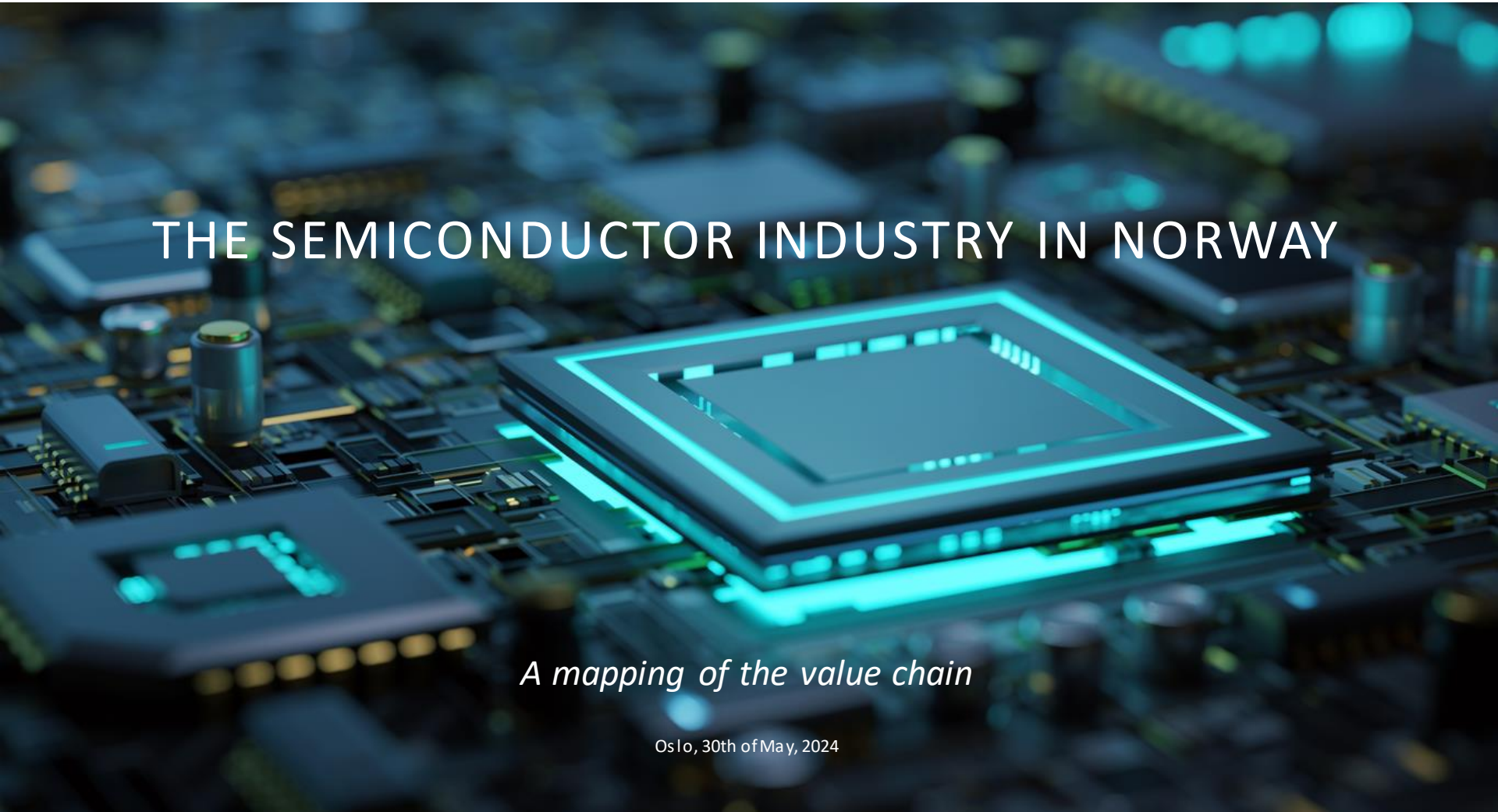


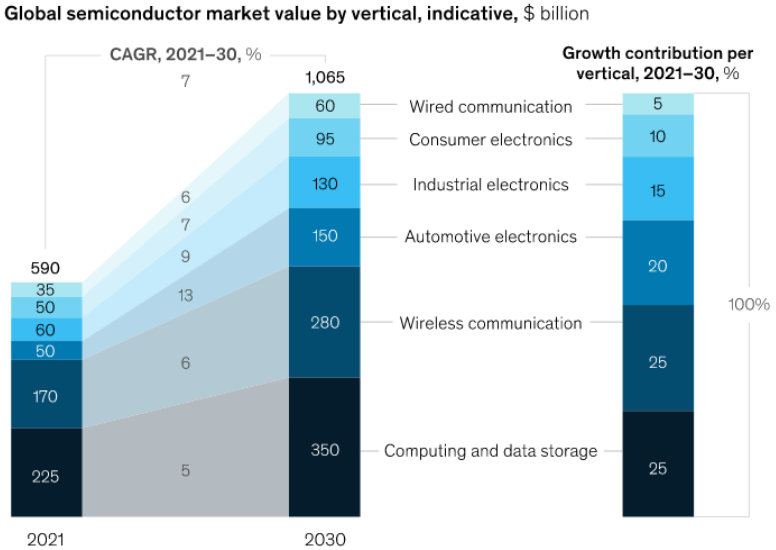
THE SEMICONDUCTOR INDUSTRY IN NORWAY

A mapping of the value chain

Oslo, 30th of May, 2024

A high-tech industry in growth

- Revenue of more than EUR 1 trillion
- Has multiplied the last 20 years. The growth is expected to continue going forward
- Parts of the industry is highly capital intensive. Other parts are more reliant on human capital.
- → These factors makes the industry highly productive.



