



# CrayoNano Investor Update

April 8th 2021



## Presenters today



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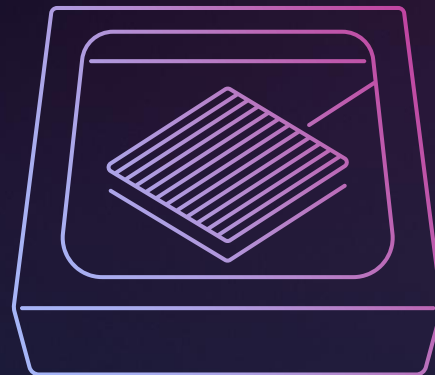
# CrayoNano

Disrupting the fast growing  
markets for disinfection



# CrayoNano in short

- Next generation semiconductor company with unique expertise within nanotechnology
- Vital **components** in fast growing markets for disinfection
- Defined road map to **profits** from mid-2023
- **Solid funding** and limited capex needs going forward
- An Environmental, Social and corporate Governance (**ESG**) company





# Key quarter 2021 takeaways

## Very strong market demand

- CrayoNano perfectly positioned

## Strong financial position

- Addition EUR 2.4 mill grant
- Optional EUR 5 mill equity

## Product demonstrator

- Achieved tech. requirements Mar 2021

## Market entry

- Revenue plan start Q1-2022

## Product realization

- UVC LED product planned end-2021, volume manufacturing in 2022

## Public listing

- 2021 / Q1-2022 following product launch

## Risk

- Covid-19
- Global semiconductor supply shortage



## Our core

Combining the new hyper-material graphene with nanowires – CrayoNano creates an extremely efficient semiconductor chip that will change the market for disinfection of water, air and surfaces, by using UVC LED (Light Emitting Diode).

CrayoNano has a patented process technology, following the fab-light model, the component will be produced by the leading semiconductor companies in Southeast Asia. It will be integrated in a wide range of end products by other companies in the value chain.



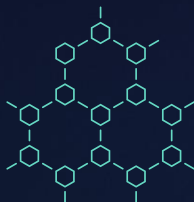


# CrayoNano technology



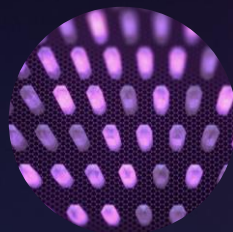
## Nanowire based design

No lattice mismatch and  
increased emission area



## Graphene material

Transparent to all wavelengths  
and strain compensating



**CrayoNano's**  
Nanowire-based  
graphene UVC LED  
Solution

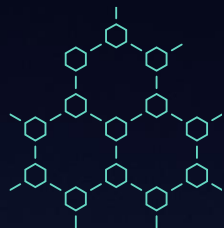
**Added value  
for UVC LED**



**Higher efficiency  
and power output**



**Lower manufacturing  
cost**



#### What is graphene:

- Low dimensional material that offer new physical properties (0-D, 1-D, 2-D)
- Graphene is a 2-D material, the thinnest, lightest and strongest material
- 200 times stronger than steel
- Best conducting material known.



#### What is nanowires:

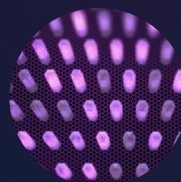
- Nano-structured material
- Extremely thin wires, 1/1000 of a human hair
- Made from various metals like gallium, nitride and others.
- The future of semiconductors to increase output, device performance and reduce size.

**To continue the semiconductor miniaturization and bring efficiency on a next level, we need to look at the atomic scale.**



#### Hypermateral:

Semiconductors are looking to new materials to push past the boundaries of Silicon. With our patented nano-merging technology, CrayoNano can combine two different materials – 0D, 1D, 2D – to create new functional materials with new capabilities.



#### UVC Nano-Hybrid

Our first application is a graphene-nanowire hybrid, unlocking a new wave of energy efficient UVC LEDs with higher output and better price performance.





The pandemic revealed the **need** for improved **sanitization** concepts.

**CrayoNano** will meet this growing demand in a wide range of markets and applications, specifically for water, air and surfaces.



