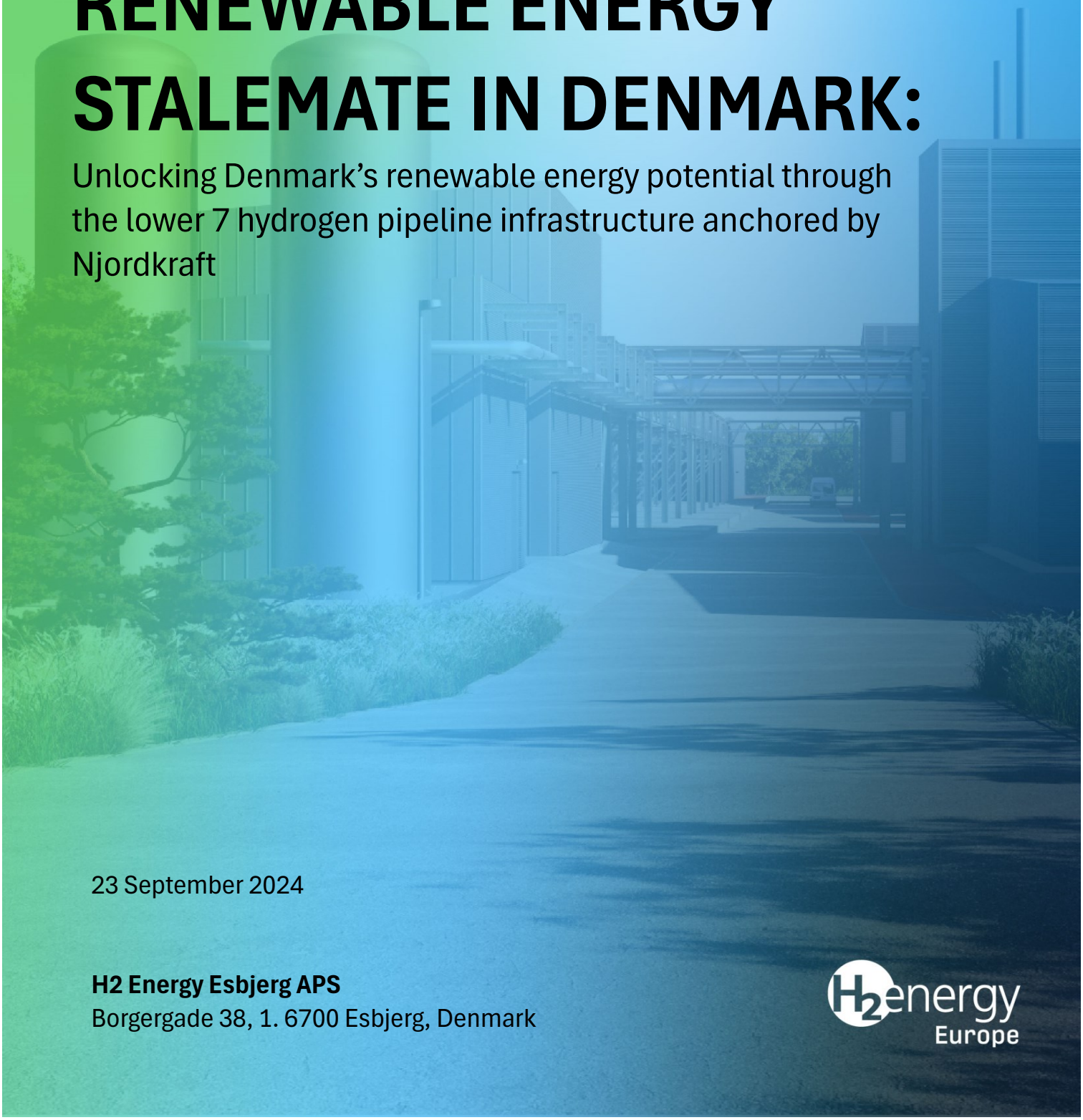
OVERCOMING THE RENEWABLE ENERGY STALEMATE IN DENMARK:

Unlocking Denmark's renewable energy potential through the lower 7 hydrogen pipeline infrastructure anchored by Njordkraft