Parts of the industry is geographically concentrated

	EQUIPMENT (SME)	CHEMICALS AND GAS SUPPLIERS	MATERIAL SUPPLIERS	FABLESS	FOUNDRIES	IDMS	OSATS
EU	27.02%	34.19%	33.08%	0.17%	0.48%	16.83%	0.00%
USA	31.35%	17.19%	7.80%	61.17%	3.09%	33.75%	13.77%
TAIWAN	1.27%	0.08%	4.43%	13.67%	39.28%	2.99%	37.43%
JAPAN	24.15%	32.73%	46.58%	3.47%	4.70%	28.96%	11.02%
SOUTH KOREA	7.62%	15.80%	3.64%	1.24%	39.42%	7.62%	3.66%
CHINA	4.18%	0.00%	4.27%	17.59%	6.34%	8.30%	27.62%
OTHERS	4.40%	0.01%	0.20%	2.68%	6.70%	1.54%	6.50%

Geopolitical tensions have led to heightened attention to the industry

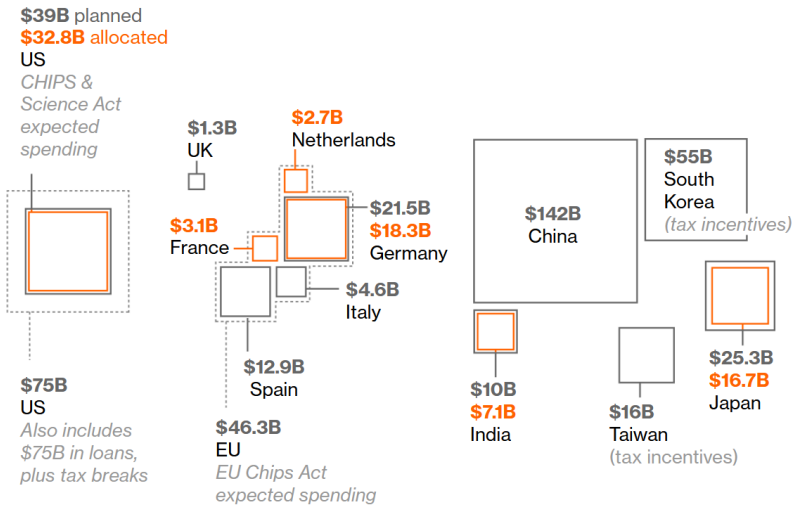




Massive investments and changes to the SC landscape

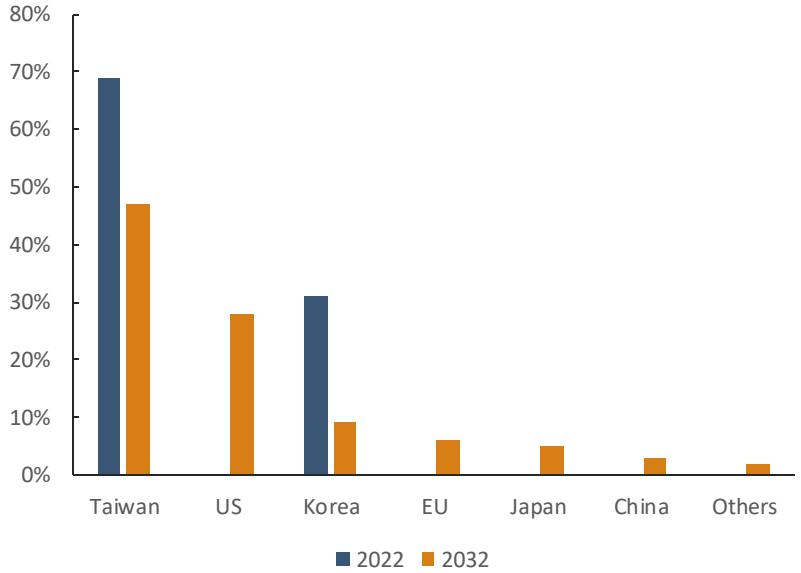
Global Chips Investments

Funding allocated or planned for semiconductors, in US dollars



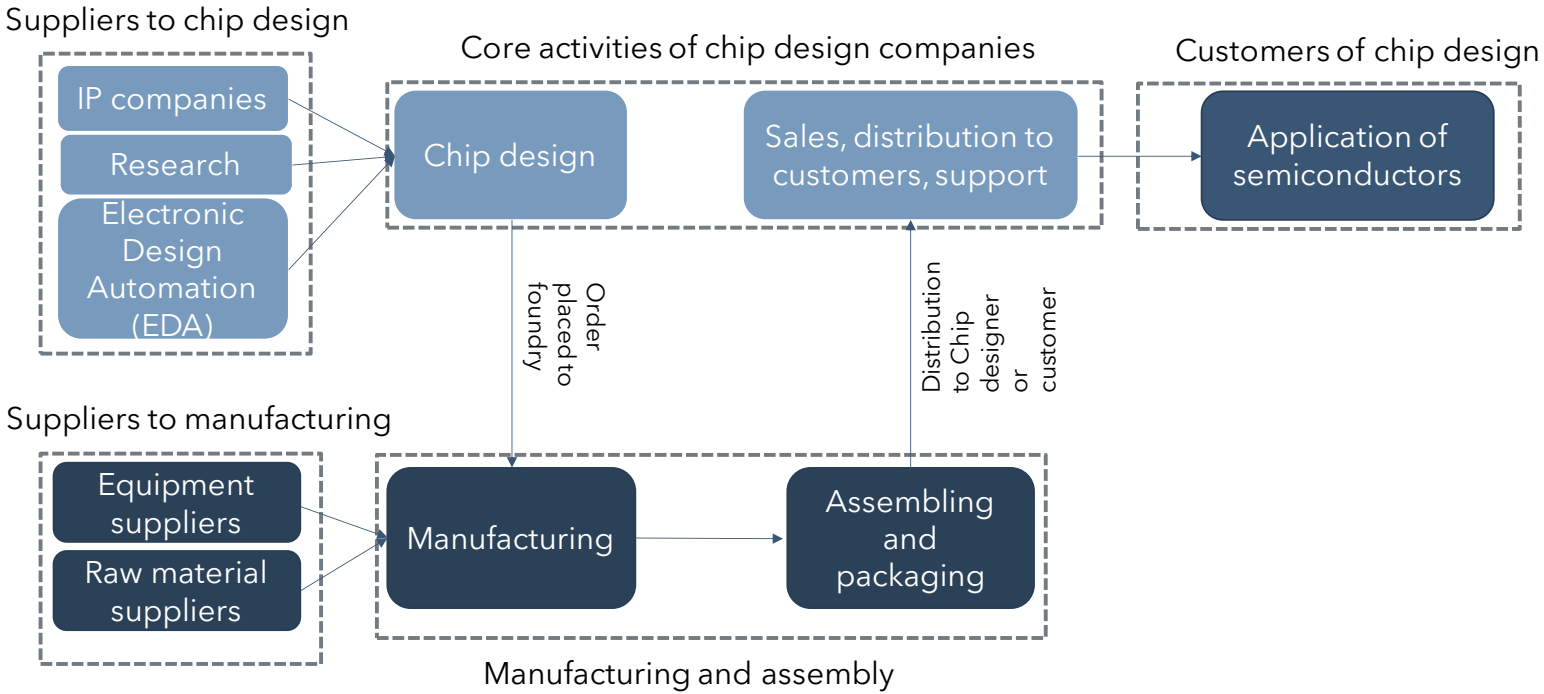
Sources: Bloomberg reporting and research, Semiconductor Industry Association

Global market share of advanced chips manufacturing capacity. Source: Bloomberg, Semiconductor Industry Association