# US\$2.5Bm UVC LED MARKET in 2025\*

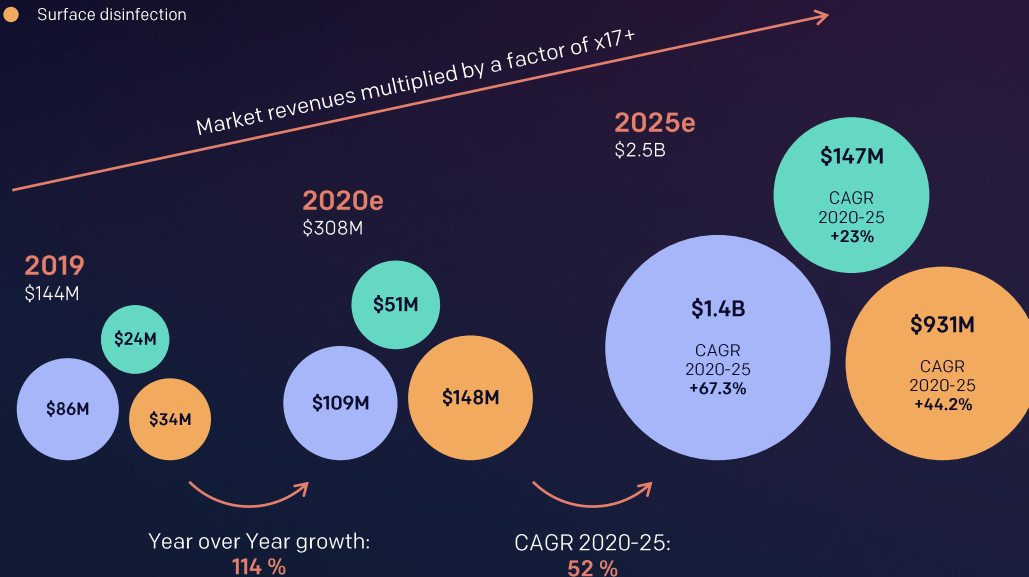
- **Acceptance to pay** for enhanced **safety** grows
- **UV disinfection** allows automation and **care-free** disinfection
- Eco-friendly and safe **UVC LEDs** will open-up **new** residential and municipal **applications markets**
- Analysts increased **2025 TAM** from \$1B to **\$2.5B**

\*Source: Yole Development 2020

## 2019-2020-2025 UVC LED market size (\$MUSD)

(Source: UV LEDs – Market and Technology Trends 2020 Report, Yole Development, 2020)

- Water disinfection
- Air disinfection
- Surface disinfection





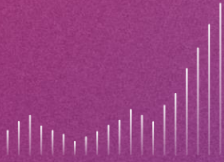
# CrayoNano market demand

- Market craves for **efficient** UVC LEDs
- Faces extreme **supply-shortage**, even for the currently available UVC LEDs
- CrayoNano receives daily requests from customers: UV integrators, OEMs, ODMs
- Customers require **high-volume** UVC LED supply to scale into the needed new application markets
- Application Areas for UVC LED disinfection
  - Drinking- and grey-**water**
  - HVAC/industrial **air**
  - **Surface** disinfection
  - Novel application areas





## Our solutions



Disrupt with a product that is **10 times more powerful** and price-efficient



Our technology enables new application markets where **disinfection is badly needed**, and no adequate solutions existing



Our technology facilitates massive potential for **CO2 savings**



# Protected by a strong patent portfolio

14

At the end of 2020, CrayoNano acquired all rights to 14 patent families, previously jointly owned with NTNU

111

Total of 111 patent filings worldwide

68

Of which 68 patents have been granted.

The patents cover all major aspects of the company's unique offering, from graphene processing and the growth of nanowires on this substrate, to LED integration and specific end products. The patent portfolio also goes beyond the UVC LED field, and covers other fields expecting to show strong growth in the future.

In selected areas CrayoNano has a 4-5 year lead on possible competitors.





## Clean water is our first market.

Independent analysts forecast exponential growth when **CrayoNano** enters a market where demand has already exploded.



# Clean water is our first market

- Most existing water treatment use large amounts of toxic chemicals. **CrayoNano** can replace this with a clean, cost-efficient UVC LED technology
- UVC Lamps is a traditional technology for disinfection.
  - Lamps are bulky, material is toxic, high maintenance
- Existing UVC LED technology is inefficient with poor quality
  - Expensive production, low efficiency, insufficient lifetime
- **CrayoNano** revolutionizes the total market with new materials and nanotechnology
  - Price performance is 10x, contributes toward ESG goals, can be produced in high volumes, longer lifetimes, low maintenance.