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CONTENTS

1. EXECUTIVE SUMMARY

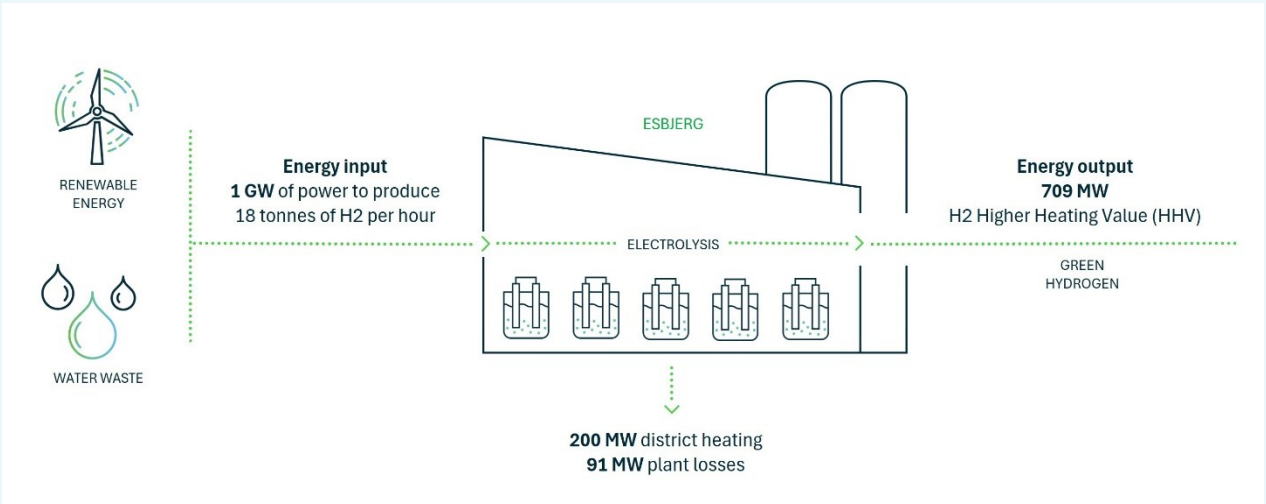
- Denmark has a **unique opportunity** to capture a significant share of **Germany's hydrogen import requirement of 45-90 TWh per year** (1.4 to 2.8 million tonnes p.a., equivalent to 10-20 GW of electrolysis capacity) **starting from 2028** due to its abundant offshore wind resources and existing pipeline connectivity to northern Germany

- **The conversion of the 'Lower 7' hydrogen pipeline**, connecting Esbjerg to Ellund on the German border, is the **most logical, lowest-risk and lowest-cost** step to capture this opportunity before competing sources appear in the market

- With a total project cost of EUR 1.8 billion, **the 1 GW Njordkraft electrolyser** project in Southwest Jutland represents an investment by H2Energy Europe (part of Trafigura group) of nearly **4x the expected cost to Energinet of implementing the Lower 7 hydrogen pipeline**

- Njordkraft is the most advanced project in Denmark and the only one **ready to commit to up to 709 MW H2 HHV (i.e. c.600 MW H2 LHV) of pipeline capacity by late 2028.** This commitment represents ca. EUR 30 million in annual payments and **covers more than 75% of the pipeline's estimated annual costs and capital recovery**

- The 25% shortfall in revenues represents a maximum **cumulative deficit projected at less than EUR 30 million**. By 2033, as utilisation ramps up after Njordkraft comes online, the pipeline will begin generating surplus revenue, reaching a fully positive financial position by 2034 - only six years into operation



THE PROBLEM: DEFINING THE IMPASSE

Denmark possesses significant potential for offshore wind energy, bolstered by the North Sea's exceptional wind resources and seabed conditions. To harness this potential, Denmark has launched several large-scale offshore wind projects, including a tender in 2024, the country's largest to date, which aims to add at least 6 GW of new capacity across six wind farms. This capacity could potentially reach over 10 GW through overplanting synergies. However, there is a major obstacle: Denmark's current electricity grid cannot accommodate this surge in energy, and grid upgrades would be prohibitively expensive.

