

COMPANY UPDATE

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March 16 2022



BERGEN  
**CARBON  
SOLUTIONS**



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## AGENDA

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2021 highlights



About Bergen Carbon Solutions



Market update



Technological breakthrough

# 2021 HIGHLIGHTS

# Ready for big scale production

## Financial results and financing (MNOK)

- Revenue and other income 0.9
- Operating profit – 29.9
- Cash balance 107.3
- Number of shareholders >3.900
- Market cap 2.5 BNOK

## Operations

- Crucible 2.0 in operation since December
- Started with 24/7 production
- Increased capacity in engineering and R&D
- Good initial results from the Japanese company we signed an LOI with in October 2021. Further testing will be conducted
- The initiative with KAOS and Aker BioMarines's AION to develop and produce carbon negative baby products has been awarded a grant from Regional Research Funds in Norway (RFF)

## Subsequent events

- Private placement successfully completed with 250MNOK
- Announced decision to move forward with full-scale factory in Mosjøen
- Positive NORCE report on reduction in CO2 emissions from using carbon nanofiber additives
- Joint collaboration project with Beyonder has given good results from battery test and we have ongoing discussion about large scale testing
- Completed pre-project with TioTech AS to study the usage of EcoNano CNF as an additive to TioTech's white titania powder to improve the fast-charging capabilities of Li-ion batteries. Agreement to continue R&D project into next phase.
- LOI with Inabata









# Financial highlights

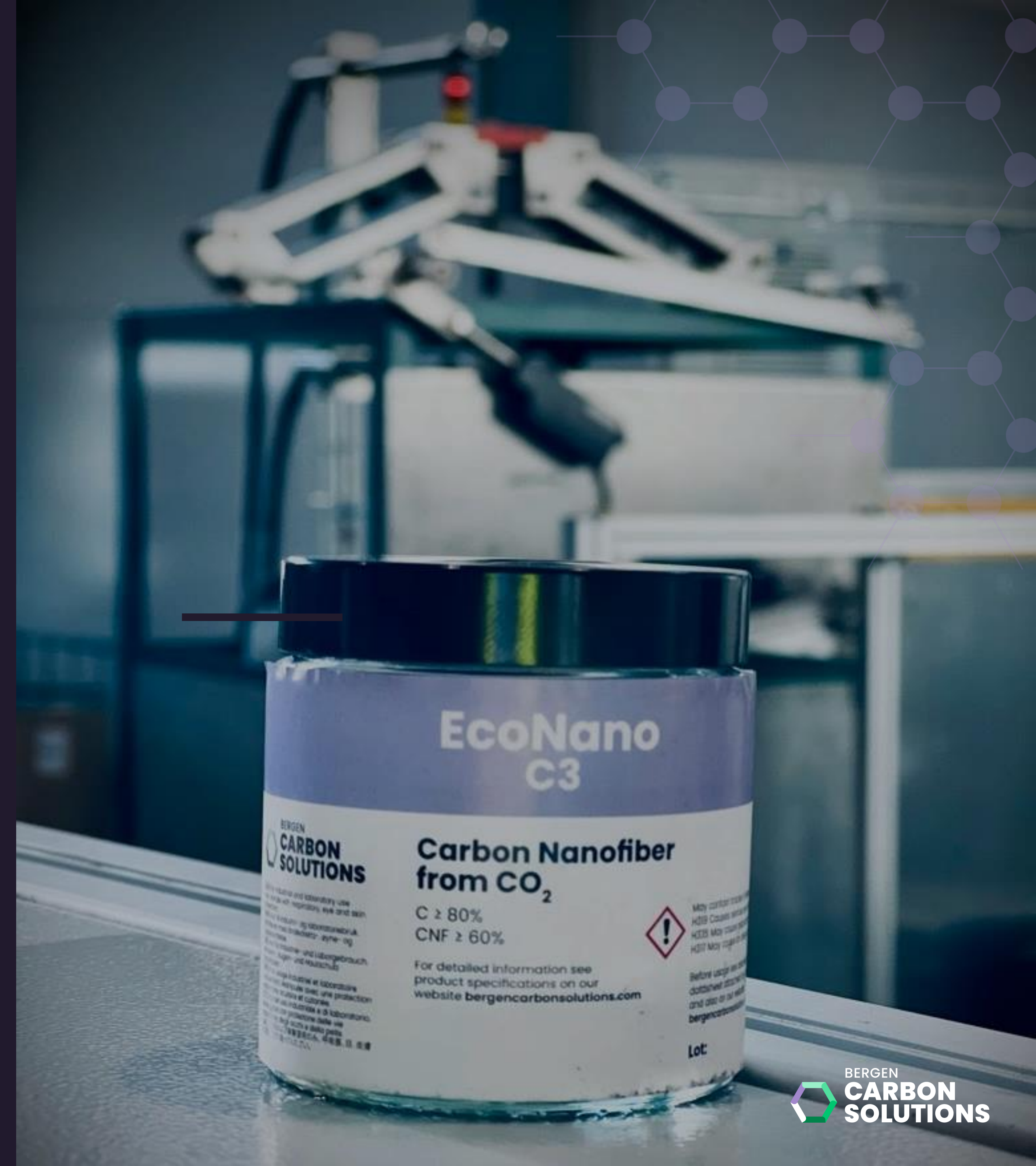
Key figures	Full year	Full year
Amounts in NOK thousands	2021	2020
Total revenue and other income	874	1
Total operating expenses	30 860	4 617
Operating profit (loss)	-29 986	-4 615
Net profit (loss) for the period before tax	-29 905	-4 655
Net change in cash and cash equivalents	66 798	32 994
Cash and cash equivalents, end of period	107 295	40 497
Equity	118 835	43 491
Total assets	124 504	48 544

# ABOUT BERGEN CARBON SOLUTIONS

# Bergen Carbon Solutions at a glance

## KEY FACTS

-  Founded in 2016
-  Producer of carbon nanofibers
-  Located in Bergen and Mosjøen, Norway
-  Competent team of engineers and PhDs
-  Unique and green technology
-  Acquired commercial production site
-  34 full time employees
-  Listed on Euronext Growth Oslo (Ticker: BCS)



## ABOUT BERGEN CARBON SOLUTIONS



**LIGHTER**  
than plastic

**STRONGER**  
than steel

**LEADS ELECTRICITY**  
better than copper

## WE USE CO<sub>2</sub> TO CREATE CARBON NANOFIBERS

- ◇ Lighter than plastic, stronger than steel, with exceptional thermal and electrical conductivity, properties that **can be transferred when combined with other materials**
- ◇ **Estimated CAGR of ~30% towards 2024<sup>1,2</sup>**, covering a wide range of industrial and technological applications
- ◇ Market price between **NOK 5 000 per kg** and **NOK 27 000 per kg** depending on quality<sup>1</sup>
- ◇ Our products cover the whole range of qualities, meeting different customer needs

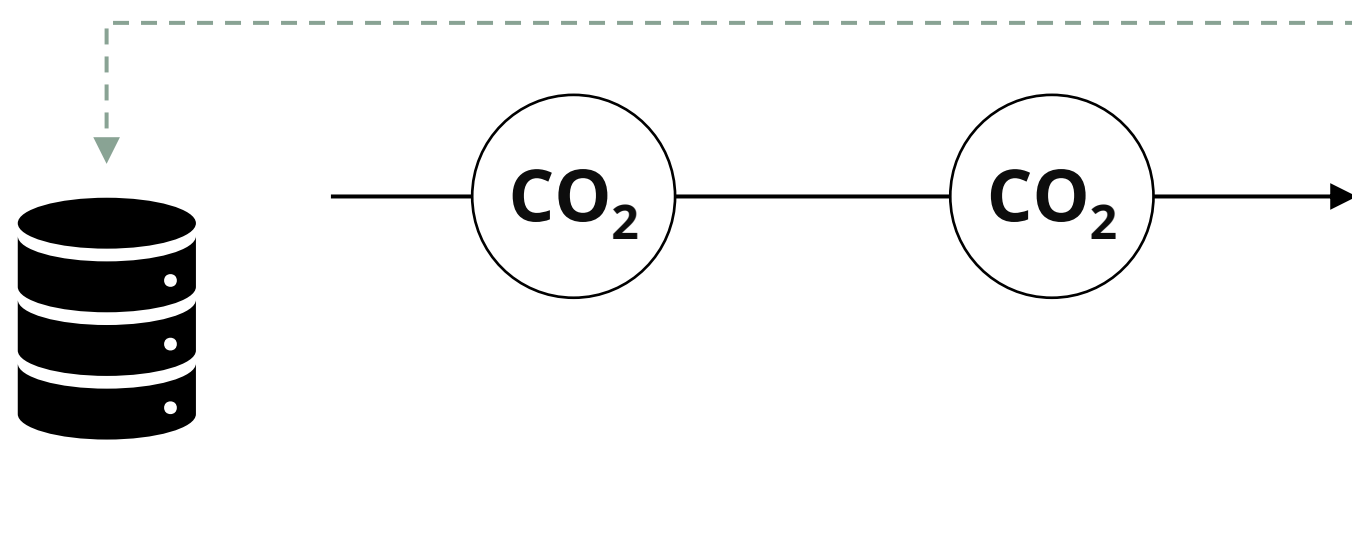
1: PwC analysis, (October 2020)

2: "Reduction in CO2 emissions from using carbon nanofiber additives" (Alagic, Blomgren et al., 2022)

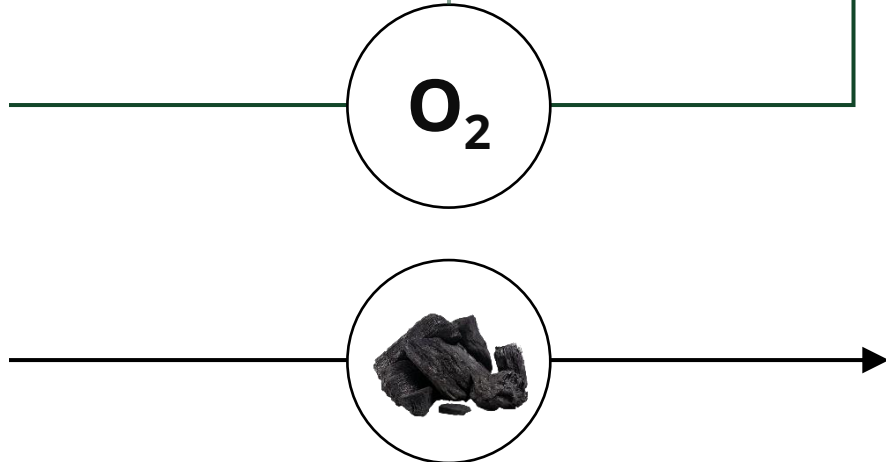
# PRODUCTION METHOD



Our technology is using CO<sub>2</sub> as feedstock in CNF production



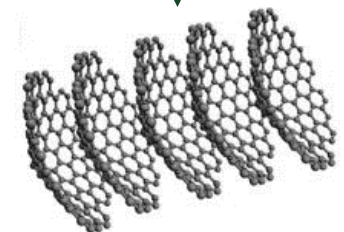
An electrolysis process break the chemical bonding. Carbon (C) can then be taken out of the production module and transferred manually over to the filtration module