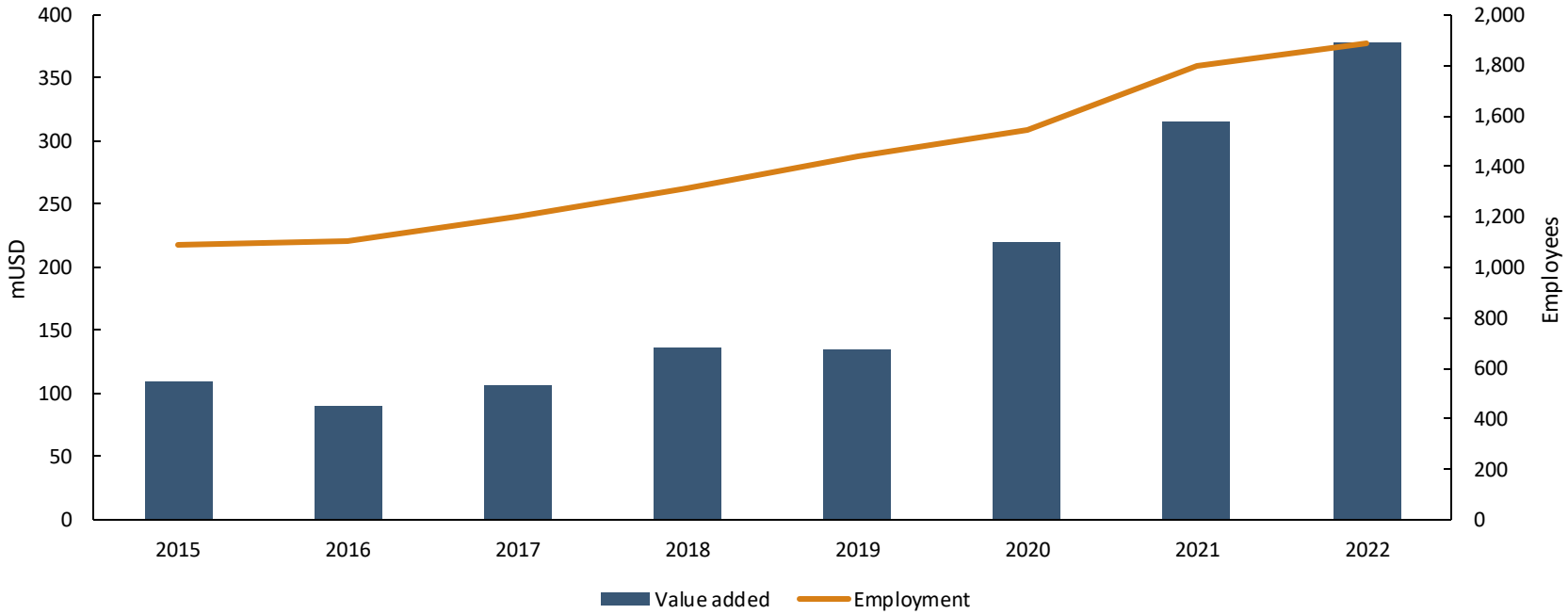
Mapping of the Norwegian value chain

Brief overview of the value chain



The Norwegian value chain

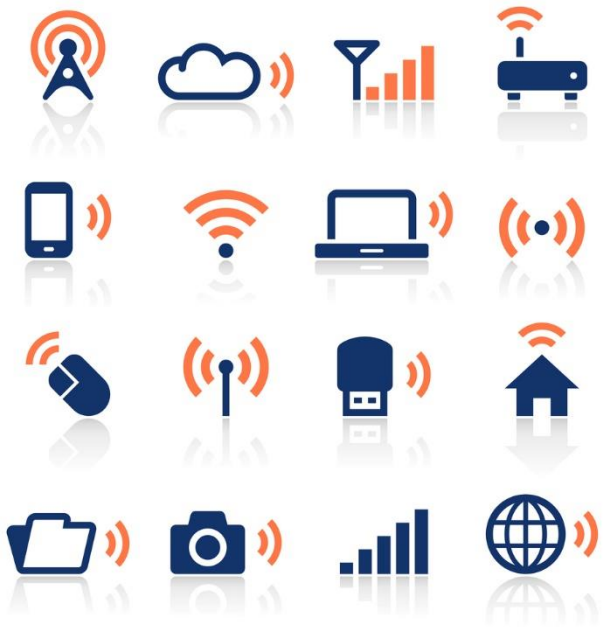
The Norwegian value chain for semiconductors is growing rapidly



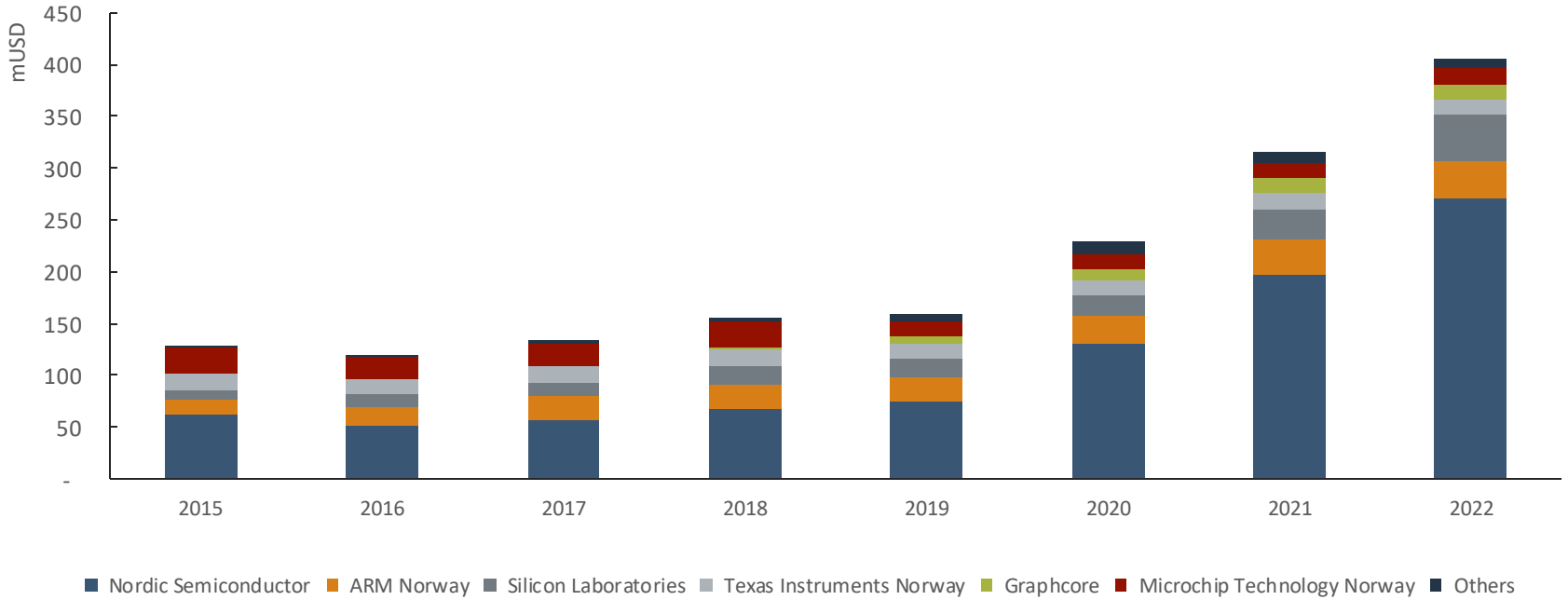
Integrated circuits

The core-skill in Norway is design, particularly for energy efficient wireless communication

- Nordic Semiconductor is a global leader in low-energy Bluetooth communication and IoT-solutions
- Many of the other companies in Norway are specialising in low energy wireless communication
- Norwegian companies design integrated circuits for Bluetooth communication, Internet of Things (IoT) applications, graphics cards (GPUs), touch screens etc.