The solution lies in transforming surplus wind energy into hydrogen and exporting it via dedicated hydrogen pipelines. However, this presents a "chicken and egg" dilemma:

- **Wind developers** are hesitant to bid aggressively on projects without the certainty of a hydrogen pipeline to facilitate grid integration of new generation capacity.
- **The Danish government** is reluctant to commit to developing hydrogen infrastructure without clear demand signals from hydrogen end users. By contrast, Germany's *Import Strategy for Hydrogen and Hydrogen Derivatives* published in July 2024 focuses on hydrogen infrastructure readiness, anticipating that German industries will rely on hydrogen imports from Denmark before the end of this decade.

This impasse risks delaying the development of wind projects, stalling the construction of Power-to-X (PtX) plants, and missing the economic opportunities available to Denmark in a future energy landscape dominated by renewables in Northwest Europe. Without resolution, Denmark's energy transition ambitions could be severely hindered. The 2022 Energinet report, *Pathways Towards a Robust Future Energy System*, emphasises the need for a hydrogen system that is co-optimised with the electricity grid to fully realise the renewable energy potential of the North Sea.

Denmark's future energy system will require seamless integration across electricity, gas, and hydrogen infrastructures. By 2030, Denmark's offshore wind potential could reach 35 GW, making a hydrogen pipeline network essential for leveraging this renewable energy and connecting Denmark to the broader European hydrogen backbone. Without a robust hydrogen network, Denmark risks losing its competitive edge in renewable energy and hydrogen production.

2. THE OPPORTUNITY: GERMANY'S HYDROGEN DEMAND SIGNALS

Germany has laid out ambitious plans to establish an integrated hydrogen production and distribution system in the North Sea region, positioning itself as a key hub for hydrogen imports and consumption. Germany's hydrogen strategy plays a pivotal role in enabling the buildout of a dedicated hydrogen pipeline network. Germany's "Wasserstoff-Kernnetz" foresees the construction of a hydrogen grid of nearly 9,700 km, which would entail 60% converted gas pipelines and 40% newly-built connections. Investment costs are estimated at €19.7 billion. By offering tax rebates and state-backed contracts-for-difference support for hydrogen pipeline investments until 2055, the scheme provides certainty to hydrogen Transmission System Operators (TSOs) and accelerates the development of critical hydrogen infrastructure.

The *German Import Strategy for Hydrogen and Hydrogen Derivatives* outlines plans for a cross-border hydrogen pipeline linking Denmark and Germany, with operations of pivotal hydrogen pipeline sections in North Germany commencing by 2028/29. German industrial users—such as those in the steel, refinery, and ammonia sectors—are counting on hydrogen supplies from Denmark to meet their decarbonisation targets by 2028.

Delays in Denmark's hydrogen infrastructure could make Danish projects less competitive in German hydrogen tenders, jeopardising **contracts worth up to EUR 1.5 billion in annual revenues from 10-year supply agreements with German industrial customers**. Specifically, tenders are currently underway with steel producers and oil refineries that are backed by state subsidies or policy tools designed to incentivise the uptake of renewable hydrogen in bulk volumes to meet decarbonisation mandates set out in EU's Renewable Energy Directive. Thus, delays in implementing hydrogen infrastructure in Denmark presents a major risk of losing these opportunities to competitors. Imported hydrogen volumes via waterborne cargoes from other low-cost production regions such as the Iberian Peninsula, North Africa, North America and the Middle East could increase geopolitical risks and create vulnerabilities in energy security, particularly for North West Europe, as it moves away from Russian natural gas. As an early mover, Denmark is well-positioned to cement its lead in long term supply of renewable hydrogen to European consumers who are grappling with uncertainties caused by delays in the implementation of the Delta Rhine Corridor network originating in the Netherlands. Repurposing existing natural gas pipelines for hydrogen, as recommended by policymakers and industry experts, would be more cost-effective and efficient than building new ones. This strategy would not only accelerate hydrogen integration but also enhance Denmark's renewable energy capacity.