Oxygen (O<sub>2</sub>) is emitted through a vented duct in the production module



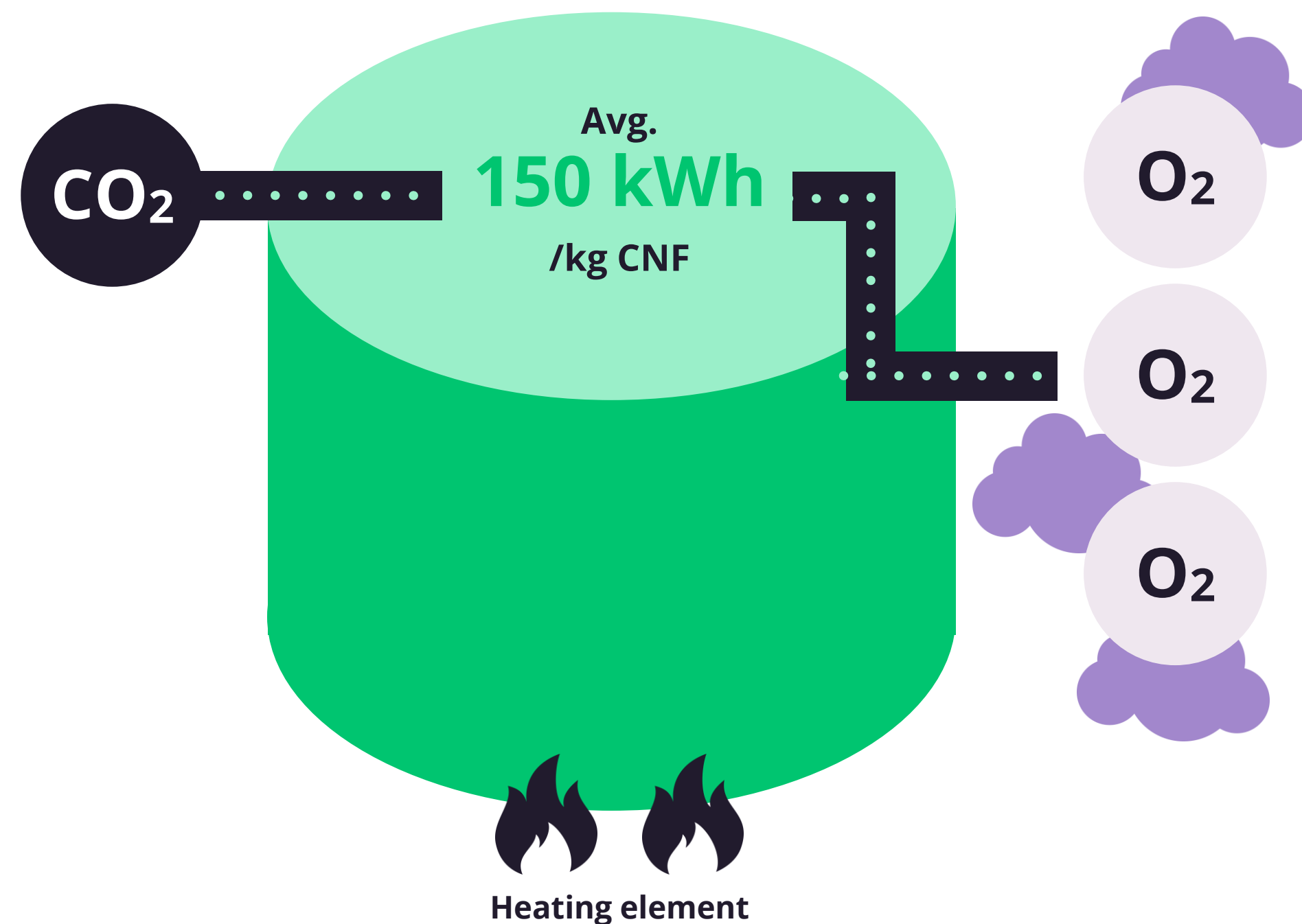
The carbon is filtrated in a patented filtration module and then, carbon nanofiber is ready for sale as a final product



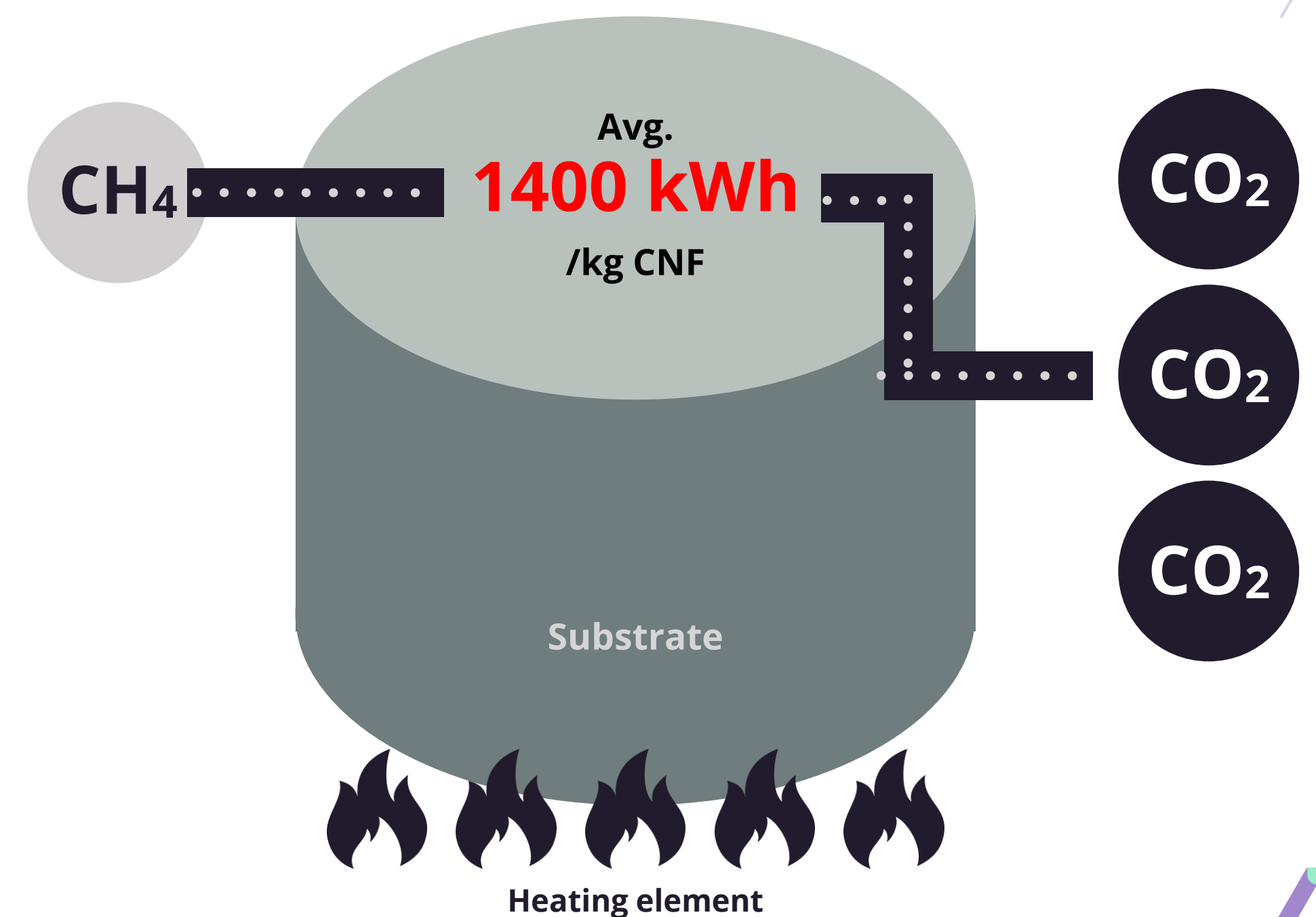
## ABOUT BERGEN CARBON SOLUTIONS

**Our technology is climate positive and uses significantly less energy than conventional methods**

### Bergen Carbon Solutions Positive CO<sub>2</sub> impact



### Traditional Method Negative CO<sub>2</sub> impact



# Zero emission products enabling a low carbon footprint

We've developed an energy efficient, carbon negative method to produce CNF out of CO<sub>2</sub>, using renewable energy, with O<sub>2</sub> as the only bi-product

Our product **ECO-C** is also known as **green carbon nanofiber**

Converting CO<sub>2</sub> into CNF will **positively contribute to UN's Sustainable Development Goals**

Our environmental efforts will help our customers:

- ◇ Reduce their carbon footprint
- ◇ Market their products as carbon positive
- ◇ Apply for grants designed for environmental purposes