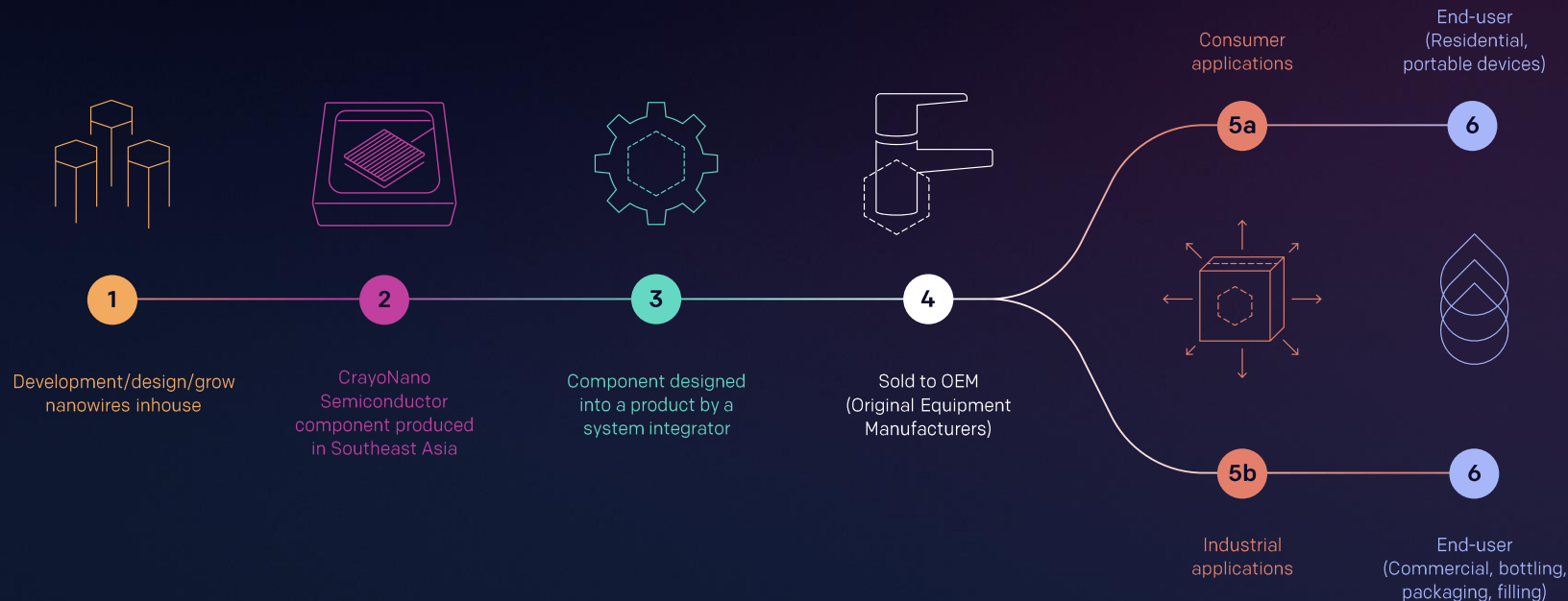


# CrayoNano contributes towards several ESG goals





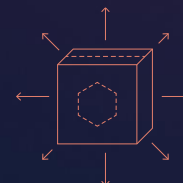
# Example: From CrayoNano to your clean tap water





# Go to market strategy

- CrayoNano will **not** sell directly to end users (that means You).
- Main target for the first market approach is system integrators
  - Competence to put together all components necessary to create a solution or a product.
  - CrayoNano will always supply a component in a larger solution.
- OEMs (Original Equipment Manufacturers) are a more direct channel.
  - These brands will integrate the chip into their finished products for sale to end users via shops or builders.
- Distributors are important for high volume sales to small and medium sized businesses.
  - The distributors will stock the LED component, anyone who wants to develop a product with this LED component can order volumes from them.
- The company has already received substantial interest from this segment, and 4 market experts are represented on the board and advisory board.
  - Target is to increase to 20 plus system integrators





The next steps for our  
**CrayoNano** community.



