023 with early-stage deals accounting for approximately half of all transactions. Even though we have had a record-breaking high of investments in total, most sectors experienced a decline in funds compared to previous years. The record-high investment year of 2023 can thus be highly characterized by mega-investments, coupled with a large amount of smaller—often early stage—deals. Looking back on 2023, we also see the unfortunate bankruptcies of two Swedish scale-ups: the electric truckmaker Volta and the electric motorcycle company Cake. These two bankruptcies occurred despite both companies working with proven technologies and each having secured considerable amounts of funding already. We are inclined to believe that these bankruptcies underscore the broader challenge of acquiring scale-up capital. While the cleantech investment landscape in the Nordics shows positive growth with record investments, the need for more capital to scale solutions remains evident. In navigating this challenge, we may also increasingly be looking towards different kinds of financing beyond venture capital. Our spotlight on FlagshipONE on p.10 sheds light on Breakthrough Energy Catalyst and serves as an example of one financial model that can scale innovations.

On the policy front, the aftermath of COP28 saw a global commitment to a transition away from fossil fuels. In the Climate Change Performance Index, Nordic countries experienced a decline in their ratings. Only Denmark retained its global leadership position, while Sweden, Norway, and Finland saw declines in their ratings. Our attention now turns to the upcoming EU election, an election which undoubtedly will be critical in shaping the cleantech future of Europe.

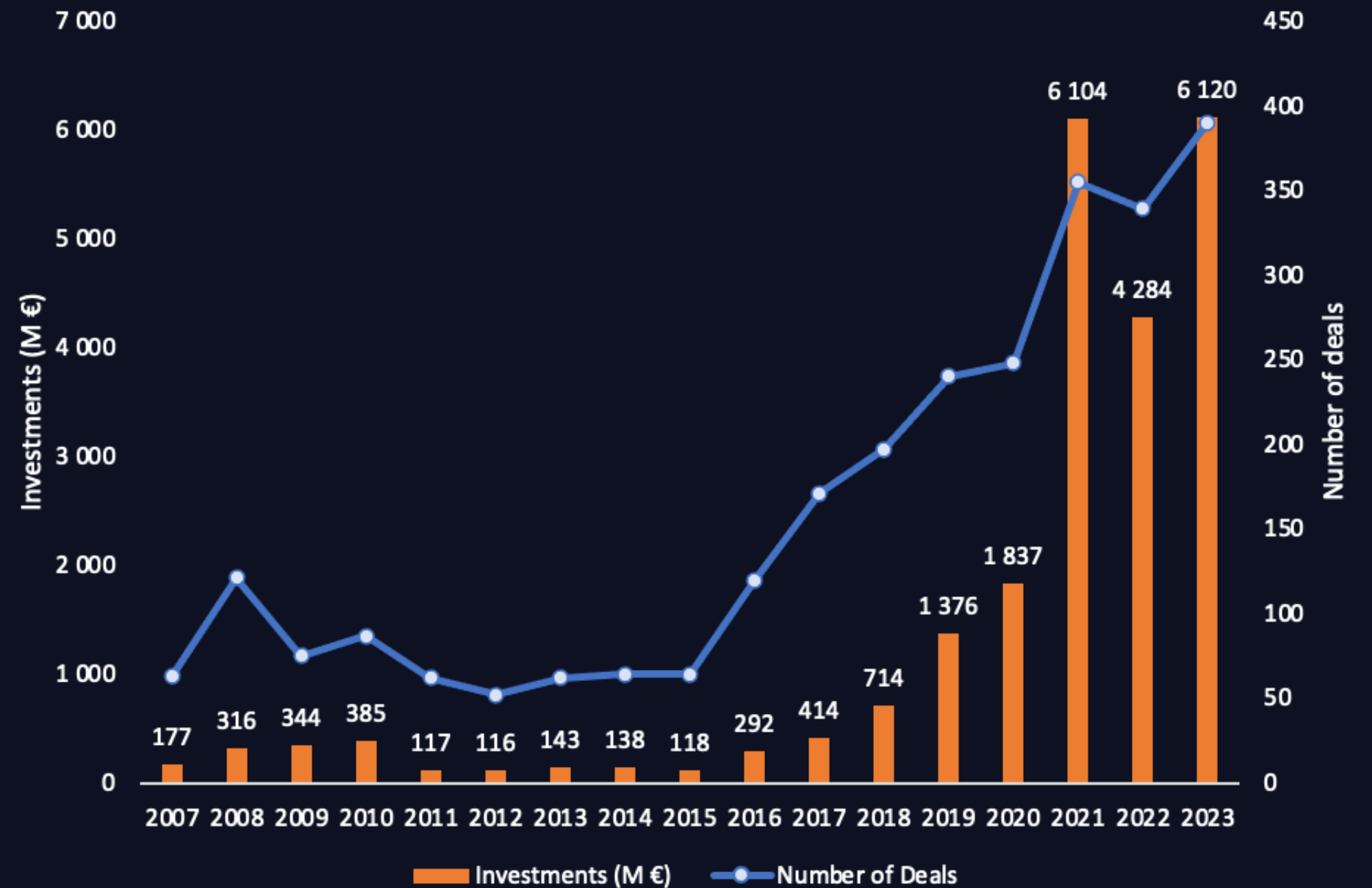
We hope you enjoy the read and don't hesitate to get in touch with us at eva@cleantechscandinavia.com.

RECORD HIGH INVESTMENTS

Cleantech investments 2023 reached a record-breaking total of 6,120 MEUR, surpassing the previous peak in 2021 at 6,104M EUR.