# MARKET UPDATE

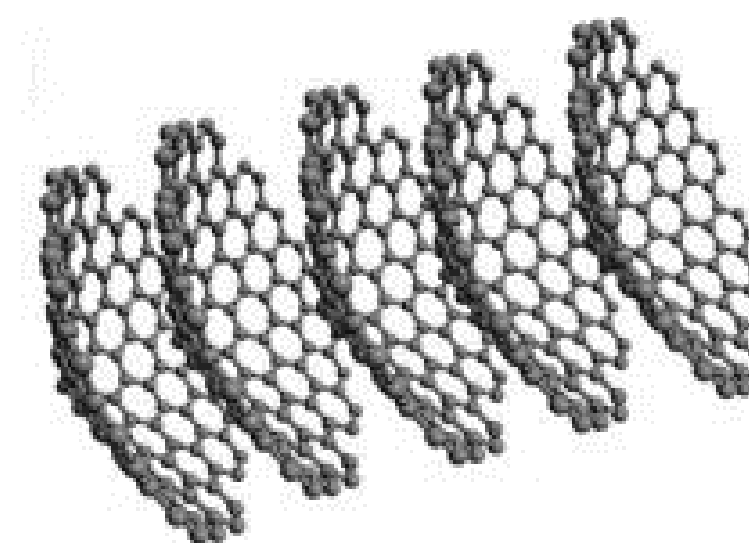
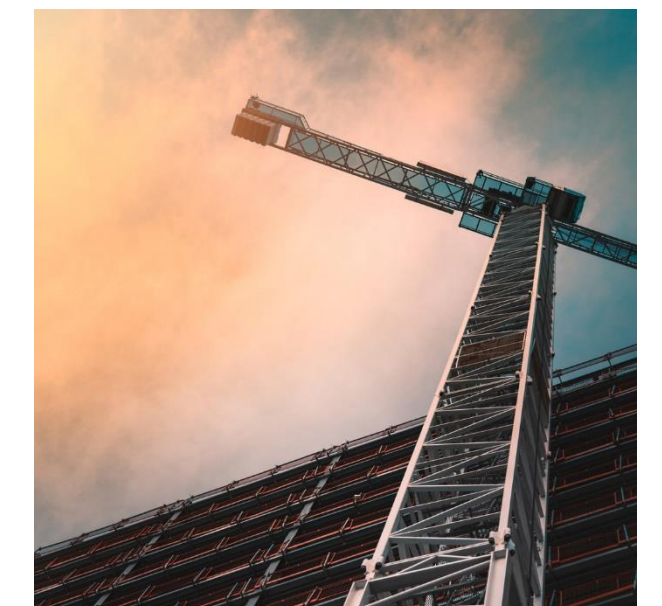
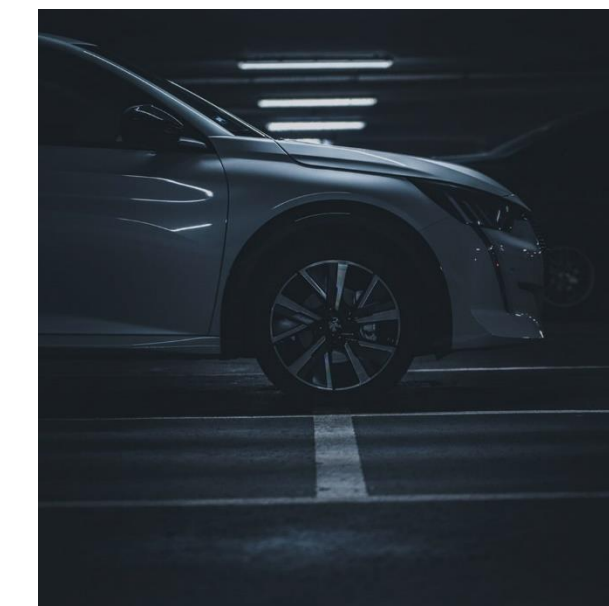
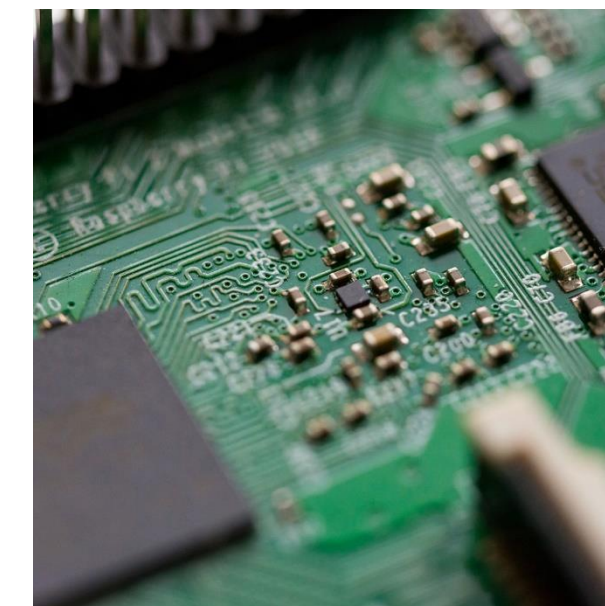
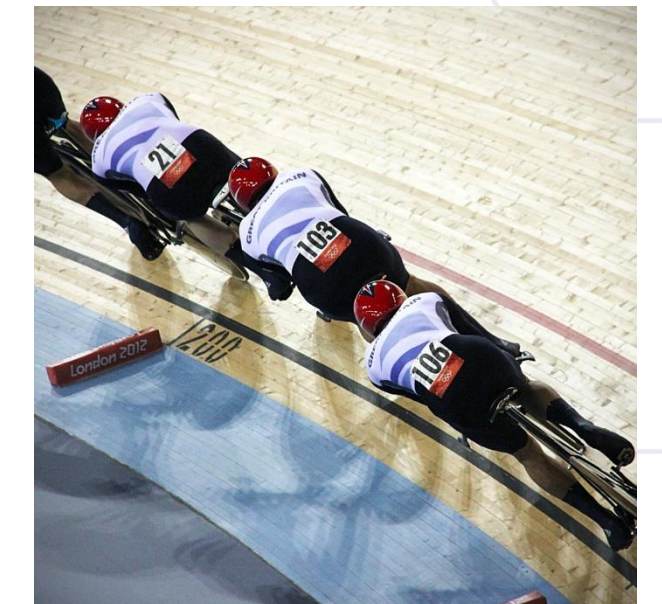
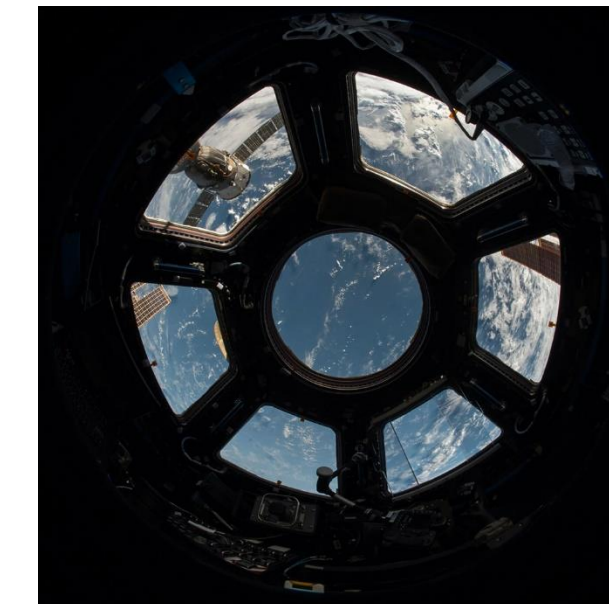
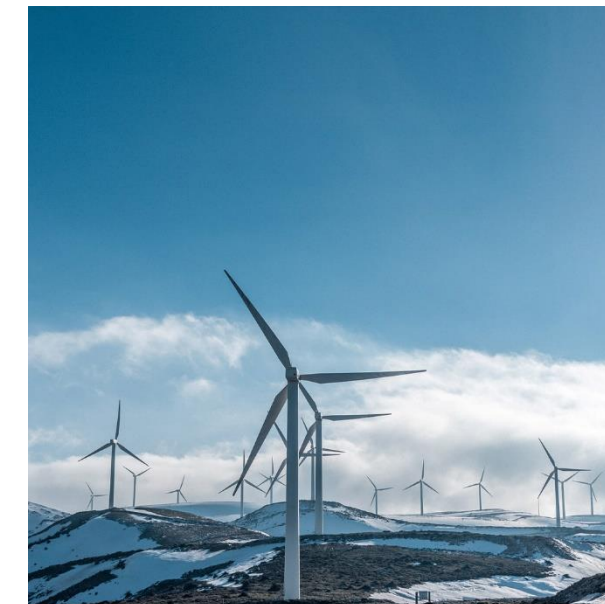
## APPLICATION AREAS

# Carbon Nanofiber (CNF)

- ◇ A black powder that has been evolving since the seventies/eighties
- ◇ CNF are carbon fibers at the nanometer scale, consisting of several graphene flakes
- ◇ Emerging material that has a unique combination of strength, durability and conductivity
- ◇ Wide range of applications, qualities which can be transferred when combined with other materials
- ◇ CNF have revolutionized energy storage, protective clothing, flame retardance and oil spill remediation, as well as therapeutic cancer drugs with its unique additive qualities

## Selected application areas

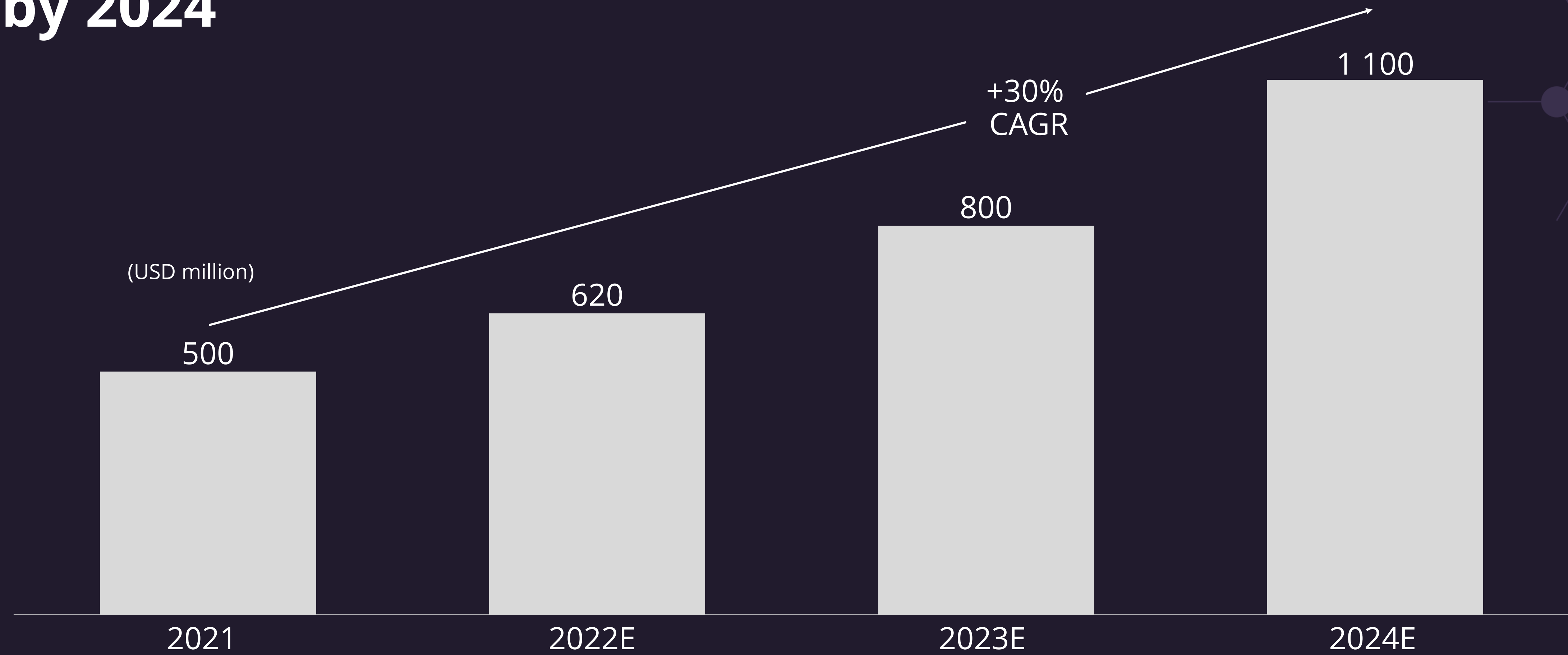
CNF is used for a variety of applications such as additive to composite, lithium-based batteries, supercapacitors and solar desalinations with mostly a clear environmental positive impact