# Further addressable markets in the near future

- **Surfaces**

- Food processing, preserving and packaging
- Medical, hospitals, laboratories
- Public transportation – buses, trains, taxis, planes

- **Air**

- Residential, public, industrial, and commercial areas – hospitals and schools
- Cars
- Public transportation like buses, trains, taxis, planes





# 2024 and beyond – endless opportunities

- The use of our technology is limitless
- Further afield the technology opens the door to sensors, lasers, integrated circuits and lab on chip devices
- Graphene is the wonder of science and holds the promise to revolutionize everything from computing, tennis rackets and bike frames to food packaging and space elevators.
- Our knowledge in nano-merging this hyper-material with nanowires makes CrayoNano stand out and command an enviable position, as opportunities are nearly endless



Nanowire based design



Graphene material







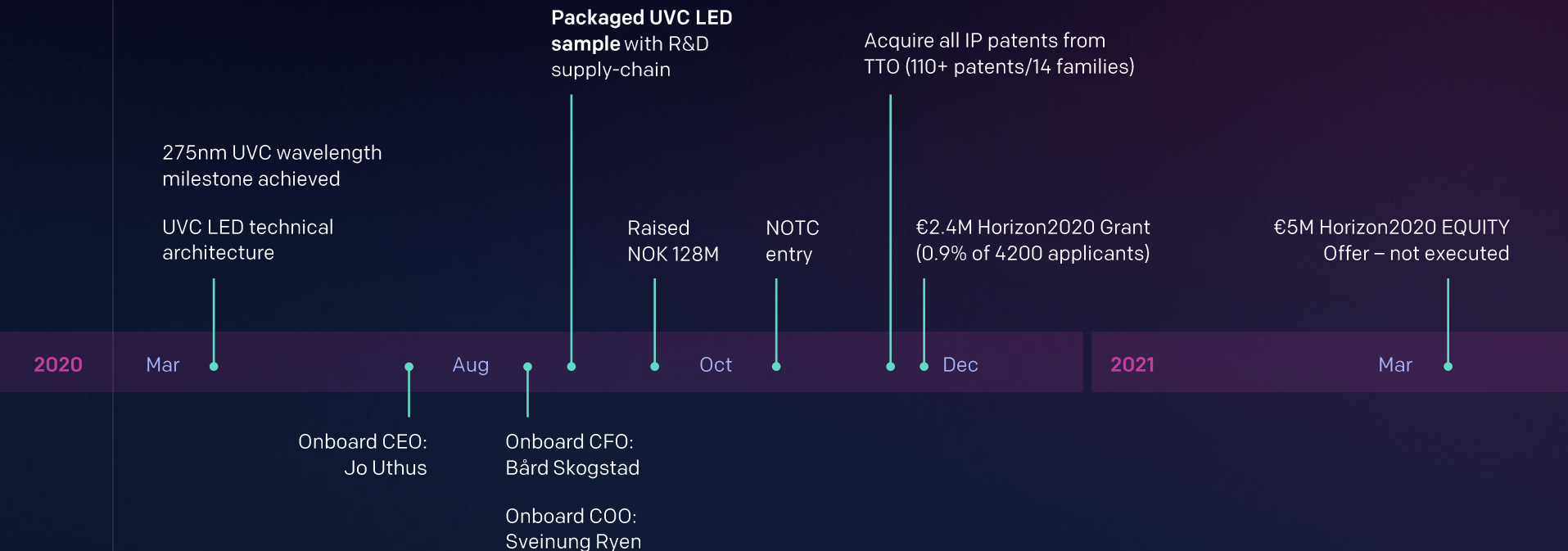
# **CrayoNano**

## **Look into Q1/2021**





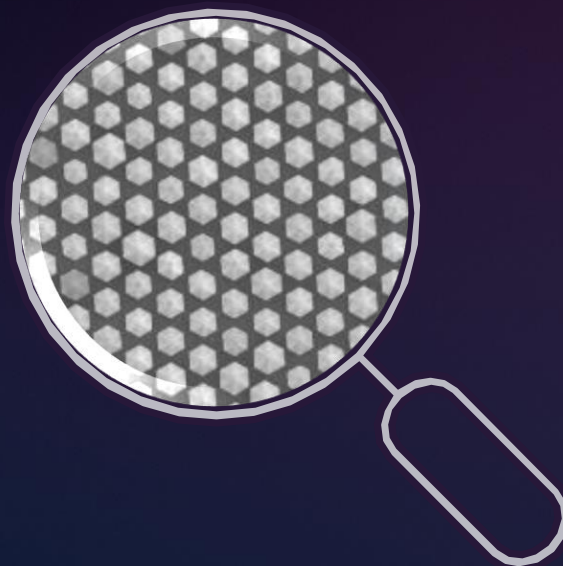
# 2020-2021 key achievements





# Technology achievements

- Complete UVC LED chip architecture
- Controlled 275nm UVC wavelength  
– optimal for water disinfection
- Controlled nanowire process at nanometer scale
- Tested 3.5x3.5mm SMD industry-standard UVC LED package from R&D supply-chain partner