Northvolt and H2 Green Steel constitute two significant outliers in the data, collectively representing more than half of total investments.

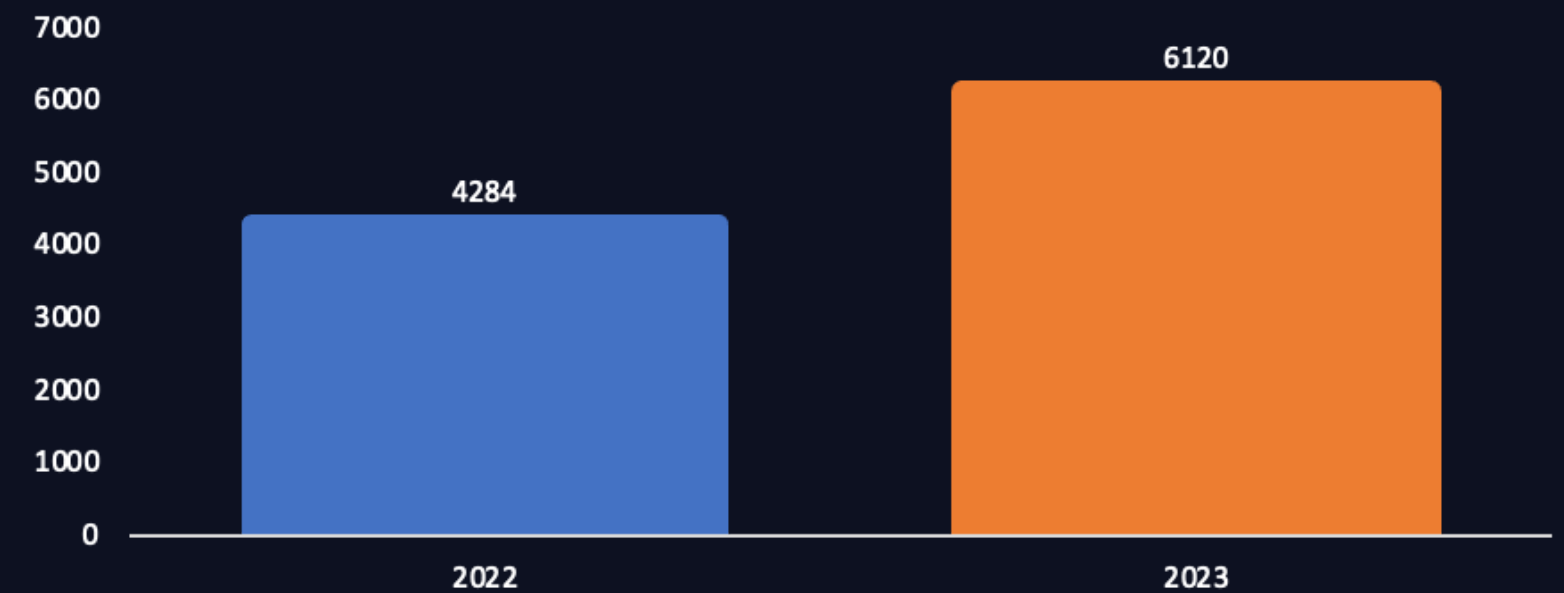
Private Investment Evolution (2007-2023)