**USD 500m**  
Market in 2021

MARKET POTENTIAL

CNF market expected to more than double by 2024

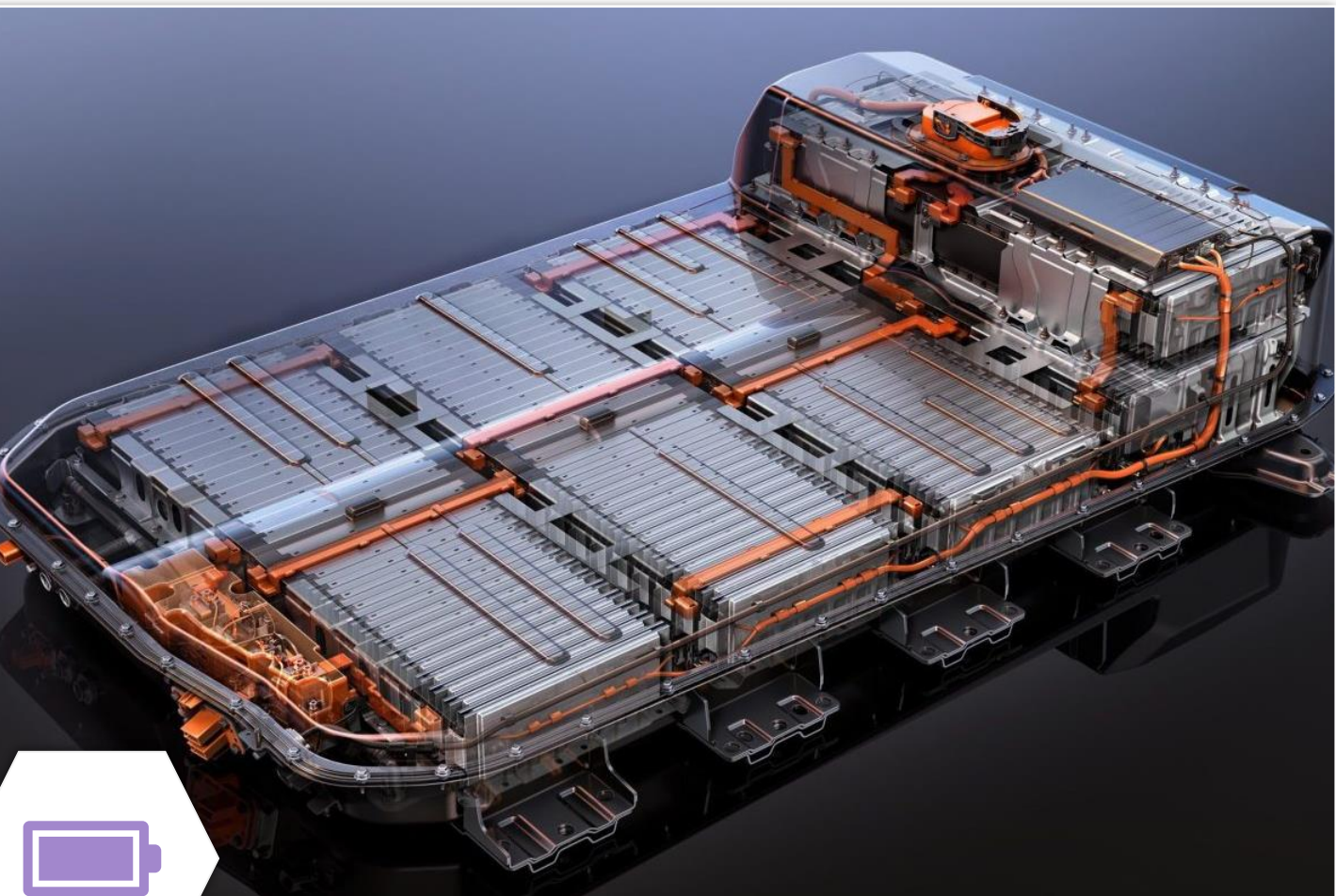


Source: PwC analysis, October 2020

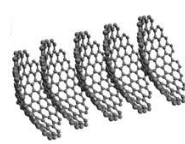
# NORCE report showing huge market potential for CNF/CNT

## Potential from using CNF additives

### Batteries



CO<sub>2</sub> emission: <0.1% of world total, but increasing

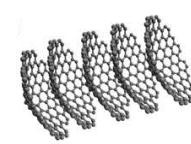


Lighter and longer-lasting with higher performance

### Plastics



Lifecycle GHG emission: 4% of world total

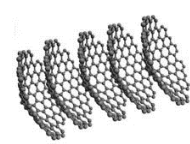


Increase strength and stiffness, while requiring less material

### Concrete and cement



CO<sub>2</sub> emission: 7% of world total



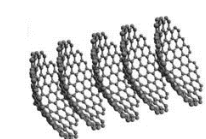
Stronger, self-sensing, less open to water, stiffer, more fire-proof

## NEW APPLICATIONS

# Test showing huge market potential for CNF/CNT when it comes to 3D-printing

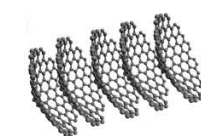
### Potential from using CNF additives

#### Batteries



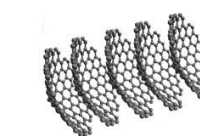
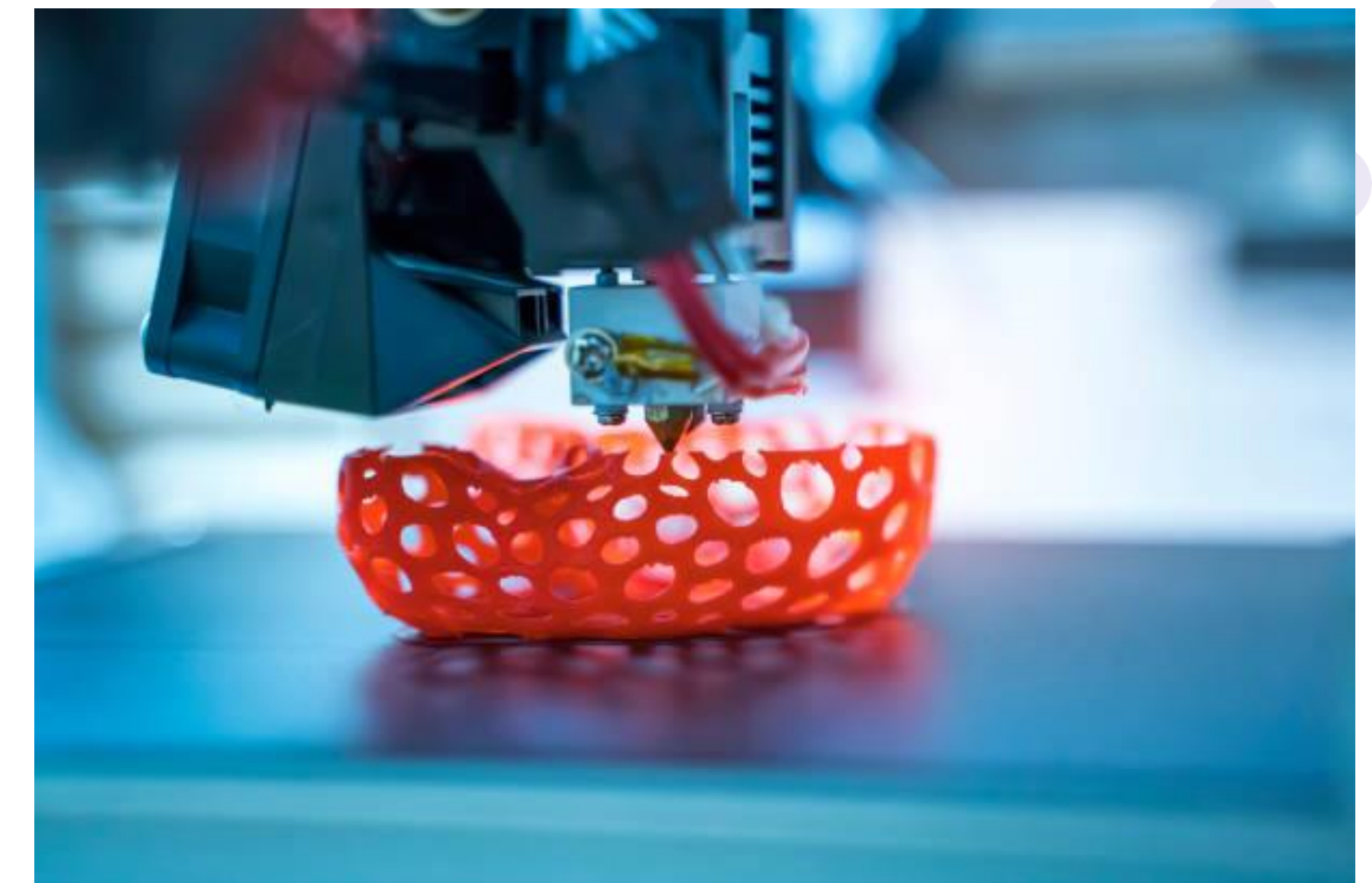
Not only for battery capacity, but also for materials surrounding the batteries

#### New applications



The R&D team is continuously testing new applications

#### 3D-printing



Rapidly expanding market worldwide

## NORCE-REPORT: KEY TAKEAWAYS (1)

# Significant emission reduction potential<sup>1</sup>

- ◇ Material improvement from CNF/CNT lead to reduced production amount
- ◇ 2 Gt CO<sub>2</sub> emission reduction potential from less production alone, in the next 10 years
- ◇ These estimates do not account for ripple effects, meaning that the reduction potential is even larger
  - E.g., less concrete production would also affect emissions from transportation at 7.9kg CO<sub>2</sub> per tonne concrete<sup>3</sup>

Can reduce more than  
**2 000 000 000**  
tonnes CO<sub>2</sub> the next 10 yrs



**Equals > 6% of global CO<sub>2</sub> emissions  
from fossil fuel in 2020<sup>2</sup>**

1: "Reduction in CO<sub>2</sub> emissions from using carbon nanofiber additives" (Alagic, Blomgren et al., 2022)

2: "Global Carbon Budget 2021" (Friedlingstein, Pierre, et al., 2021)