# Organization

- Currently 13 nationalities
  - 32% Norwegians, 32% EU/UK, 36% ROW
  - 64% male 36% Female
  - Age from 27 to 61 with an avg of 39
- Plan to double size of team in 2021
  - Industrialization
  - Supply-chain
  - Sales and Marketing
- Onboarding experts from leading research and industry players in UVC LED
- Huge interest from global semiconductor professionals



# Operations / supply-chain

- Low-volume supply chain engaged
  - Preparing controlled production and release 2021
- LED Foundry early engagement
  - Prototypes second half '21, prepare 2022 volume ramp-up
- Accelerate plan by outside engineering expertise
  - Contract complete with undisclosed UVC LED research partner
  - Stage 1 of 4 complete in Q1/21
  - Manufacturing scale up
- Investment in engineering, tooling and qualifications
  - ~10 MNOK Q2-Q4 2021
  - Process standardizations - transfer to high volume production





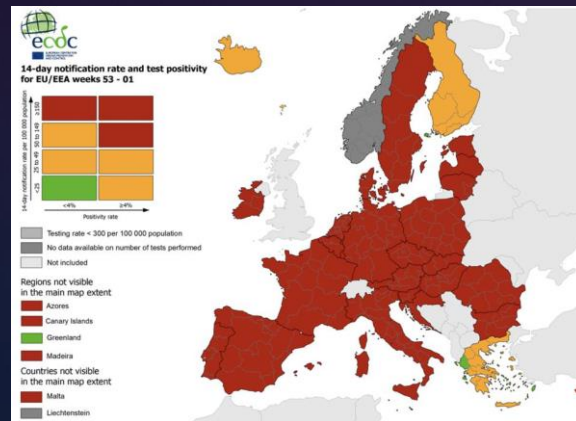
# Risk factors – Covid-19

## Covid-19 impact in Norway

- Strong political climate to handle impact
- Strong awareness of disinfection solutions
- Norway borders closed for non-residents and visitors.

## Impact to CrayoNano

- Very positive attraction of world-class talent to Norway
- No Covid-19 with CrayoNano employees to date
- Currently 5 people on contract unable to onboard to HQ in Trondheim
- Slow-down in R&D plans due to onboarding issues
- Equipment downtime – shortage of service
- Work From Home and company lock-down due to government restrictions impact productivity, require lab access



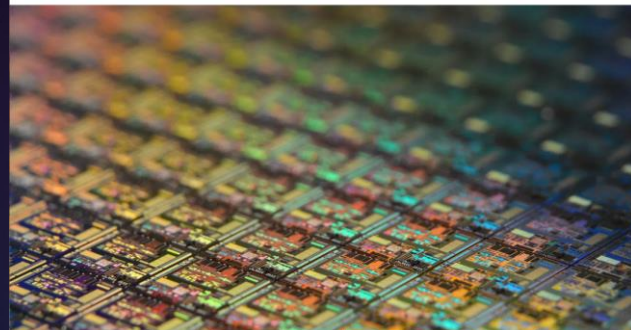


# Risk factors – Semiconductor supply shortage

- Global Semiconductor Supply Shortage
  - TSMC + Samsung in short supply of wafers globally in all markets
  - All industries impacted
- Potential Impact to CrayoNano
  - LED Foundry capacity and availability concern
  - Lead-times
  - Cost impact
- CrayoNano on top of issue
  - Working daily on mitigation and planning for volume production

## Chip shortage sees TSMC announce massive \$100B investment to boost capacity

Ben Lovejoy · Apr. 1st 2021 4:08 am PT [@benlovejoy](#)



1 Comment [Facebook](#) [Twitter](#) [Pinterest](#) [LinkedIn](#) [Reddit](#)

Apple A-series and M1 chipmaker TSMC has announced dramatic investment plans to help address the global chip shortage.