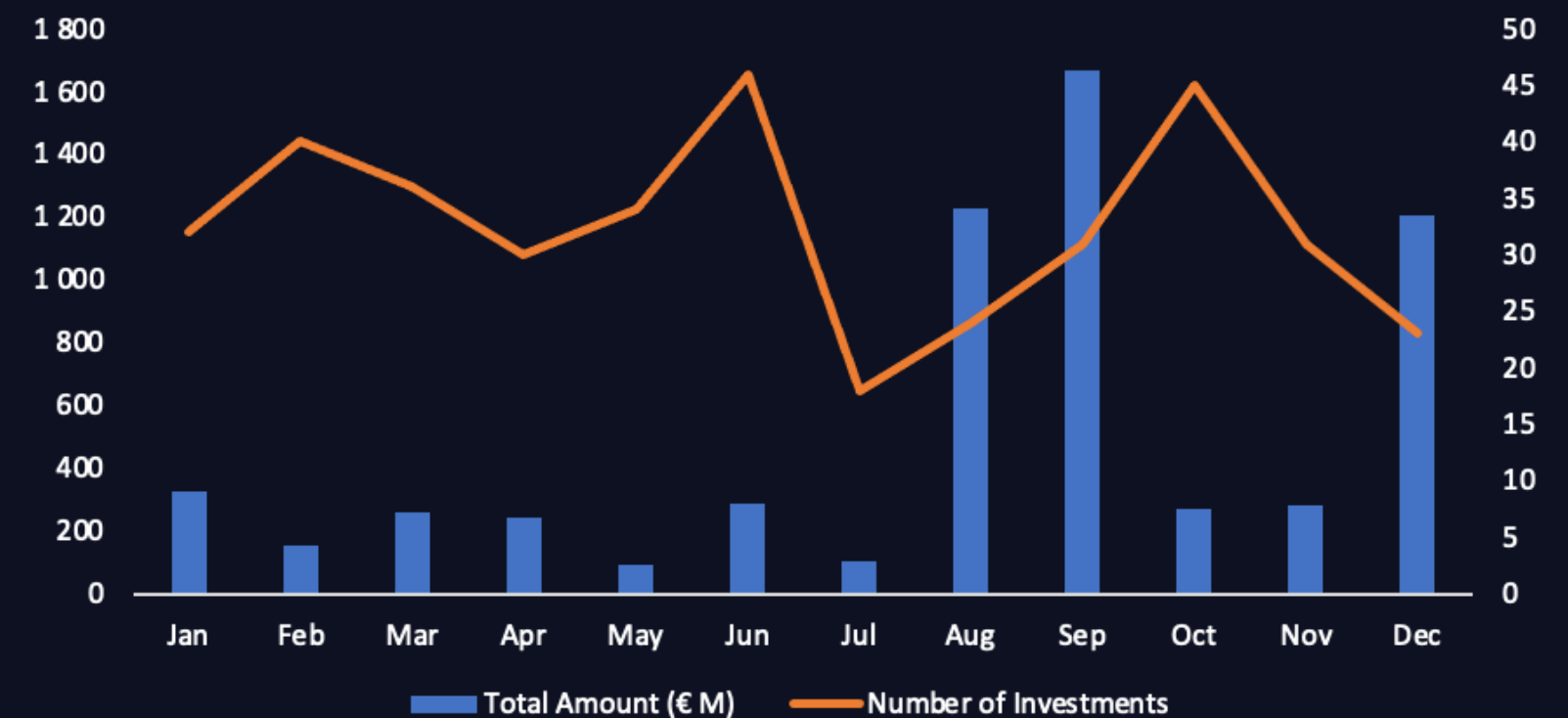
THE 2023 CLEANTECH YEAR

- The Nordics witnessed a surge in cleantech investments during the year, marking the highest amount of invested value ever (at least since we started measuring this in 2007). The total unprecedented high soared to 6,120 million euros. This substantial figure not only surpassed the investments recorded in 2022, which amounted to 4,284 million euros, but also exceeded the levels seen in 2021 and the prior record of 6,104 million euros.
- Notably, the year 2023 not only set a new record for the highest invested funds but also achieved an all-time high in the total number of cleantech deals with 390 deals closed.
- The 2023 year is marked by megadeals, with three distinct peaks in invested value during the months of August, September, and December. Each of these spikes can be directly attributed to substantial investments in H2 Green Steel (August) and Northvolt (September and December), where these individual deals alone surpassed 1,000 M EUR.
- Examining investment categories reveals that roughly half of all deals are early-stage investments, encompassing pre-seed, seed funding, or series A. Not surprisingly, in terms of monetary value, early-stage investments make up only a small fraction, remaining in the single-digit percentage range.

Total investments (M EUR)