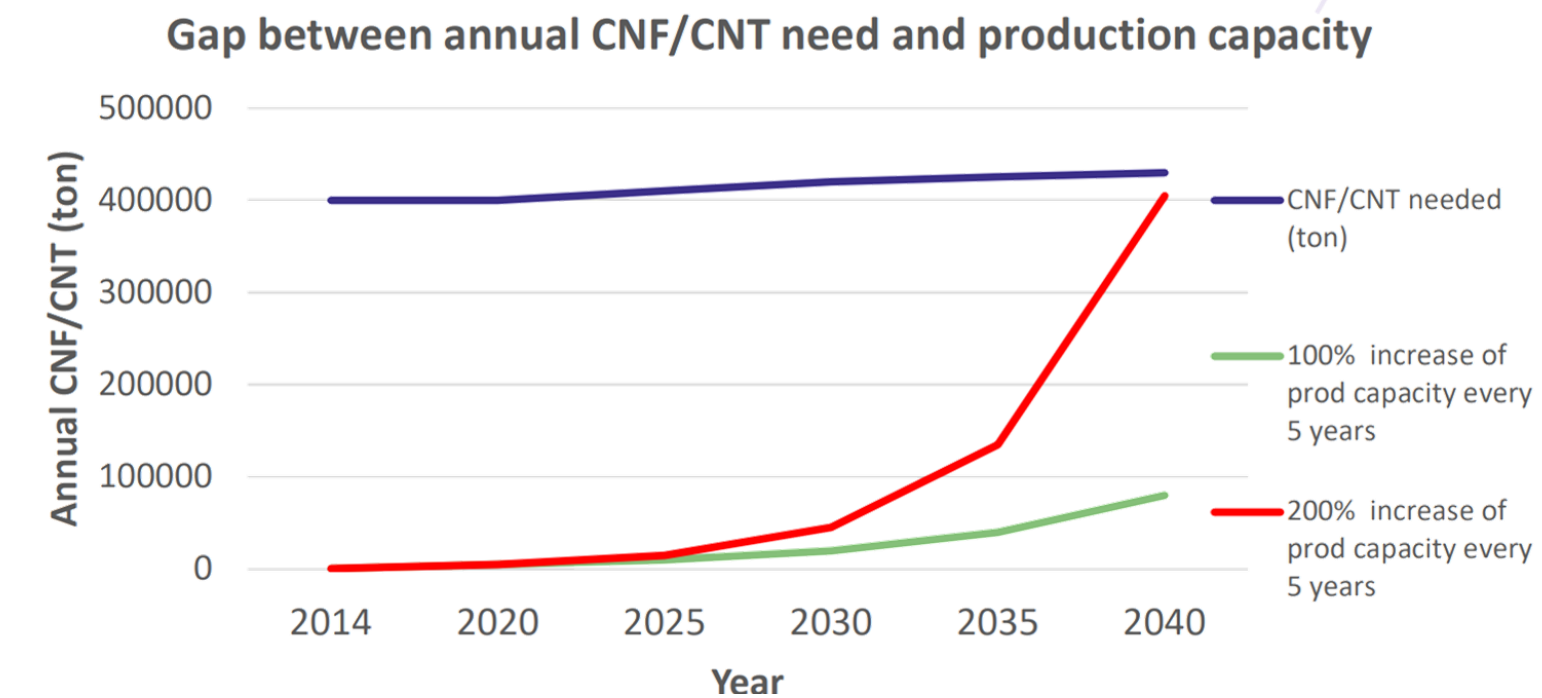
3: MPA The Concrete Centre, 2020

Globe-icon from flaticon.com

## NORCE-REPORT: KEY TAKEAWAYS (2)

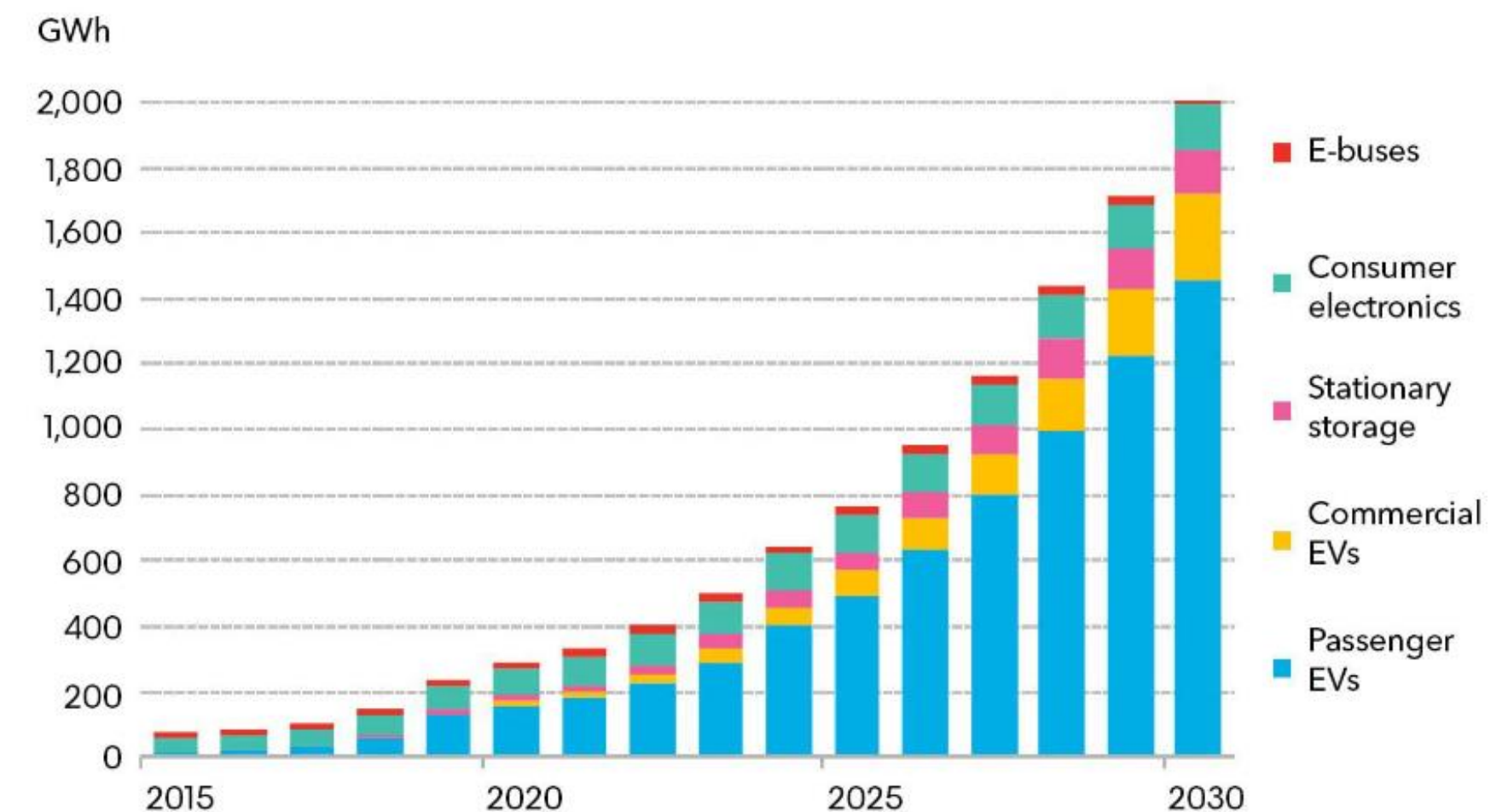
# Market potential for CNF/CNT products in the future<sup>1</sup>

- ◆ Rapid technology development and material improvement in the past decade
- ◆ CNF/CNT demand expected to grow in the future
- ◆ Demand from Norwegian-based rubber/plastics, electrical equipment and non-metallic mineral industries represent a significant part of the market
- ◆ Potential CO<sub>2</sub> emission reduction of 250 Mt/year by adding 0.01% CNF to concrete/cement



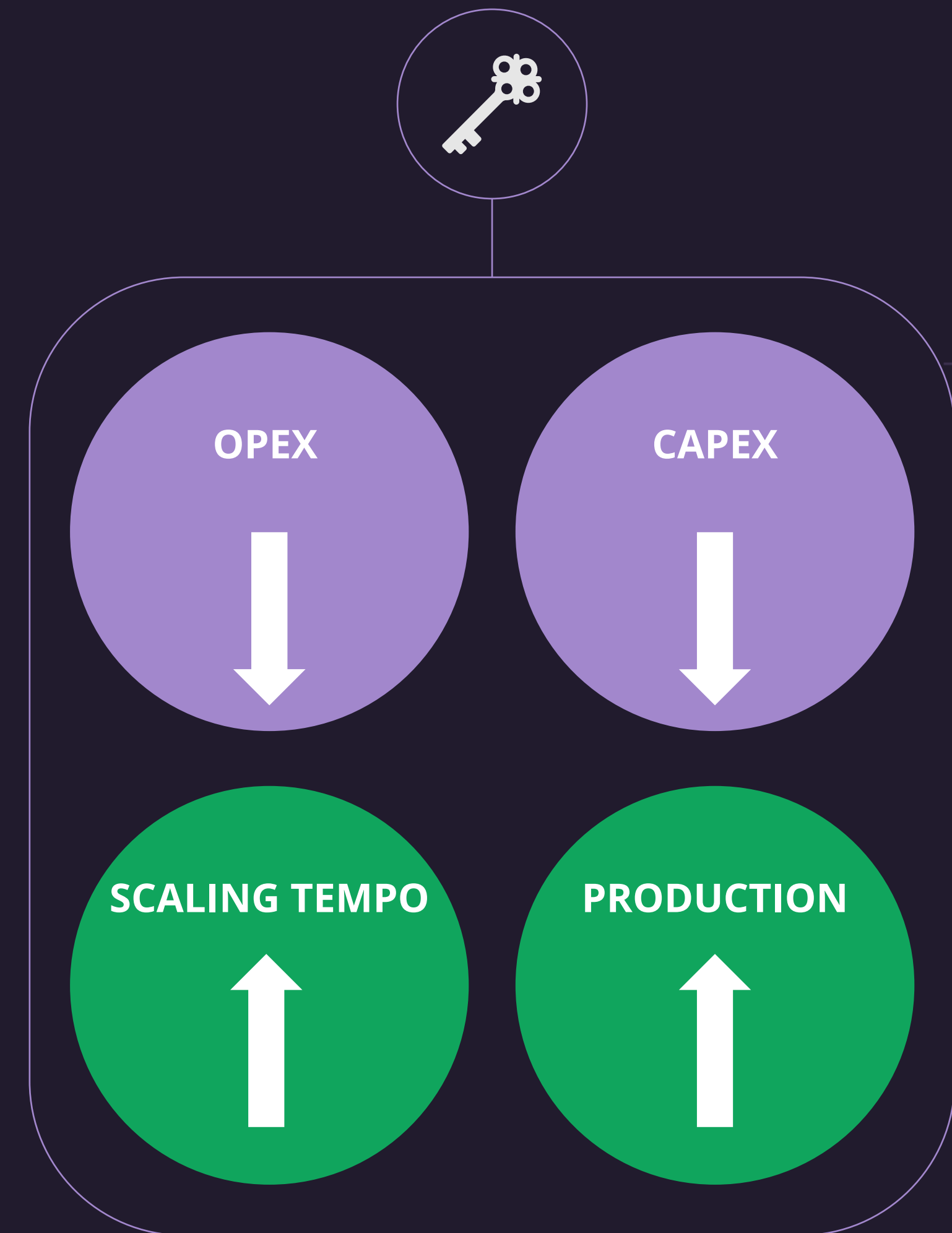
*Estimated cement demand and production availability of CNF to cement*

### Annual lithium-ion battery demand



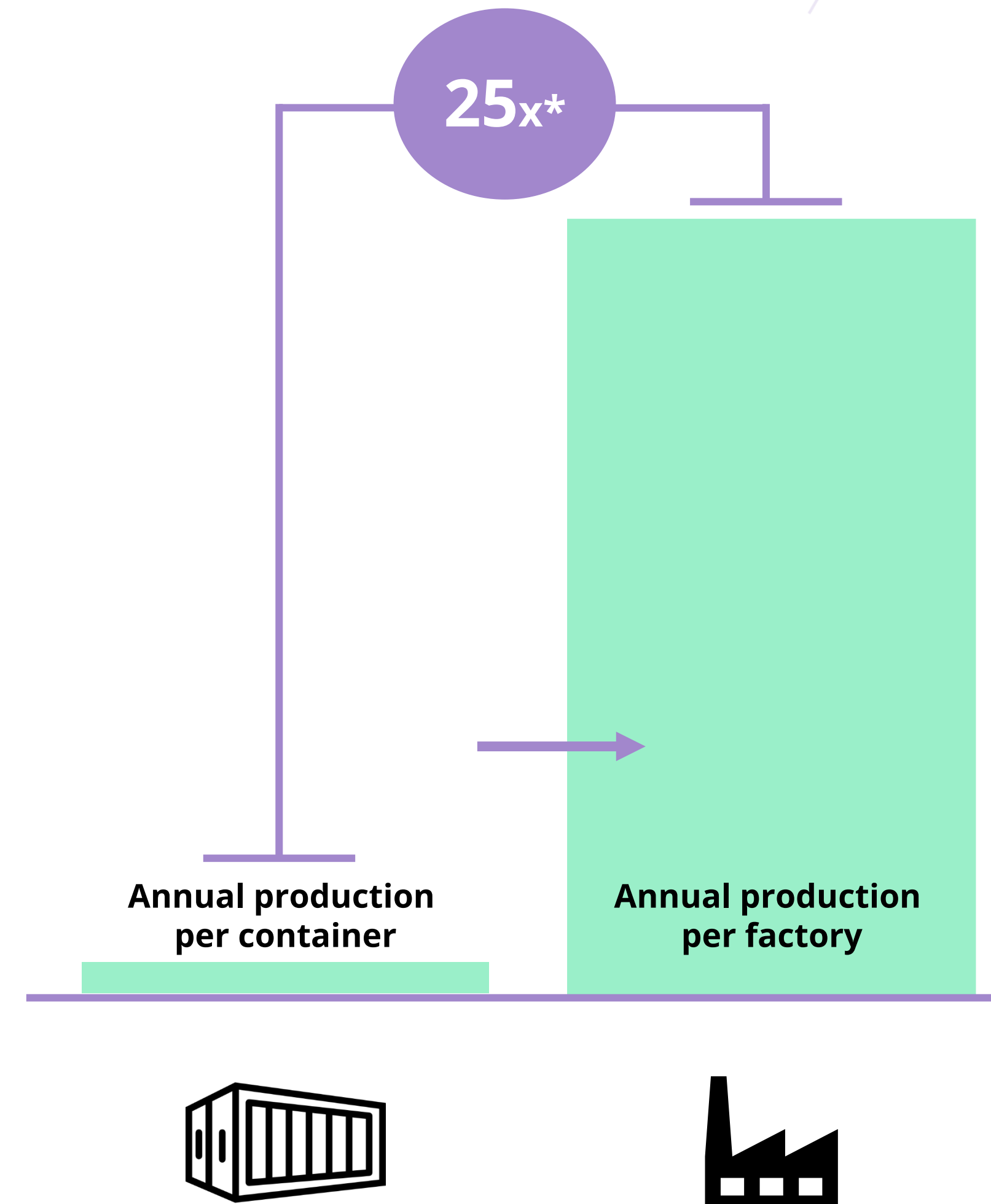
## Scaling and cost reduction are keys to market adoption<sup>1</sup>