The company had previously announced plans for a record \$28B investment in capital expenditure, but

Source: 9to5 Mac 2021





**Financials**





# Strong funding track record and further funding inbound

2020

Sep

1,9 MNOK  
exercise  
warrants

Oct

Raised  
127,9MNOK

2,2 MNOK  
exercise  
warrants

Nov

1,7 MNOK  
exercise  
warrants

Dec

2,3 MNOK  
exercise  
warrants

2021

Mar

2,0 MNOK  
exercise  
warrants

25 MNOK EIC grant paid  
out next 18 months

50 MNOK EIC/EU  
equity available

9 MNOK remaining  
warrants due Sep 2021

CrayoNano burnrate currently at 15 MNOK pr  
quarter. According to business plan expected to  
increase towards 25 MNOK at year end

Our funding and funding pipeline provide runway  
for current business case throughout 2022

=138 MNOK in raised  
equity September  
2020 to date

Of this 117 MNOK as  
«dry powder» in the  
bank end of March



84 MNOK  
further  
funding



201 MNOK solid  
capitalbase to fuel  
current business case



# 2020 Financials

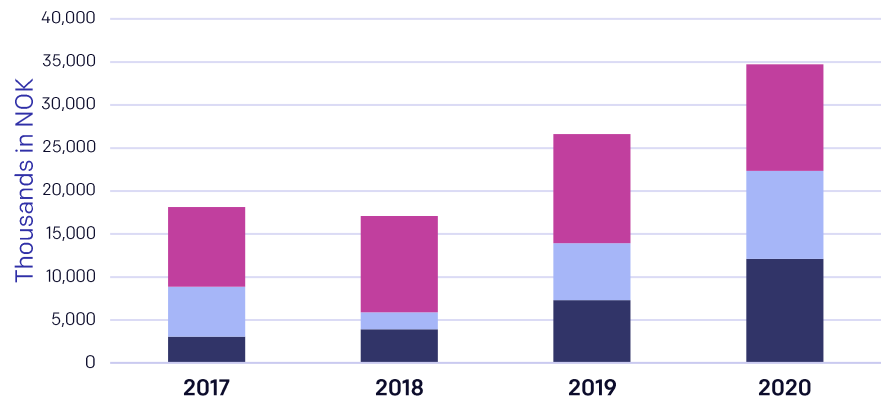
- Public funding primary source for revenue
- One of 38 funded companies out of 4 200 applicants for European Horizon 2020 - > public funding of 2,4 MEUR 2021-2022 secured
- Operating expenses for full year 2020 was 22,3 MNOK versus 13,9 MNOK for 2019.
  - 2020 OPEX slightly below originally planned spend due to time it takes to ramp up from when business case was funded

<b>Condensed profit and loss statement</b> (figures in NOK thousands)	<b>FY</b> <b>2020</b>	<b>FY</b> <b>2019</b>
Sales revenue	76	0
Other revenue and public grants	1 979	5 300
Total revenues	2 055	5 300
Payroll and related costs	12 122	7 319
Other operating costs	10 205	6 594
<b>EBITDA</b>	<b>-20 272</b>	<b>-8 613</b>
Depreciation	4 953	4 502
<b>EBIT</b>	<b>-25 225</b>	<b>-13 115</b>
Net financial items	-844	-45
<b>Net profit before tax</b>	<b>-26 069</b>	<b>-13 160</b>
Tax expense	-6 230	-3 133
<b>Net profit (loss)</b>	<b>-19 839</b>	<b>-10 027</b>



# Investing for hyper growth

- Plan for 2021 ramp up is an additional 70-80 MNOK investment



■ Payroll and related costs ■ Other operating costs ■ Gross capitalized development exp (pre funding)

Development spending	FY	FY	FY	FY
(figures in NOK thousands)	2017	2018	2019	2020
Avg. gross monthly spend	1,512	1,423	2,218	2,895



# Key quarter 2021 takeaways

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## Strong financial position

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## Product demonstrator

- Achieved tech. requirements Mar 2021

## Market entry

- Revenue plan start Q1-2022

## Product realization

- UVC LED product planned end-2021, volume manufacturing in 2022

## Public listing

- 2021 / Q1-2022 following product launch

## Risk

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