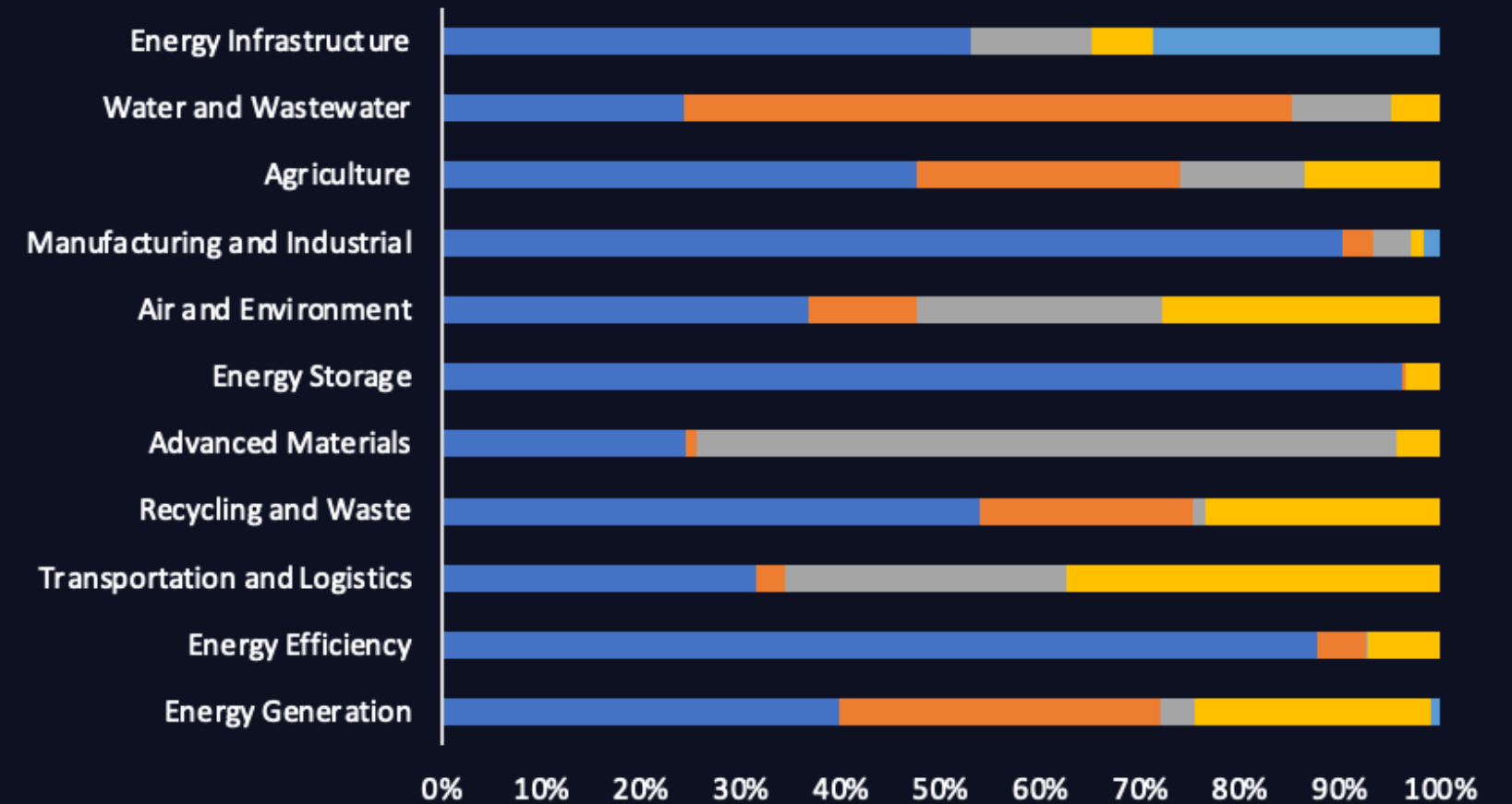
Investments over the year



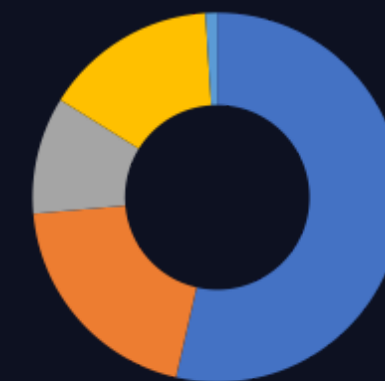
THE 2023 CLEANTECH YEAR

- Of the 11 tracked industry segments, most sectors are witnessing an uptick in deal activity compared to 2022. Only three sectors—advanced materials, air and environment, and energy infrastructure—registered a decrease in deal flow in 2023 compared to the previous year. However, in terms of value, a contrasting pattern emerges as most industry segments actually saw a decline in invested amounts. Notably, only four sectors—energy generation, energy storage, manufacturing and industrial, and agriculture—managed to secure more funds compared to the previous year, despite an overall record-breaking investment landscape in 2023. This captures the prevailing trend of a few mega-investments and a large number of smaller deals in, what is generally perceived as a more capital restrained market.
- Sweden stands out as an outlier and continues to lead in investment activity among its Nordic counterparts, capturing half of all deals and three quarters of the total invested amounts. This trend extends to the broader European context. *Cleantech for Europe* recorded EU27 investments totaling 11.1 billion EUR. Despite potential data variations, it is reasonable to assume that Swedish investments constitute a substantial part of this European total, ranging from a third to almost half of European investments. Again, much of this can be attributed to the large investments secured by Northvolt and H2 Green Steel.

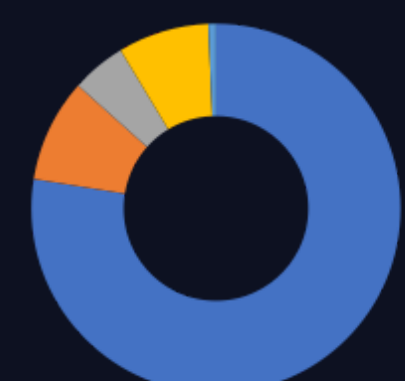
Deals by segment and by country (% of value)



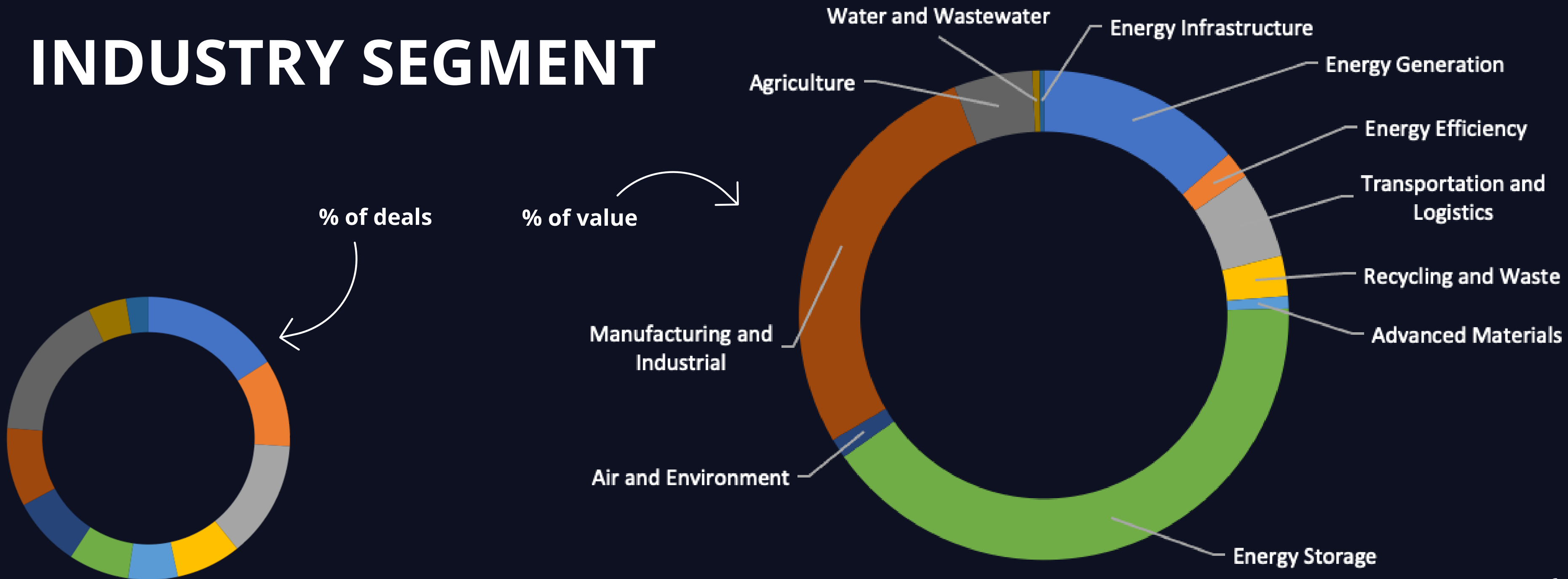
Distribution of Investments by Number of Deals