- ◇ Full market penetration of CNF/CNT requires fast upscale of production capacity and industrial scale adoption in new products
- ◇ Technology for upscaling CNF/CNT production capacity and reducing costs are key to accelerate market adoption



## Full-scale design positions Bergen Carbon Solutions towards market adoption

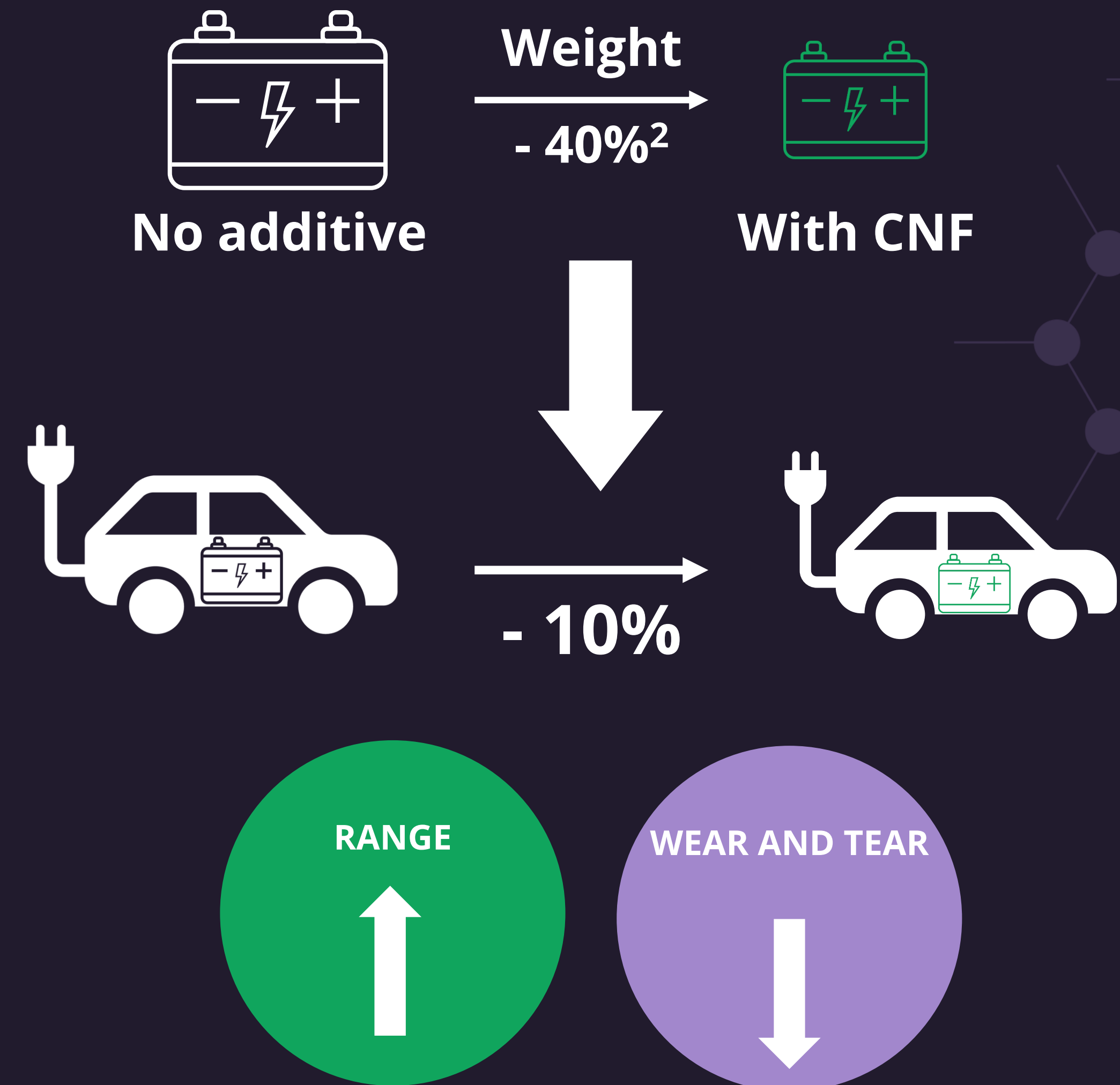
- ◇ New FULL-SCALE design enables significant higher production than previously guided
- ◇ Initial calculations indicate **25% lower\*** **capital expenditures** with factory setup compared with containers
- ◇ We expect a new design to **reduce operating expenses (OPEX) by at least 20%\*** from the containerized solution



## SELECTED SEGMENT: BATTERIES (NORCE)

### Small improvement in battery performance, can significantly impact global emissions<sup>1</sup>

- ◇ CO<sub>2</sub> emission may increase by a factor of 10 within a decade unless production technologies improve
- ◇ CNF-potential for currently dominating graphite anode
- ◇ Promising results for next generation Silicon-based anodes
- ◇ Vehicle weight reduction of 5-10% seem within reach while maintaining vehicle performance



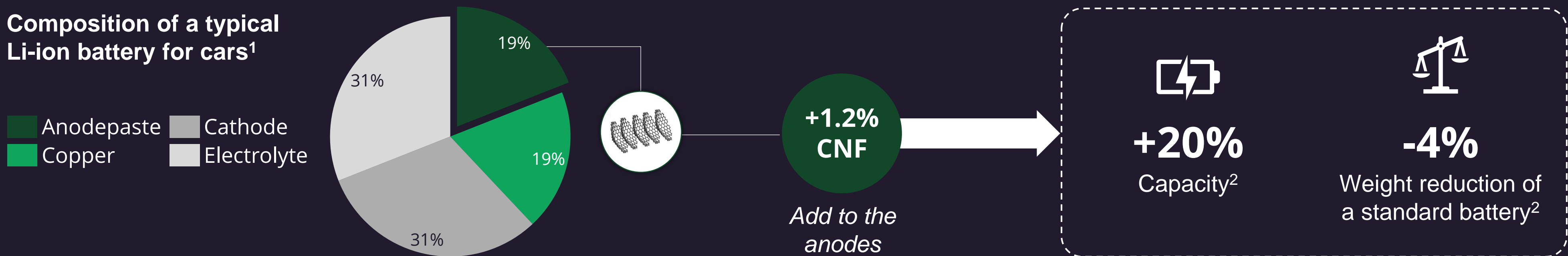
1: "Reduction in CO<sub>2</sub> emissions from using carbon nanofiber additives" (Alagic, Blomgren et al., 2022)

2: Based on assumption that the battery pack constitutes roughly 25% of an electric vehicle today

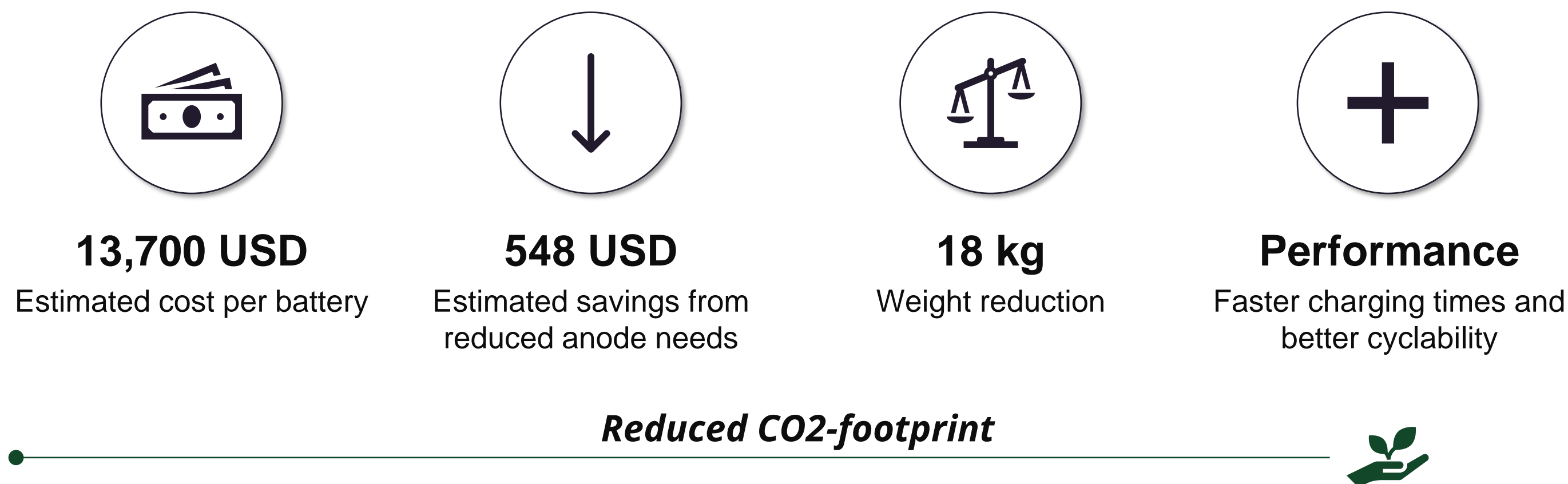
# ELECTRIC VEHICLE EXAMPLE

## CNF's effect on EV-batteries

Composition of a typical  
Li-ion battery for cars<sup>1</sup>



### EXAMPLE: TESLA WITH A 100kWh BATTERY – BATTERY WEIGHT 450 KG



All above indicate a CNF-value of around 1,000 USD/kg

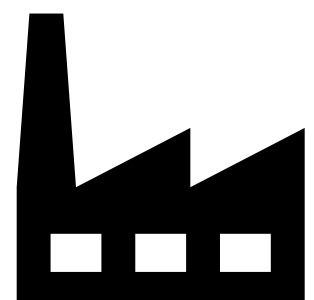


<sup>1</sup> Excluding the battery casing; <sup>2</sup> Park et. al, Cameán et. al, Wang et. al

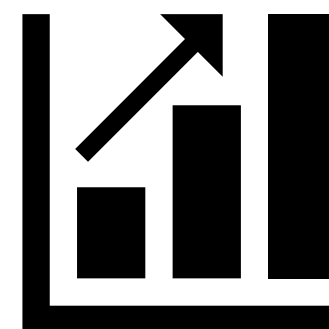
## NORCE-REPORT: KEY TAKEAWAYS (4)

# Adding CNF to the investigated material groups can create national value and employment<sup>1</sup>

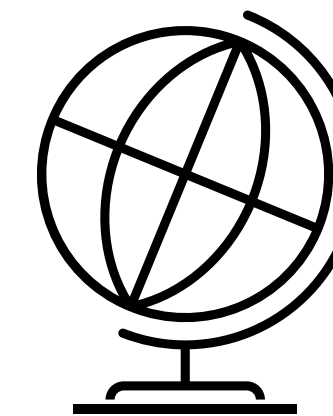
A **new industry** reliant on Norwegian labour and sub-suppliers (ripple effects)



Making end-products “greener” will **increase future demand**



Direct providers can use experience to **export their products** internationally



1: “Reduction in CO2 emissions from using carbon nanofiber additives” (Alagic, Blomgren et al., 2022)