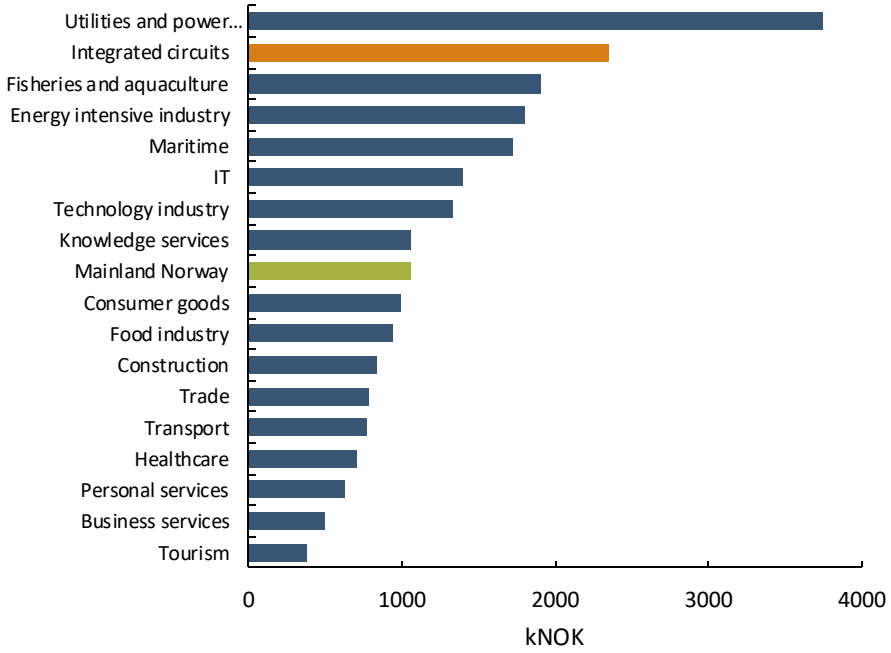


The value chain for integrated circuits is growing rapidly

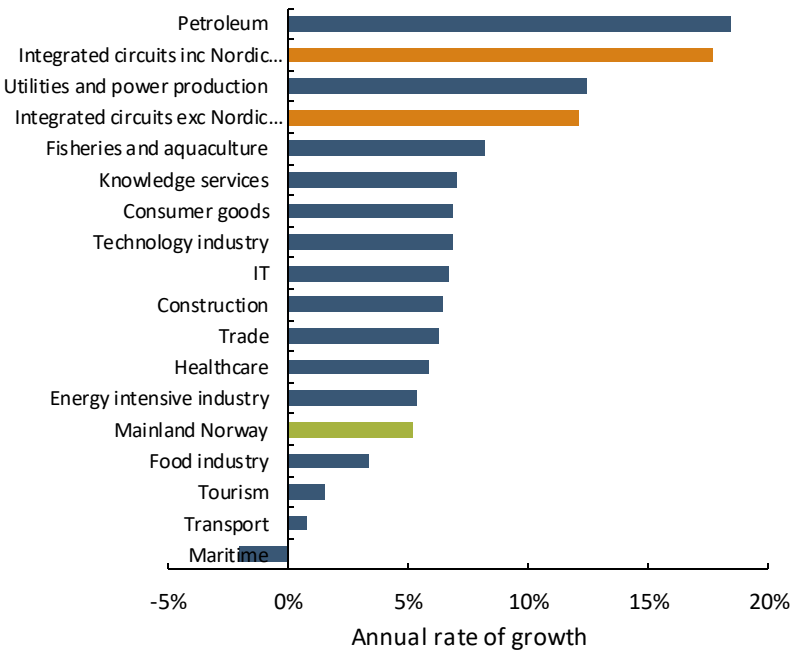


Rapid growth, high productivity

Annual productivity as value added from 2015 to 2021



Annual rate of growth of value added from 2015 to 2021



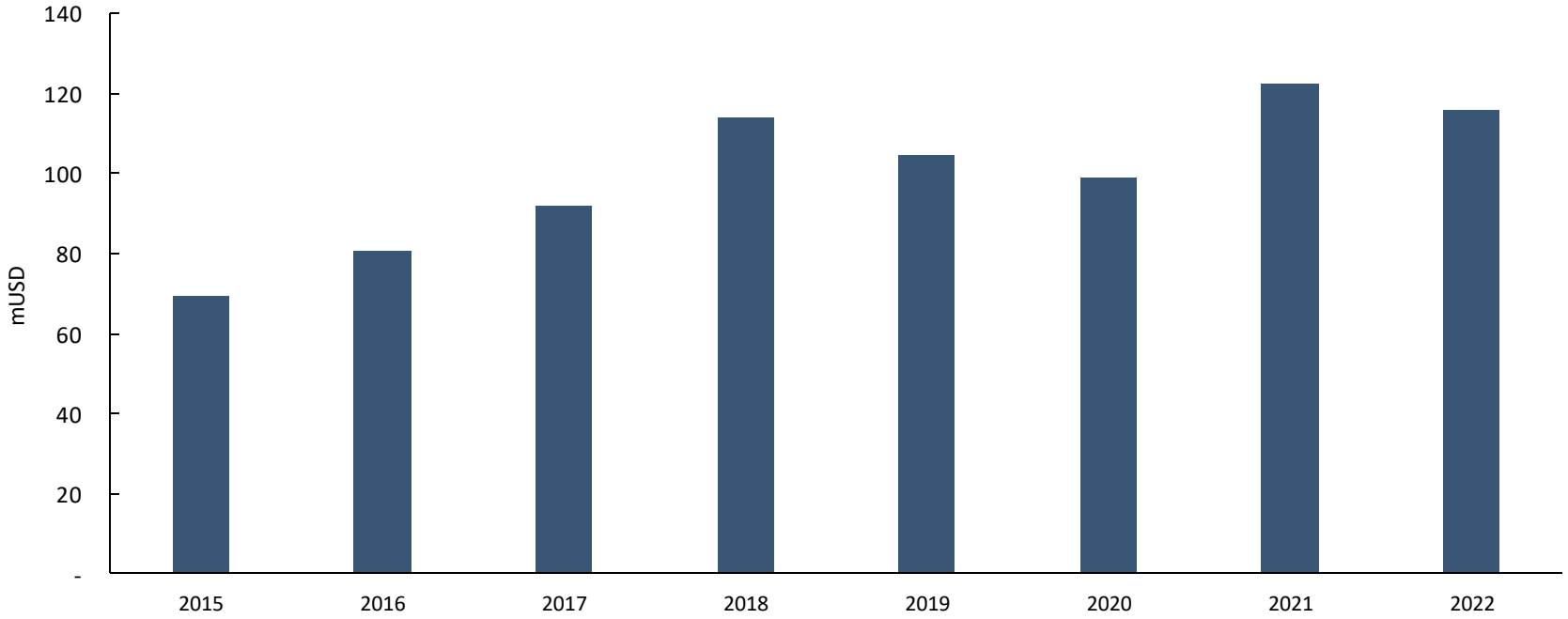
Sensor chips

Norway possesses expertise within the field of sensor chips

- Some semiconductors are produced in Norway - miniaturized sensors capable of detecting physical phenomena such as pressure, temperature and acceleration.