Distribution of Investments by Amount



INVESTMENTS BY INDUSTRY SEGMENT



THE FLEXIBILITY MAKERS

AN INTERVIEW WITH ALBERTO DALLA RIVA FROM ØRSTED ON HOW TO ACCELERATE GRID FLEXIBILITY

“Flexibility makers” refers to solutions that increase the capability of the energy system to maintain balance between generation and consumption. They are critical to expanding integration of renewable energy sources like wind and solar, which are more variable than conventional energy sources. In this context, Long Duration Energy Storage (LDES) technologies capable of storing energy for extended periods is pivotal. While various solutions exist within this domain—including thermal, electrochemical, and mechanical storages — there is much room for advancement and a great need for deployment of these technologies on a broader scale.

Ørsted is one of the world’s leading renewable energy companies, with hands-on experience of integrating renewables and storage solutions into the grid. During the recent Cleantech Capital Day in Copenhagen, a conversation with Alberto Dalla Riva, Lead Business Developer at Ørsted, provided the following key insights on what is needed to accelerate flexibility in general and, more specifically, the deployment of LDES:

Technologies still need maturation. In the last few years, we have seen an unprecedented cost decline in lithium-ion batteries, to the point where the technology became the de-facto standard storage for durations up to 4 hours. When talking about Long Duration Energy Storage the technology landscape is much more fragmented, with a large variety of concepts at different technology readiness level

and still relatively high cost. It is important to recognize the need for fast maturation of these technologies in order to be able to deploy them when needed. For this, all parties have a role to play: collaboration is needed between manufacturers (OEMs), developers, start-ups and academia, as well as targeted support from government and other institutions for pilots, demonstrators and pre-commercial projects.

Overcoming regulatory barriers. Regulatory roadblocks need to be removed as existing regulation does not always align with the goal of enhancing flexibility and storage, including issues like grid tariffs, high connection fees, and double taxation. This can result in increased costs for technologies and solutions which may, in fact, relieve pressure from the grid. For example, flexible demand consumes when renewable energy production is high while refrain from consuming during peak hours, actively supporting the grid. Legacy grid tariff regimes simply based on the capacity connected to the grid fail to capture this dynamic and are not truly reflecting the value these technologies bring to the system.

Addressing revenue uncertainty. Investors face uncertainty in revenue due to the challenge of predicting power price variations over the next decade, which is heavily influenced by national climate policies and the evolution of regulatory of regulatory frameworks. This creates a dual challenge of technological and market risk. This uncertainty can be mitigated through dedicated auctions, supporting mechanisms

THE FLEXIBILITY MAKERS

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like Cap and Floor, as well as providing clear indications of regulatory development and power demand evolution. These approaches can often create win-win solutions for both governments and developers. This creates a dual challenge of technological and market risk. This uncertainty can be mitigated through dedicated auctions, supporting mechanisms like Cap and Floor, as well as providing clear indications of regulatory development and power demand evolution. These approaches can often create win-win solutions for both governments and developers.

Qualitative tenders and market pull. Governments can actively promote the critical role of LDES and similar technologies through specific auctions and tenders, thereby establishing a clear market demand for these technologies. Examples include encouraging non-price criteria in tenders, as seen for example in the Netherlands, where an offshore wind tender was coupled with requirements to promote flexible demand. Going beyond price-only tenders and incorporating qualitative aspects can help accelerate the needed flexibility, system integration, and innovation in the energy system.

Flexibility beyond LDES. While advancing energy storage solutions is key, flexibility in the energy system can be achieved through various means. Examples include power-to-x and hydrogen production, which have the potential to increase flexibility

on a gigawatt-scale. This can not only increase flexibility for integrating renewables, but also aid in decarbonizing hard-to-abate sectors.

Recognition of urgency. Policymakers need to recognize the urgency of implementing policies and frameworks that remove barriers to flexibility technologies. Delays could jeopardize the stability of the power system, and industry is eagerly waiting to deploy flexibility at scale. Enabling policies need to be sped up, because many technologies which have the potential to become realized projects that create value are waiting for policy enablement and clarity.

THE FLEXIBILITY MAKERS

FLEXIBILITY MAKERS FOUND IN THE DEALFLOW

The need for accelerating flexibility is not just a more prevalent topic on the policy agenda, but now also increasingly a trend in the Nordic investment landscape. Taking a look at the deals in 2023, here are six different companies from the Nordics providing solutions for flexibility in creative ways that all got investors to open their wallets during 2023.

FLOWER

Flower is a versatile energy solutions provider, offering services in energy storage, solar power, wind power, demand response, and residential solutions. As a leading developer of grid-scale Battery Energy Storage Systems (BESS), Flower addresses challenges in grid stability, frequency, prices, and volume through a holistic approach.

SNERPA POWER

SNERPA Power is developing a Power Energy Management System, with a distinct focus on demand-side consumption. This system enables customers to make automated decisions regarding electricity consumption, scheduling, and contract management, while enhancing grid flexibility.