3. OUR PROPOSAL: AN INVESTIBLE PROPOSITION FOR THE LOWER 7 PIPELINE NETWORK ANCHORED BY NJORDKRAFT

To resolve the impasse, we propose an investible solution, anchored by Njordkraft's commitment to long-term pipeline transport capacity. This proposal focuses on developing the **Lower 7 Hydrogen Pipeline Network**—infrastructure connecting **Esbjerg** to **Ellund** in southern West Jutland, which will transport hydrogen from Denmark to Germany.

Key aspects of the proposal:

- **Lower 7 Pipeline Network**: A 150 km hydrogen pipeline system consisting of:
    - 57 km east-west corridor from Endrup to Egtved (new hydrogen pipeline).
    - 90 km north-south section spanning from Egtved to the German border at Ellund (repurposed pipeline).

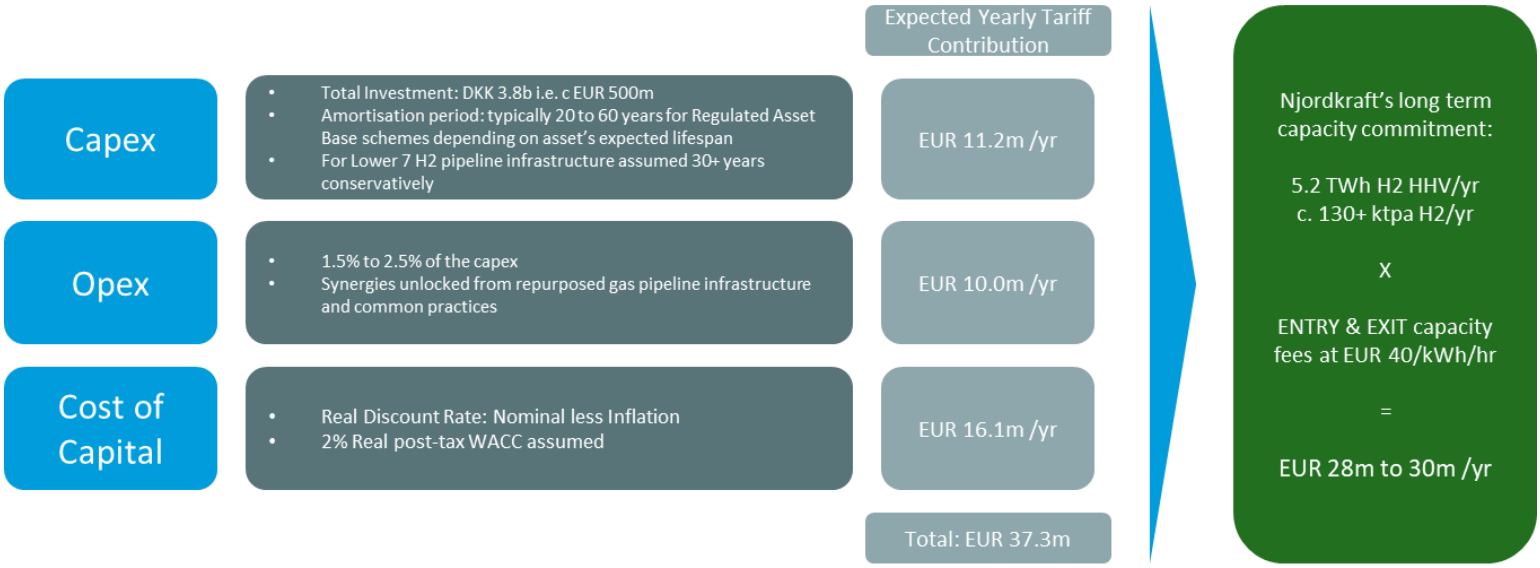
This network provides the highest value-for-money investment for Denmark's hydrogen infrastructure, supported by long-term user commitments, including Njordkraft's advanced discussions with German off-takers.

- **Initial Hydrogen Production**: The Lower 7 pipeline will have an initial capacity of 3,000 MW of hydrogen production, enabling distribution capacity for up to 670,000 tonnes of hydrogen annually. Njordkraft proposes to contract 130,000 tonnes of annual hydrogen supply, covering a large proportion of estimated pipeline investment, capital recovery and ongoing maintenance and operations. Similarly, other large scale PtX projects under development near Esbjerg by seasoned developers present a high likelihood of becoming significant customers for contracting additional pipeline transport capacity. Collectively, these projects are poised to contribute to the long-term utilisation of Denmark's hydrogen infrastructure.