## SELECTED SEGMENT: SUPERCAPACITORS

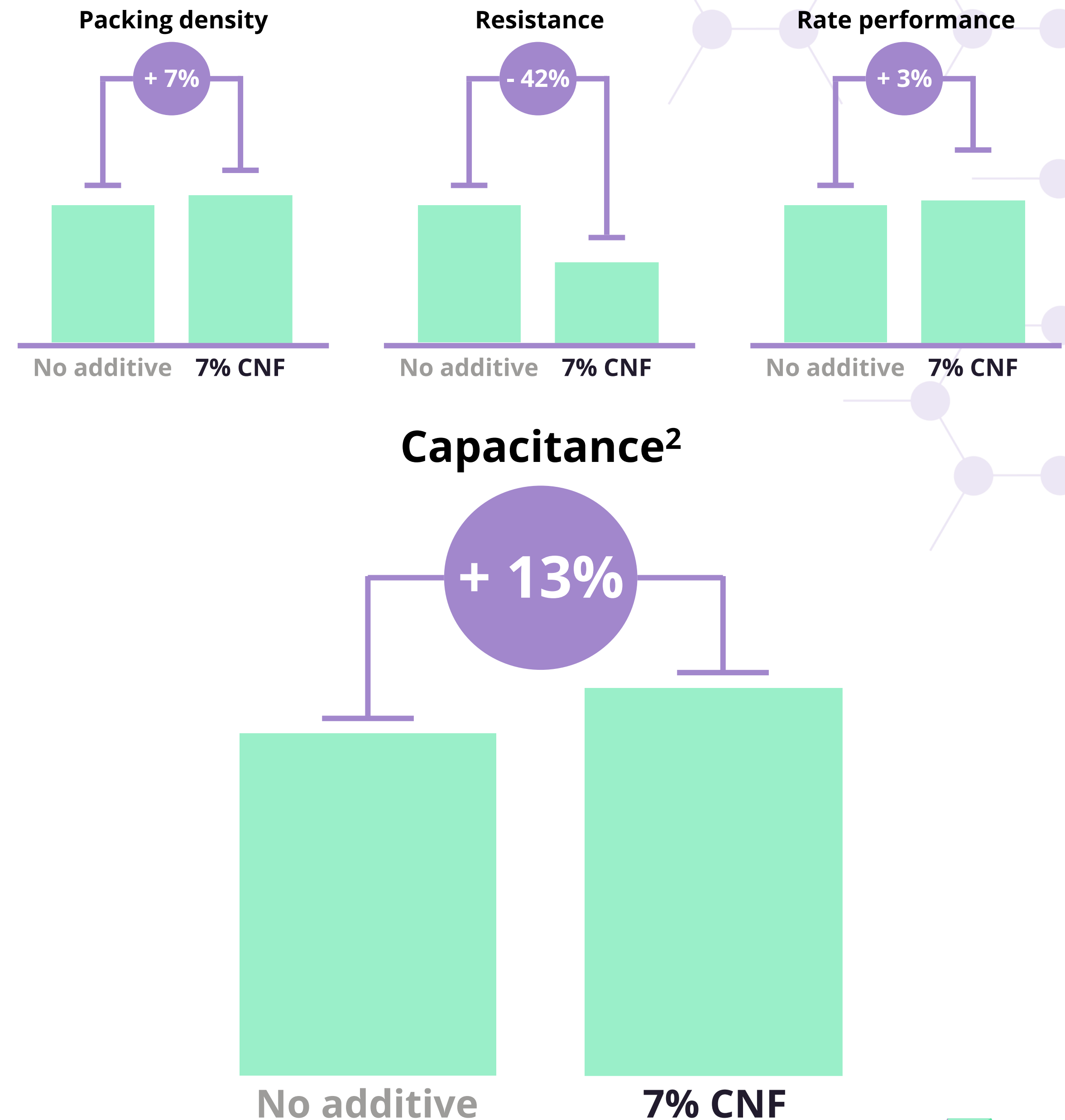
# Increase in supercapacitors performance by adding our CNF<sup>1</sup>

Addition of CNF in electrode composite resulted in;

- ◇ 13% increase in volumetric capacitance
- ◇ Improved packing density
- ◇ Electrodes with very low resistance and higher rate performance even at high current densities

*"The carbon nanofiber sample was used as received without any pre-treatments."*<sup>1</sup>

Great base for further research of optimal battery composition and large scale-testing



1: Report from Beyonder, tested on supercapacitors, received Jan. 2022

2: Volumetric capacitance

# Inabata Europe GmbH



Bergen Carbon Solutions has signed a Letter of Intent with the Japanese company Inabata where the intention is for Inabata to develop business relationship with BCS and purchase of carbon nanofibers (EcoNano) from BCS.

Inabata intends to introduce EcoNano in their different product ranges such as high-performance and engineered thermo plastics, composites, automotive, electronic appliances and other related products.

Inabata and BCS agree on introducing BCS EcoNano to their customers in Europe and Japan.

# Chinese company

LOI entered on 8 June 2021 with an undisclosed Chinese company for supplier- and business development cooperation for green carbon-nanofibers (CNF) applications in Asia

BCS' first initiative in China, highlighting the strong interest for Bergen Carbon Solutions' green carbon-nanofiber technology and the company's opportunity to rapidly expand its commercial footprint in Asia

BCS has now hired an operation manager Asia who has the main focus to continue establish collaboration both in China and rest of Asia

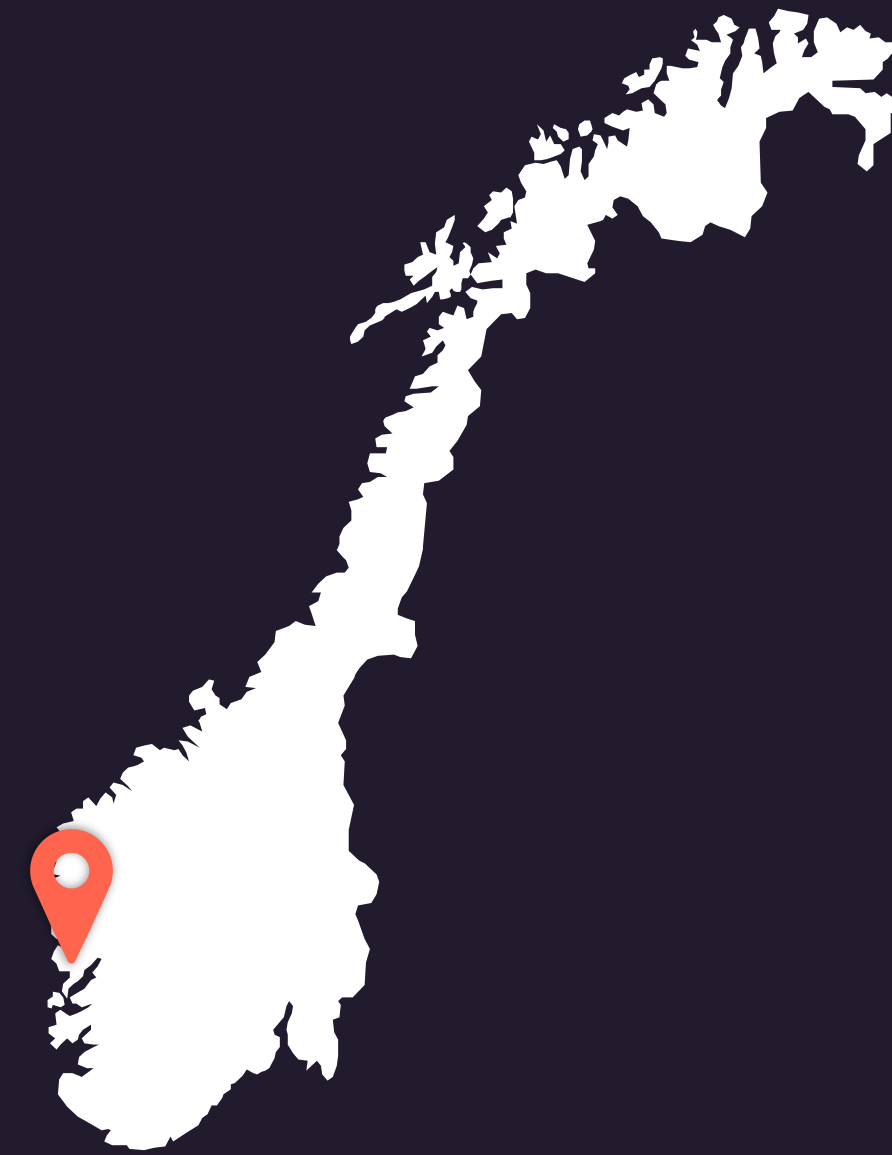


# TECHNOLOGICAL BREAKTHROUGH

WHAT WE HAVE DONE

# TEST CENTER FLESLAND

Successful implementation of Diegel 2.0



**4x**

Diegel 2.0 in production  
by the end of Q1 2022

**3.2t**

Annual production  
capacity



In active discussions to  
increase power input

**2021**

Opened

**34**

Employees at the test  
center

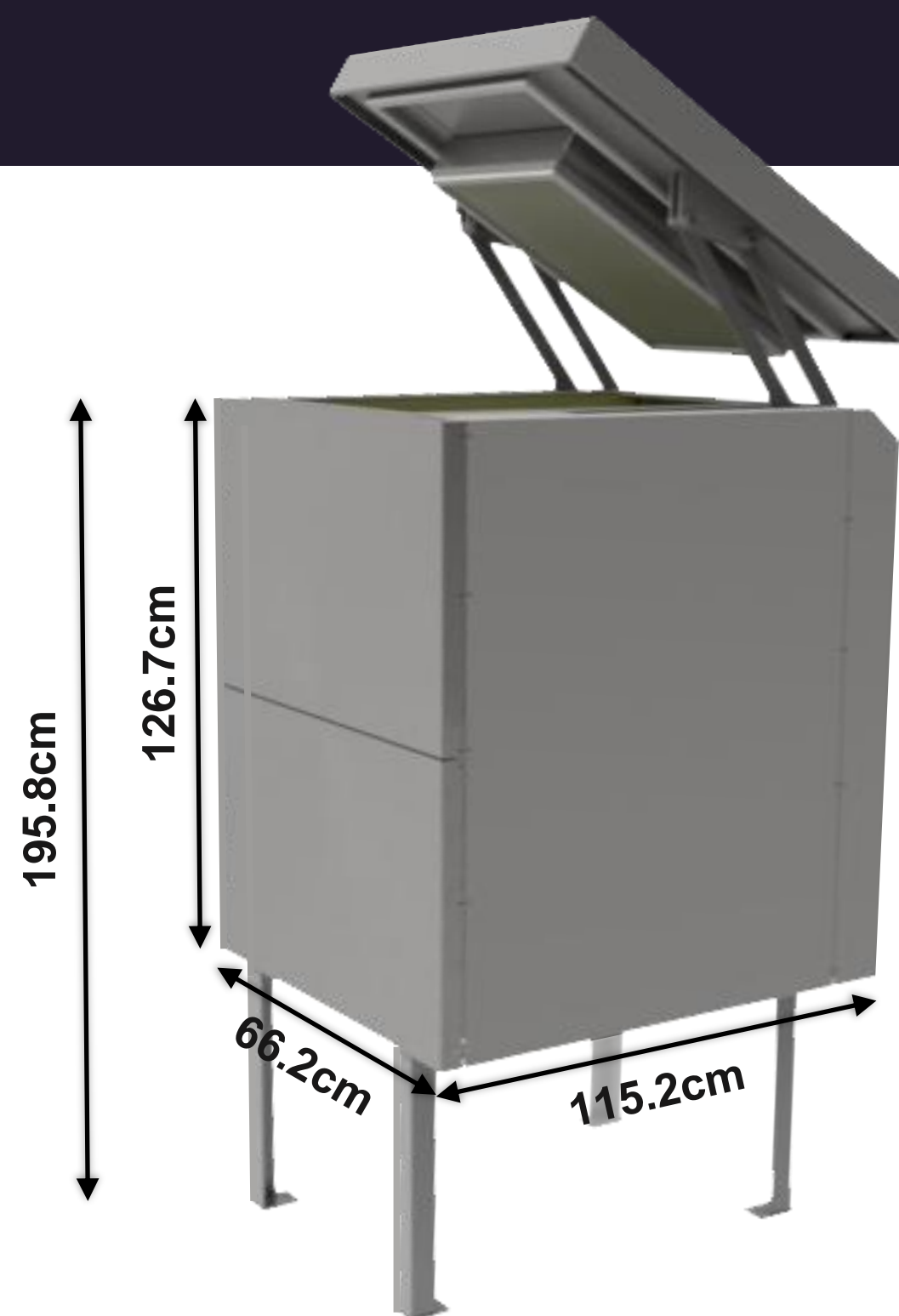
**2,500m<sup>2</sup>**

With production facilities  
at the test center

WERE WE ARE GOING

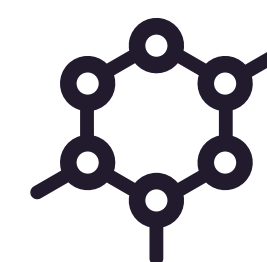
# DIEGEL 2.0 IS NOW IN OPERATION

We are pleased to announce that our first “Diegel 2.0” is now in operation at our test center at Flesland, Bergen