- Semiconductors produced in Norway are used, among other applications, in point-of-care diagnostics, intravenous medicine, underwater exploration, onboard aircrafts, and in space exploration.
- Sensor chips are far less standardized than integrated circuits, with a greater need for tailoring.
- Most of the chips produced in Norway are produced in SINTEF MiNaLab, which is a part of the Norwegian infrastructure for Micro- and Nanofabrication (NorFab)

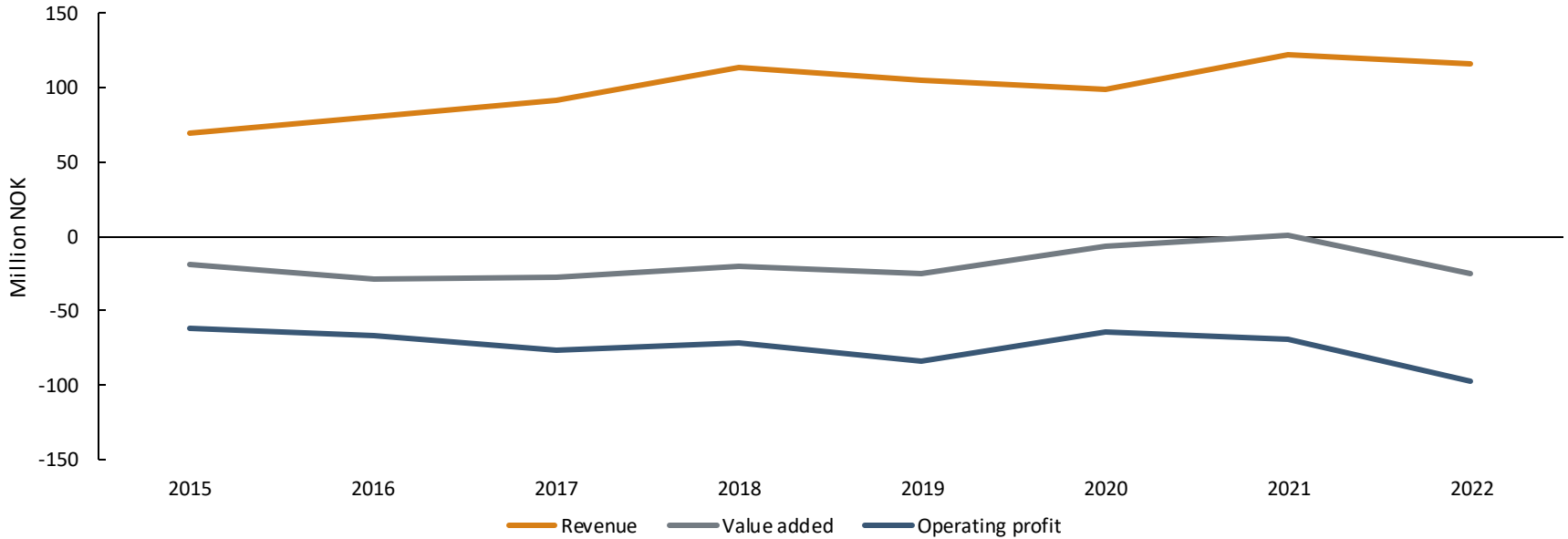
The companies designing and producing sensor chips have grown