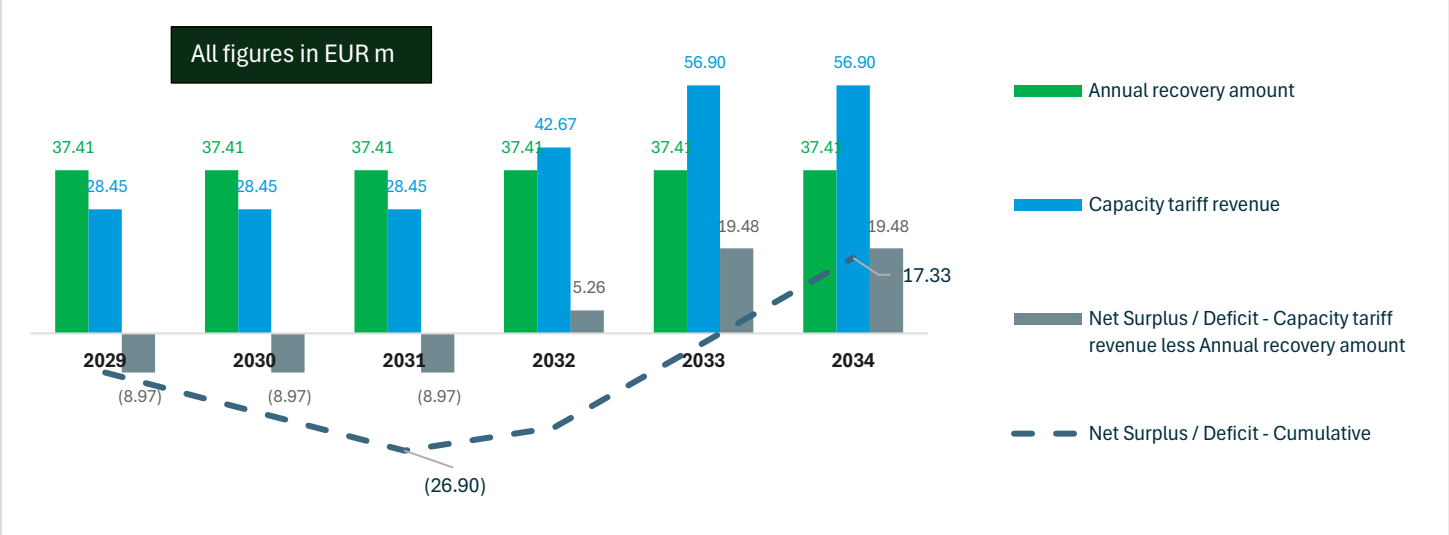
- **Njordkraft's Role**: Njordkraft's 1 GW electrolyser plant in Esbjerg, Jutland, has cleared key development milestones, including completion of Front-End Engineering Design (FEED), securing grid connection, building and environmental permits. Njordkraft is designed to operate reliably over 7,500 full load hours (FLHs) while fully complying with the EU's Delegated Act for Renewable Fuels of Non-Biological Origin (RFNBO) hydrogen.

  To substantiate an investable business case for the Lower 7 pipeline, key assumptions and cost drivers were triangulated from publicly available information from Energinet and other European TSOs and data from comparable power and utilities infrastructure investments in Europe. Early modelling suggests that the annual recovery amount associated with capital depreciation, regulated returns and operations and maintenance would amount to EUR 37 million annually over the asset's useful lifespan. By comparison, Njordkraft is projected to generate EUR 28m – 30m annually in

pipeline transport capacity payments, thereby establishing a strong business case for the DKK 3.8 billion (approximately EUR 500m) investment required to develop the Lower 7 pipeline.