PLEXIGRID

Plexigrid is a deep-tech company specializing in enhancing electricity grids, transforming power grids to make them more flexible, intelligent and efficient to facilitate the renewable energy transition. Solutions cover grid monitoring, grid analytics, flexibility management, and demand response.

TETHER

Tether is a pioneering energy company that transforms parked Electric Vehicles (EVs) into a network of grid-connected energy storage. By leveraging the battery capacity of idle EVs, Tether aims to maximize renewable energy usage and eliminate the need for fossil fuels.

CARTESIAN

Cartesian uses thermal energy storage to make energy use more efficient and reduce carbon footprints in high-energy sectors. They offer affordable storage systems for large heating and cooling setups, helping optimize energy use and save surplus energy for later.

FEVER ENERGY

Fever Energy is creating a smart grid platform that automates and optimizes the bidding and market participation of companies' energy assets. They offer a platform for aggregators to participate in balancing markets efficiently, ensuring partners maximize their energy resources, optimize flexibility, and generate new revenue streams.

SPOTLIGHT: FlagshipONE

Breakthrough Energy Catalyst has partnered with Ørsted's FlagshipONE, Europe's largest e-Methanol project which aims to decarbonize the shipping industry. As part of this collaboration, Breakthrough Energy Catalyst will acquire a 15% equity interest in FlagshipONE and provide a grant to support the project. In addition to Breakthrough Energy's investment, FlagshipONE will also receive funding through an equity investment from the European Investment Bank (EIB) under InvestEU, along with a grant from Horizon Europe. Moving forward, Ørsted aims to establish long-term offtake agreements, introducing a new model for purchasing fuel in the shipping industry, thereby facilitating the scalability of green fuels.

FlagshipONE, a commercial-scale "Power-to-X" project, is set to become Europe's largest e-Methanol plant. Power-to-X refers to the conversion of renewable energy into another form, often gas or liquid, making it a substitute for fossil fuels. Power-to-X becomes particularly useful for sectors which are difficult to electrify, such as shipping, among other sectors. E-methanol, a form of Power-to-X, is a fuel made from renewable hydrogen and biogenic carbon dioxide. Compared to conventional fossil fuels, e-methanol can cut carbon emission up to 95%, and currently, the shipping industry accounts for roughly 3% of global carbon emissions.

At FlagshipONE, hydrogen will be produced using renewable energy, and carbon dioxide will be sourced from a nearby biomass-fired combined heat and power plant. The plant also provides steam and water, and excess heat is returned to the local heating network. This also explains why FlagshipONE is based in Örnsköldsvik in northern Sweden, as the location benefits from plenty of renewable energy in the local grid and a leading forestry energy to provide the green hydrogen and biogenic carbon dioxide needed for producing e-methanol.