Revenue among companies designing or producing sensor chips



… but they are yet to be profitable

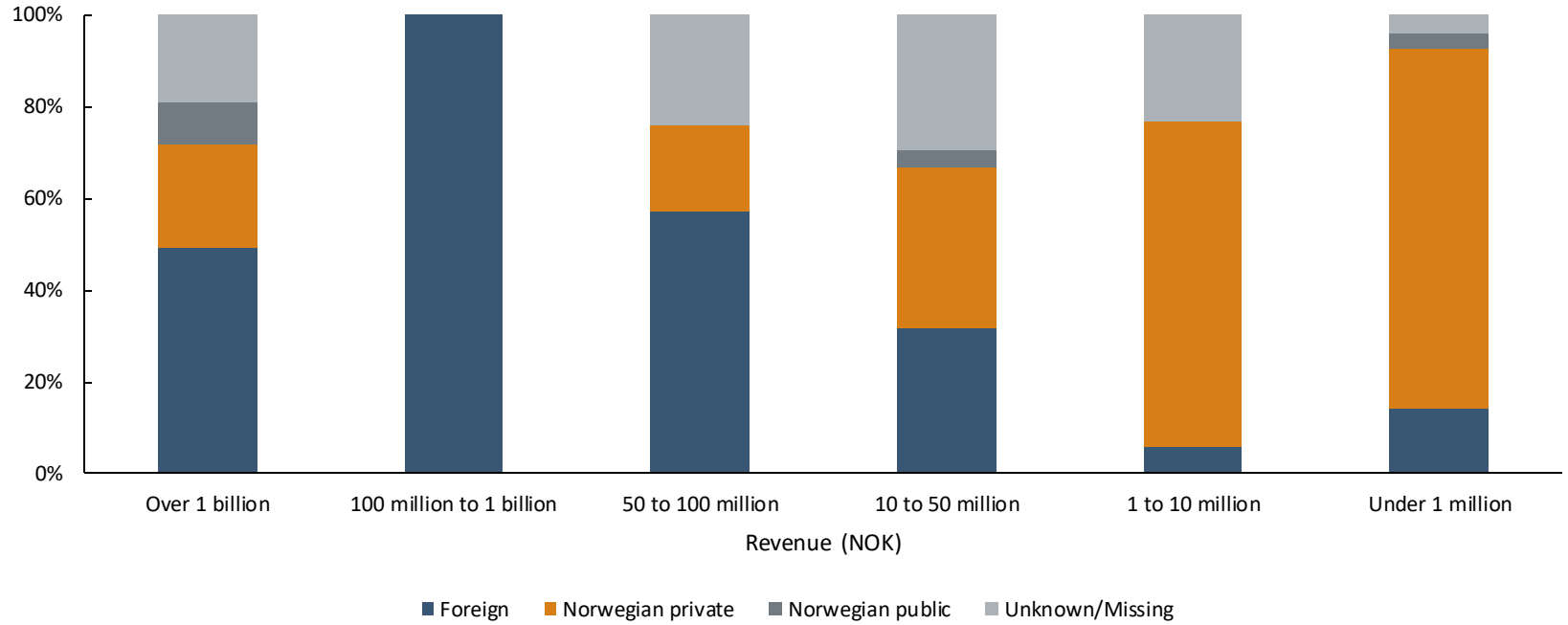
Revenue, value added and operating profit among companies designing or producing sensor chips



Ownership

The largest Norwegian companies are foreign-owned

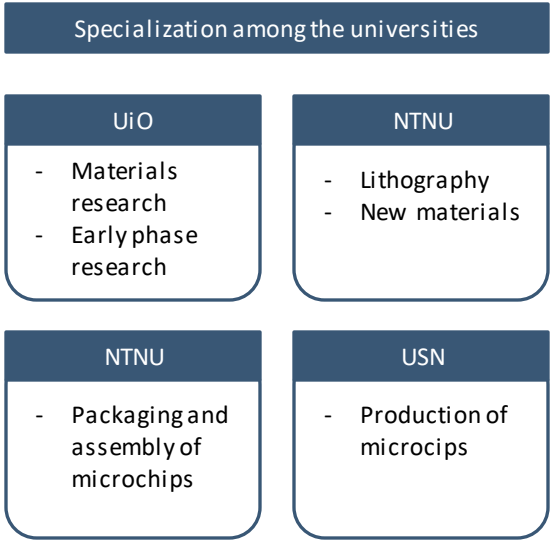
Ownership of Norwegian semiconductor companies, by revenue bracket



Research and education

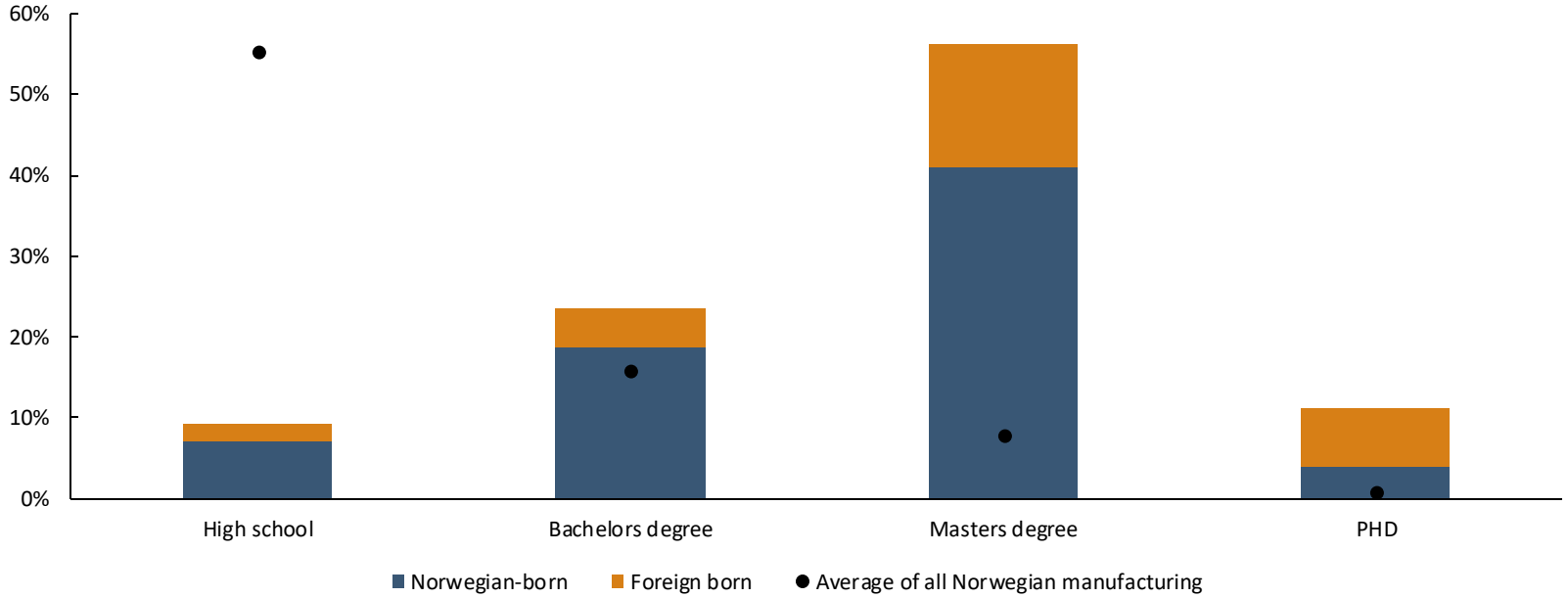
The most important public infrastructure for semiconductors is NorFab