- **Economic Analysis and Tariff Model:** According to information published by Energinet in September 2024, the capacity tariff model for the Lower 7 pipeline is expected to closely mirror the current tariff structure of the Danish methane transmission network. The entry-exit split for booked pipeline capacity, along with a uniform cost allocation method, has been adopted in the economic evaluation of the Lower 7. During the initial period, the pipeline's economics will be anchored by Njordkraft's volumes.



Long-term capacity commitments from Njordkraft, which will inject 18 tonnes of hydrogen per hour (709 MWh H2 HHV per hour), are expected to generate approximately EUR 28.4 million annually. As further electrolyser capacity comes online, the proceeds from capacity bookings are anticipated to increase. Advanced projects, from credible developers intending to utilise the Lower 7 pipeline, represent over 2 GW of electrolysis capacity by the end of the decade. However, in the accompanying chart, a modest ramp-up in capacity bookings is assumed, with 2 GW of capacity projected to be

online by no earlier than 2033. Implementing the Lower 7 as a priority will significantly enhance the value for money of public funds committed to the development of the Danish Hydrogen Backbone network, particularly during the early years of demand maturation.

The projected annual revenue required to cover capital expenditures, operating costs and the regulated return on capital, is estimated to amount to approximately EUR 37 million. This corresponds to capacity revenue of around 24 tonnes of hydrogen per hour (945 MWh H2 HHV per hour).

The analysis assumes a capacity tariff for multi-year firm entry and exit bookings respectively of EUR 20/kWh/h on an annual basis, aligned with tariff methodologies used by other relevant TSOs in the European Hydrogen Backbone, such as Fluxys in Belgium and Gasunie in the Netherlands. While tariffs are subject to inflation and potential changes over time, future adjustments could be based on an optional market participation mechanism with market growth and maturity. The utilization of 945 MWh H2 HHV per hour, represents one-third of the pipeline's overall design capacity of 3000 MWh H2 HHV per hour. Over time, increased usage of the pipeline is expected to result in tariff rationalisation such that tariffs align closer to the current methane transmission network rates, which range from EUR 5 to EUR 7 kWh/h annually for firm capacity bookings with a one-year runtime.

It is projected that in the early years of the pipeline's operation, income from capacity tariffs will be lower than the projected annual cost drivers, resulting in an estimated peak cumulative net deficit (under-recovery) of approximately EUR 27 million by 2031—the third full year of the pipeline's availability, which begins in 2029. However, as utilisation increases, the pipeline is projected to achieve surplus collections (over-recovery) from as early as 2033. By 2034, which marks the sixth full year of pipeline operation, the accumulated under-recoveries could be fully recouped, with the pipeline entering a positive financial position. Investing in a wider network – such as the "Lower T", the "Backbone to Holstebro" or "the fully developed Danish Hydrogen Backbone" as presented in the Information Package 2 from Energinet – will be accompanied by a larger recovery deficit and a longer time window to achieve positive financial position (revenue from capacity charges exceed annual recovery amount). This may largely be attributed to higher investments and uncertainties associated with capacity utilisation of the wider network.

In comparison, the German government is supporting the construction of a 9,700-kilometre hydrogen pipeline network, requiring investments of EUR 19.8 billion by 2032. However, operators' revenues from hydrogen transportation are expected to increase only gradually. To support these investments, Germany plans to establish an "amortisation account" to cap grid fees for users, with the expectation that targetted utilisation rates will be achieved no earlier than 2055. This implies a 25+ year time window for achieving positive financial position. By contrast, the analysis indicates the tangible possibility of reaching financial sustainability within just six years for the Lower 7 pipeline system when the accumulated deficit of early years could be fully recouped.

- **Expansion Potential**: With compression, pipeline capacity could increase to 7,000–10,000 MWh H2 HHV per hour, further enhancing Denmark's ability to supply hydrogen to Germany.

By endorsing this proposal and allowing Energinet to proceed with the Lower 7 development, the Danish government can give wind developers the certainty they need to bid confidently, thereby unlocking Denmark's full renewable energy potential.