WHAT WE'RE PAYING ATTENTION TO



FUNDING MODELS

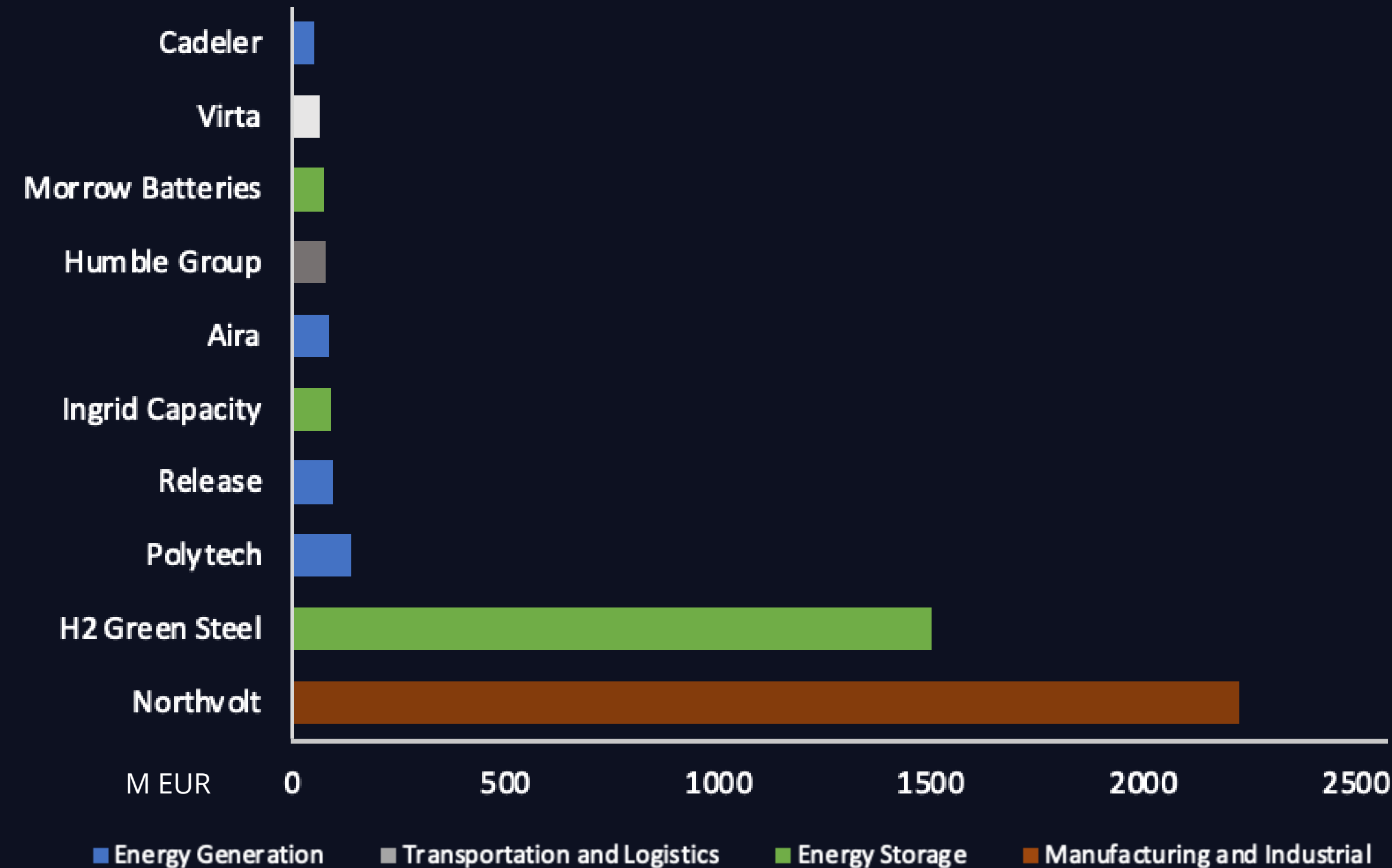


SCALABLE DECARBONIZATION



NORDIC PROMINENCE

TOP 10 NORDIC INVESTMENTS 2023



Energy generation and energy storage

Among the top ten investments in 2023, companies specializing in energy generation and energy storage are particularly prominent, constituting seven out of the ten total investments.

Vargas Holding companies going strong

A notable trend emerges as three out of the top ten companies receiving investments are under the umbrella of Vargas Holding - Northvolt, H2 Green Steel, and Aira. Northvolt and H2 Green Steel stand out in this surge, having secured monumental funding in 2023.

TOP 10 NORDIC INVESTMENTS 2023

NORTHVOLT

Northvolt specializes in lithium-ion battery cells, manufacturing batteries with clean energy, resulting in 80% lower CO2 emissions compared to coal-powered cells.

H2 GREEN STEEL

H2 Green Steel produces green steel. Powered by hydrogen, H2 Green Steel produces steel with 95% reduced CO2 emissions compared to traditional steel-making.

POLYTECH

Polytech is a wind energy company specialized in the development, design, and production of systems dedicated to improving wind turbines.

RELEASE

Release designs, finances, and installs scalable solar power plants and battery storage, offering equipment leasing through flexible short- or long-term contracts.

INGRID CAPACITY

Ingrid Capacity is an energy company building infrastructure for large-scale energy storage.

AIRA

Aira provides intelligent heat pumps, offering innovative and affordable technology to advance electrification of residential heating.

HUMBLE GROUP

Humble Group is a family of companies with a focus on healthy snacks and sustainable beauty and health products.

MORROW BATTERIES

Morrow Batteries is a battery technology company producing sustainable batteries for solutions within energy storage and mobility.

VIRTA

Virta delivers intelligent electric vehicle charging services through a digital platform, offering end-to-end charging solutions.

CADELER

Cadeler accelerates the transition to renewable energy by installing offshore wind farms and providing services in the transport, installation, and maintenance of offshore wind turbine farms.

POLICY NEWS

- **COP28 agrees on transition from fossil fuels.** At COP28 a historic climate agreement was reached calling for a transition away from fossil fuels. The deal aims to send a message to investors and policymakers about the global commitment to break from fossil fuels. The agreement urges countries to triple renewable energy capacity, double energy efficiency, and achieve net-zero emissions by 2050. However, critics highlight the voluntary nature of the deal. For instance, no specific end date is set for fossil fuel production, and the agreement's success is dependent on follow-up actions and decisions in upcoming climate summits. Looking at a Nordic perspective, Norway did play a role in emphasizing the need to end the burning of fossil energy. Nevertheless, concerns are raised about Norway's increased investments in oil and gas, contradicting the global shift towards renewable energy. The agreement also faces criticism for inadequate funding provisions for climate justice and the transition in developing countries.
- **Nordics drop in CCPI ranking.** Finland, Norway, and Sweden have seen a drop in their standings on the Climate Change Performance Index (CCPI). In contrast, Denmark not only retained its position at number four but also stands out as the top-ranked country, with the top three spots unoccupied as no country was deemed strong enough to claim them. The rankings are determined across four categories: GHG emissions, Renewable Energy, Energy Use, and Climate Policy. It's worth noting that Iceland was not assessed in the CCPI Index.
- **Sweden and Finland commit to nuclear.** Sweden, Finland, and 20 other nations committed to tripling nuclear energy capacity by 2050 at COP28. Sweden's parliament also approved over ten reactors and expanded nuclear placement. Advocates stress nuclear power's cleanliness and reliability, but financing remains a challenge. In a report commissioned by Norwegian Industry, the economic viability of nuclear power was questioned. To address the financial challenge, Sweden's PM forwarded the need for governments to participate in sharing financial risks. However, recent nuclear shutdowns in both Sweden and Finland have also raised questions about nuclear's stability.
- **Norwegian's Climate Committee outlines decarbonization pathway.** The Climate Committee of Norway was assigned the responsibility of outlining the pathway for achieving a 90-95% reduction in greenhouse gas emissions by 2050, compared to 1990 levels. The committee advised against new oil exploration, urges a strategy for the final phase of petroleum activities, and advocates halting new oil and gas permits. The