- NorFab is a collaboration between NTNU, UiO, USN and SINTEF
- The universities are specialized in different parts of the value chain.
- Specialization avoids duplicates of machines and is adjusted according to the expertise of the universities.
- There are several spin outs from the universities, which are closely integrated to the industry.



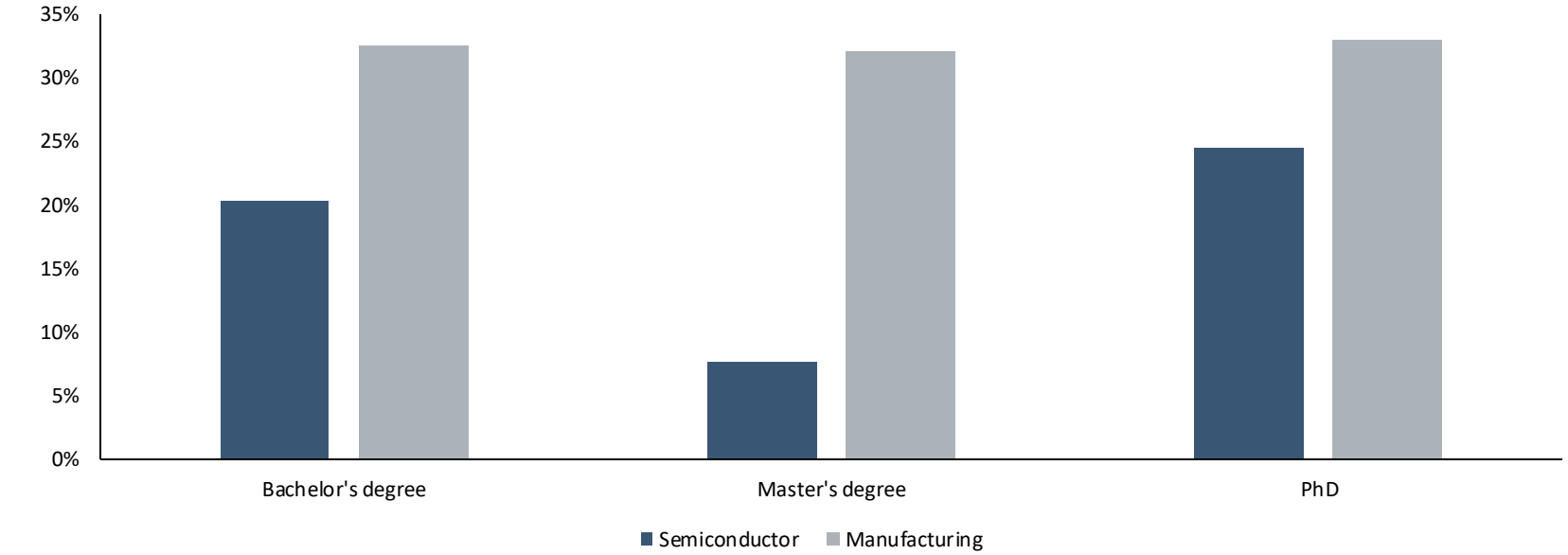
The semiconductor workforce is highly skilled

Level of education in the semiconductor industry compared to the average in the Norwegian manufacturing. Source: Estimates by Menon based on microdata from SSB



… but its gender distribution is highly skewed

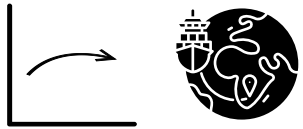
Proportion of women among employees in the semiconductor industry compared to Norwegian industry



The semiconductor industry in a broader Norwegian context

The semiconductor industry and the main challenges in the Norwegian economy

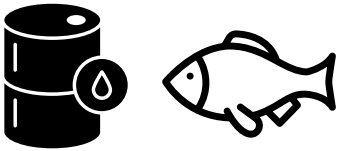
1) Low growth in mainland exports



2) Poor productivity performance



3) Concentrated and price sensitive exports



MENON ECONOMICS