4. THE CONCLUSION & OUR ASK

Denmark stands at a crucial crossroads. The country has a unique opportunity to lead in renewable energy and hydrogen production and make a meaningful contribution to Europe's decarbonisation and energy sovereignty. However, to capitalise on this, the Danish government needs to act decisively by committing to the Lower 7 pipeline, underpinned by Njordkraft's long-term capacity commitments. We anticipate a rapid expansion of the PtX industry once Njordkraft has proven the viability of a model underpinned by hydrogen exports to Germany with 3+ GW of PtX projects expected to reach Final Investment Decision (FID) between 2025 and 2028. This will unlock a range of benefits, including enabling wind developers to bid in upcoming tenders and ensuring Denmark's competitiveness in the emerging hydrogen economy.

We ask the Danish government to:

1. **Endorse the construction of the Lower 7 hydrogen pipeline** as a national priority, supported by Njordkraft's long-term capacity commitments.
2. **Provide time-bound financial and regulatory support** to facilitate Njordkraft's collaboration with Energinet in refining this investible proposition for the Lower 7 network. Such collaboration will involve joint work on formulating financing solutions that present highest value for money for the Danish state and also lead to reduced reliance on public funds.
3. **Establish a roadmap for the timely commissioning of the Lower 7 pipeline network** by the end of 2028.

By taking these steps, Denmark can break the current stalemate, secure its role as a key hydrogen supplier to Germany and Northern Europe and lay the foundation for long-term success in the global energy transition.

5. PROJECT SUMMARY AND COMPANY OVERVIEW

5.1 ABOUT NJORDKRAFT

Njordkraft is a large-scale renewable hydrogen production project in Esbjerg, Denmark, developed by H2 Energy Esbjerg ApS, a subsidiary of the Trafigura Group. The project features a 1 GW PEM electrolyser facility, aiming to produce up to 135,000 tonnes of green hydrogen annually, avoiding 1.1 million tonnes of CO2 emissions each year. It supports the establishment of a cross-border hydrogen market between Denmark and Northwest European countries. The construction of Njordkraft is aligned with Denmark's offshore wind farms and its strategic hydrogen pipeline plans. Subject to the certainty of the planned hydrogen pipeline infrastructure in Denmark, the final investment decision (FID) is expected in 2025, with the plant scheduled to begin operations by as early as 2028.

Key development milestones include the selection of advanced technology, securing 1 GW electricity grid connection, completing Front-End Engineering Design (FEED), and making significant progress with export credit agencies and project financiers. With an investment plan exceeding EUR 1.8 billion, Njordkraft is set to play a critical role in integrating North Sea renewable resources and promoting cost-competitive hydrogen production and distribution across Europe.

5.2 ABOUT H2 ENERGY EUROPE

In 2020, Trafigura, a global leader in the commodities industry, announced its investment in H2 Energy. In 2021, Trafigura formed a joint venture with H2 Energy, H2 Energy Europe, to develop large-scale green hydrogen ecosystems across Europe. In October 2023, Trafigura became the majority owner of H2 Energy Europe. Major planned projects include a 1GW green hydrogen initiative in Esbjerg, Denmark, converting offshore wind power, and a 20MW green hydrogen project in Milford Haven, South Wales. H2 Energy Europe is also advancing a network of hydrogen filling stations along key transport routes in Germany as part of its strategy to build a comprehensive European green hydrogen ecosystem.

Visit: https://h2eeurope.com

5.3 ABOUT TRAFIGURA

Trafigura is a leading commodities group, owned by its employees and founded over 30 years ago. At the heart of global supply, Trafigura connects vital resources to power and build the world. We deploy infrastructure, market expertise and our worldwide logistics network to move oil and petroleum products, metals and minerals, gas and power from where they are produced to where they are needed, forming strong relationships that make supply chains more efficient, secure and sustainable. We invest in renewable energy projects and technologies to facilitate the transition to a low-carbon economy, including through H2 Energy Europe and joint venture Nala Renewables.

The Trafigura Group also comprises industrial assets and operating businesses including multi-metals producer Nyrstar, fuel storage and distribution company Puma Energy, the Impala Terminals joint venture and Greenergy, supplier and distributor of transportation fuels and biofuels. The Group employs over 12,000 people, of which over 1,400 are shareholders and is active in 156 countries.

Visit: http://www.trafigura.com

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