POLICY NEWS

- report faced criticism from, for instance, Offshore Norway, the Conservative Party, and the Progress Party, who instead highlighted anticipated demand for oil and gas up to the year 2050. The committee also recommends measures for emissions reduction across various sectors, including food and agriculture, transport, and the promotion of a circular economy.
- **Sweden presents Climate Action Plan.** The Swedish government presented its Climate Action Plan, outlining a roadmap to achieve carbon neutrality by 2045. Key priorities include international collaboration, prioritizing fossil-free electrification with expanded nuclear power, ensuring a transition while maintaining competitiveness and job growth, and fostering public support. The plan comprises over 70 measures, including joining the EU's new emissions trading system in 2027, conducting investigations on policy instruments, analyzing charging infrastructure expansion, and promoting wood construction, among other measures. Notably, the plan places a significant emphasis on long-term solutions rather than immediate effects. Sweden's Climate Policy Council has deemed the plan as insufficient for reaching Sweden's climate goals.
 - **Denmark commits one billion DKK into green industries.** Denmark will allocate one billion DKK in state aid for key green sectors in 2024, aiming to stay competitive amidst increasing global green subsidies. The support will benefit companies in wind, hydrogen, and power-to-x industries. Eligible companies can apply for grants covering up to 15% of costs or loans and guarantees covering up to 20%.
 - **Denmark introduces green tax on flights.** Denmark will introduce an air travel tax, starting in 2025 and gradually increasing up until 2030. The tax varies based on flight distance. In 2025, the tax for short flights will be 30 Danish kroner, equivalent to 4 euros, and is set to increase to 50 kroner by 2030. For long-haul flights, the tax will be 410 kroner, approximately 55 euros, by 2030. Around half of the revenue generated will contribute to financing the shift to more sustainable aviation fuels.
 - **Finland plans budget cuts to EV charging.** Finland is planning to end subsidies for EV charging stations, impacting the affordability of charging infrastructure for housing associations. Currently, housing associations benefit from a 35% subsidy, but if the 2024 state budget is approved, it will be discontinued. The decision is anticipated to slow the adoption of electric cars and hinder progress towards climate goals. The funds

POLICY NEWS

allocated for this purpose are expected to be exhausted in the next few months. Other climate subsidies, including support for workplace EV charging infrastructure, are also being phased out. Additionally, subsidies for homeowners switching from district heating to geothermal heating will no longer be available from the beginning of next year.

- **Finland unlikely to meet climate targets.** Finland's overall emissions are not dropping significantly, despite a decline in industrial emissions. A forecast by the research institute Etila indicates 4% annual reduction in GHG emissions from 2023 to 2027, which is insufficient for reaching Finland's goal of climate neutrality by 2035. Etila forwards the need of reducing fossil fuel usage, embracing emission-saving technologies, and strengthening carbon sinks to effectively meet the climate target.
- **Iceland funds geothermal exploration projects.** Iceland's Ministry of the Environment, Energy, and Climate has approved grants totaling ISK 447 million (apprx. 3 M EUR) for eight geothermal exploration projects. This marks the first geothermal exploration initiative in 15 years, addressing the upcoming challenges in heating utilities and reducing subsidies on heating costs. Over 90% of Iceland's population already has access to geothermal heating systems, and this effort aims to further utilize geothermal energy for general domestic heating in areas currently relying on electricity or oil for central heating
- **Direct subsidies replace tax incentives for energy conversions in car fleet.** Iceland is switching from tax incentives to direct subsidies for energy conversion in transportation starting January 2024. The shift aims to simplify and make the system more transparent, focusing on promoting a green energy transition in the car fleet. Before, incentives for energy conversion in land transport came as VAT discounts. However, the cancellation of the VAT on electric cars is causing concern among car dealers who are uncertain of what the effects will look like in practice and, indeed, there is a somewhat reduced level of support for energy conversion compared to the previous model.
- **Nordic region boasts lowest power prices in Europe.** With the end of the year, it can be determined that the Nordic market had the lowest power costs in Europe 2023, averaging €56/MWh on Nord Pool. Sweden and Finland respectively had the lowest prices in all of Europe.

LOOKING TOWARDS AN EU ELECTION

The super election year of 2024 is here, marking the largest global electoral year in history, with approximately half of the world's population heading to the polls. From our Nordic outlook, the EU election in June holds significant importance, but Finland and Iceland will each host their own presidential elections as well this year. The results of the European elections are crucial for the climate and cleantech community, shaping the direction of EU policy for the next five years. Looking at the timeline of climate change, this election may well represent the last opportunity to prioritize climate mitigation on the agenda, with climate adaption likely taking precedence once we reach 2029.

The previous EU political cycle witnessed the adoption of ambitious climate policies. The 2019 election was even nicknamed “the first climate election”, and the outcomes of said election were evident in the policies produced by the EU in the last five years. However, looking forward, current predictions suggest potential gains for the far-right and losses for the center-left and green parties—a precarious predicament for climate policy. From a cleantech perspective, it is crucial that the EU maintains a strong position on climate change as well as other environmental impacts and that we do not see a reversal of green policies as a potentially new power dynamic enters the European parliament. The imperative is rooted not only in the urgency of the climate crisis, but also in the broader context of fostering consistent policies. Such consistency and predictability is key for driving investments and helping businesses and industries in making strategic and informed choices in working towards a sustainable and resilient future.

Our hope from Cleantech for Nordics in the coming months is that we see an EU election movement where cleantech takes center stage, with MEPs prioritizing its important role. This endeavor is not just a necessity, but also an opportunity to drive positive change towards a sustainable and resilient future. We will do what we can to inform future MEPs on the role of cleantech innovation and growth in the EU context, and of course, we urge you all to vote when the day comes!

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