**8x**

Higher production  
than its predecessor



**800**kg

Annual CNF  
production

**CO<sub>2</sub>**

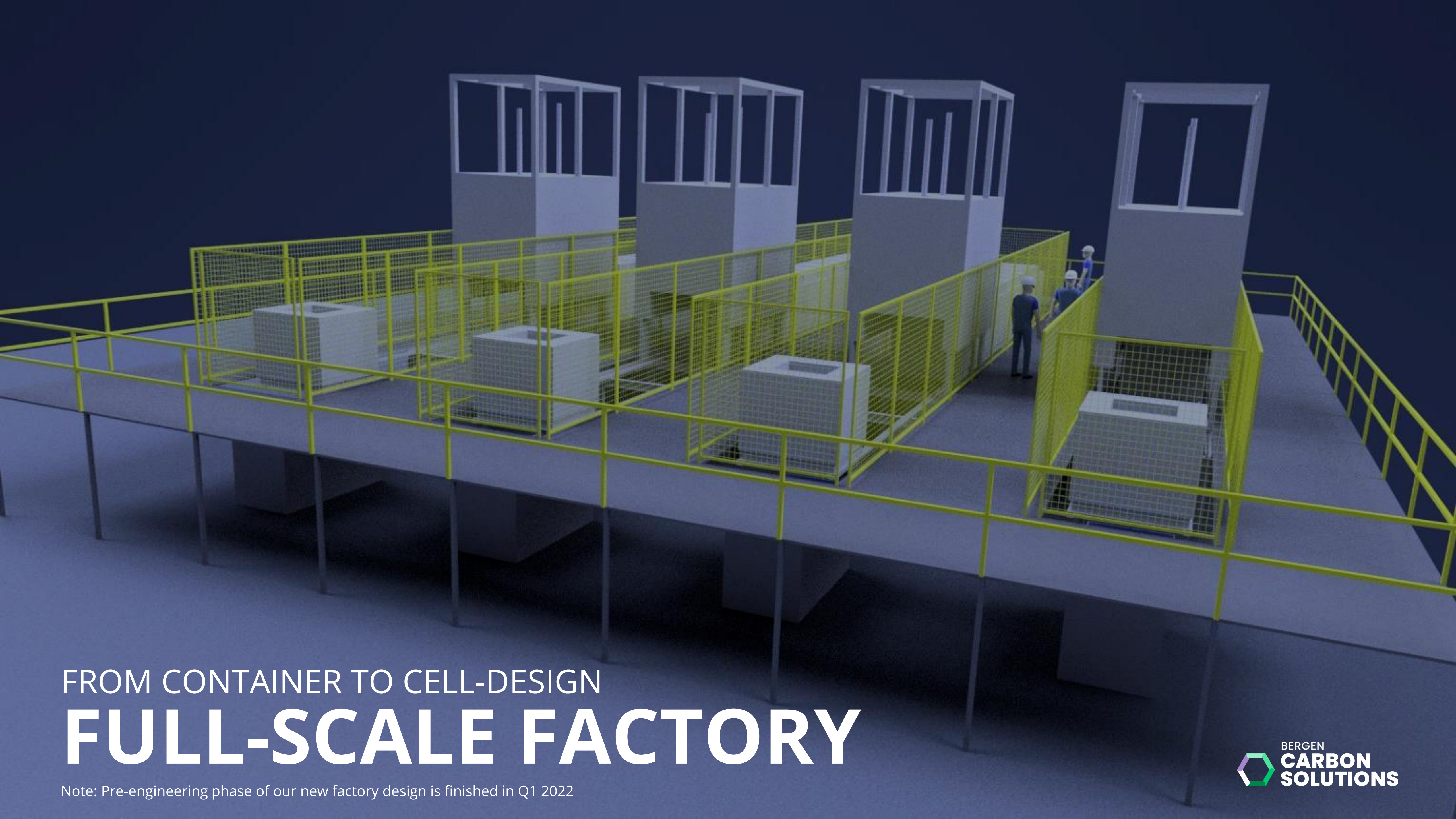
**5:1**

Requires 5kg CO<sub>2</sub>  
per 1kg of CNF



**150**kWh/kg

Efficient power  
consumption



# FROM CONTAINER TO CELL-DESIGN **FULL-SCALE FACTORY**

Note: Pre-engineering phase of our new factory design is finished in Q1 2022

## FULL-SCALE FACTORY

# OUR FIRST FACTORY: MOSJØEN



Centrally located on the Helgeland coast in Nordland County Municipality



Access to extraordinary amounts of renewable Norwegian hydropower



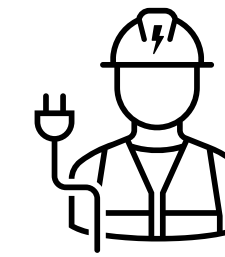
Access to skilled industrial labour, sufficient energy and proximity to CNF Arena project



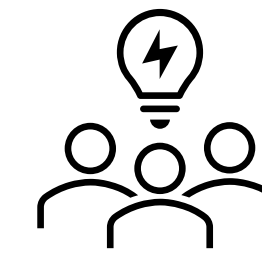
Aims for construction start end of Q2 2022



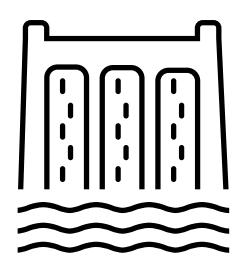
Expected to reach full capacity of 160 tonnes per annum by year-end 2023



**SKILLED  
LABOUR**



**PROXIMITY TO  
CNF ARENA**



**SUFFICIENT  
HYDROPOWER**

**ANNUAL PRODUCTION CAPACITY: 160 tonnes\***

\*Preliminary numbers. Production expected to start in 2023.



FULL-SCALE FACTORY

# OUR SECOND FACTORY: HØYANGER



Located in Høyanger, which is a modern industrial society that has grown in step with Hydro Aluminium



Modern infrastructure where all relevant service functions are available



Access to skilled industrial labour, sufficient licensing hydropower and an attractive long-term power supply agreement



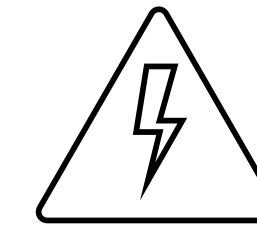
Facilities already in place



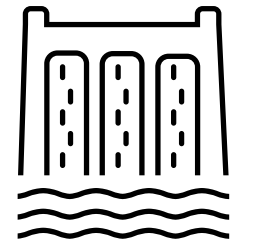
Expected production of CNF in late 2023 or early 2024 with full capacity by year-end 2024



**SKILLED  
LABOUR**



**ELECTRIC  
INDUSTRY**



**SUFFICIENT  
HYDROPOWER**

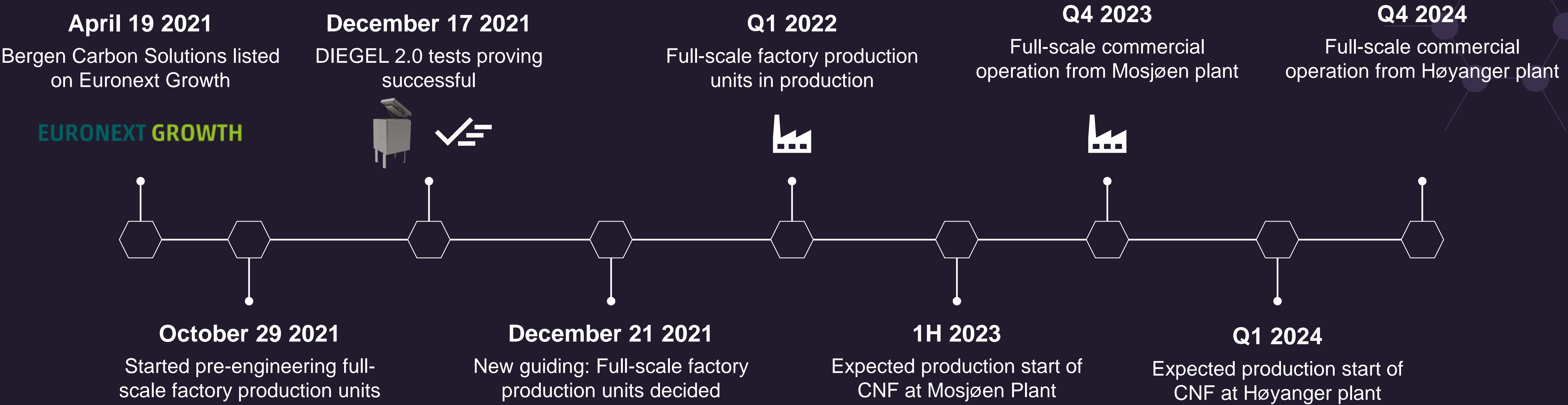
**ANNUAL PRODUCTION CAPACITY: 240 tonnes\***

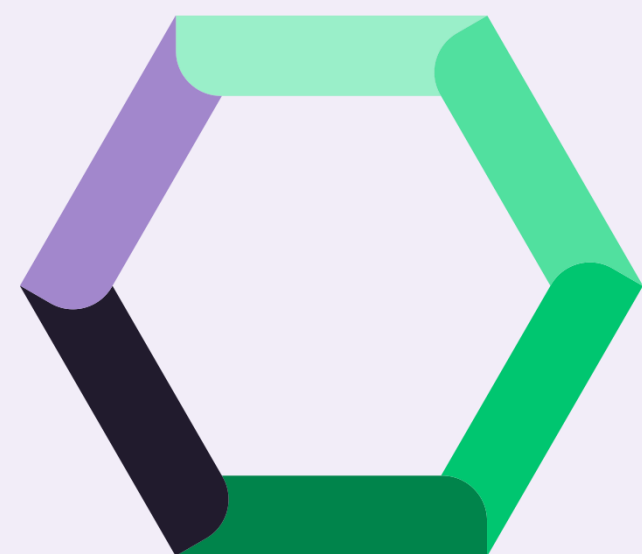
\*Preliminary numbers. Production expected to start in 2024.



FULL-SCALE FACTORY

TIMELINE OF FACTORY PRODUCTION UNITS





# BERGEN **CARBON SOLUTIONS**