



**Tesi**

# New industrial projects

Market study on new large-scale industrial investments in Finland

2024

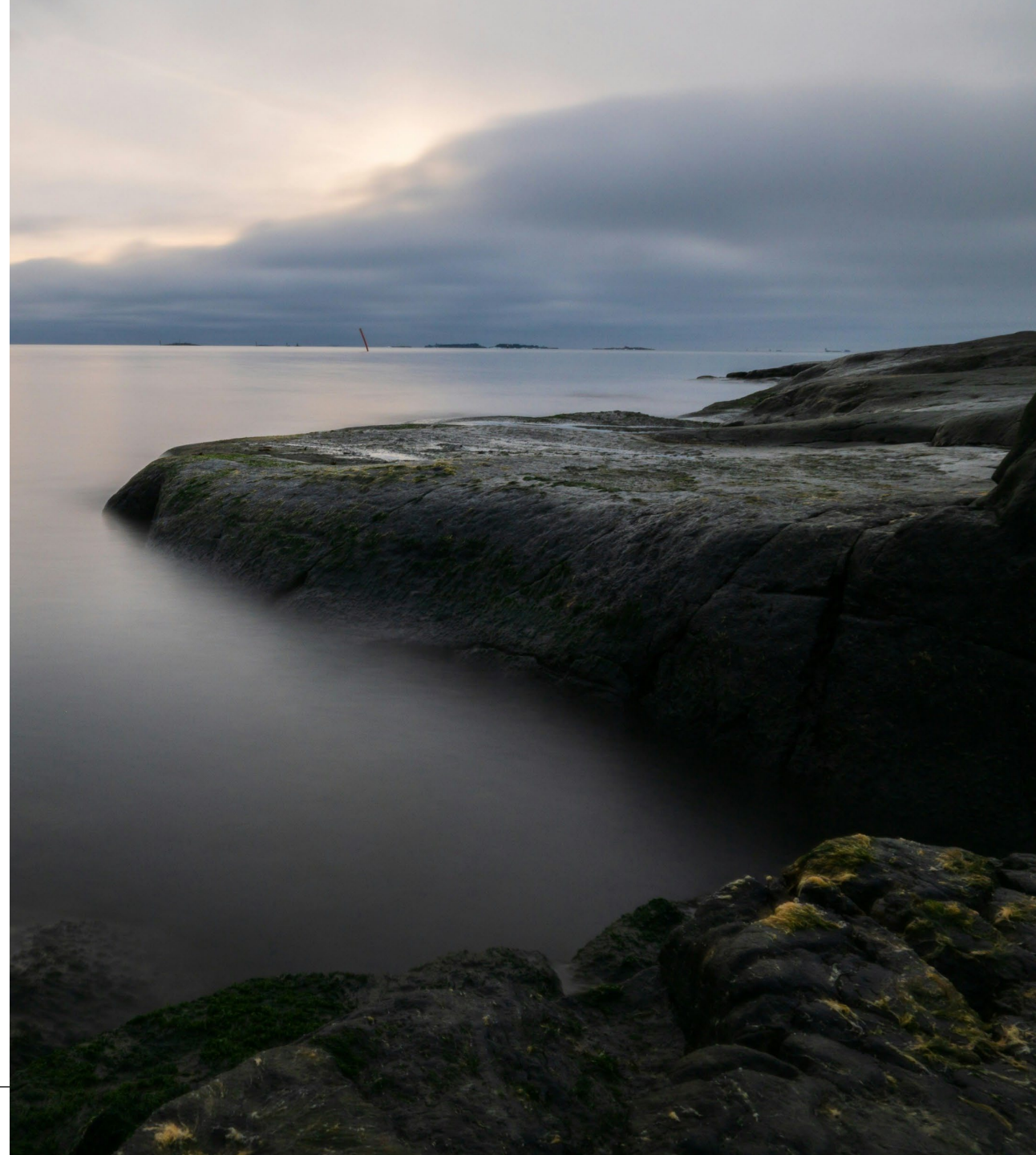
# Foreword

The global shift toward sustainable, low-carbon economies has created a significant demand for large-scale industrial investments, particularly those that support the clean transition in hard-to-abate sectors and energy. New industrial projects, characterized by their high capital requirements and focus on industrial decarbonization and transition infrastructure, play a vital role in advancing technologies that reduce emissions and improve resource efficiency. These projects, spanning sectors from production of green hydrogen, eFuels, biomaterials to green metals, are critical in meeting long-term climate goals.

Finland, with its access to affordable renewable energy and low-carbon grid connection, gas distribution infrastructure, biogenic CO<sub>2</sub> supply and high availability of connected industrial sites, is well-positioned to attract these investments. In addition, Finland has record high amount of renewable energy supply projects waiting for investment decisions. The chicken-egg problem with renewables is created when both demand and supply side projects are pending on investment decisions. The key is to unlock the industrial demand side of the power market by investing to local offtakers of renewable energy and hydrogen.

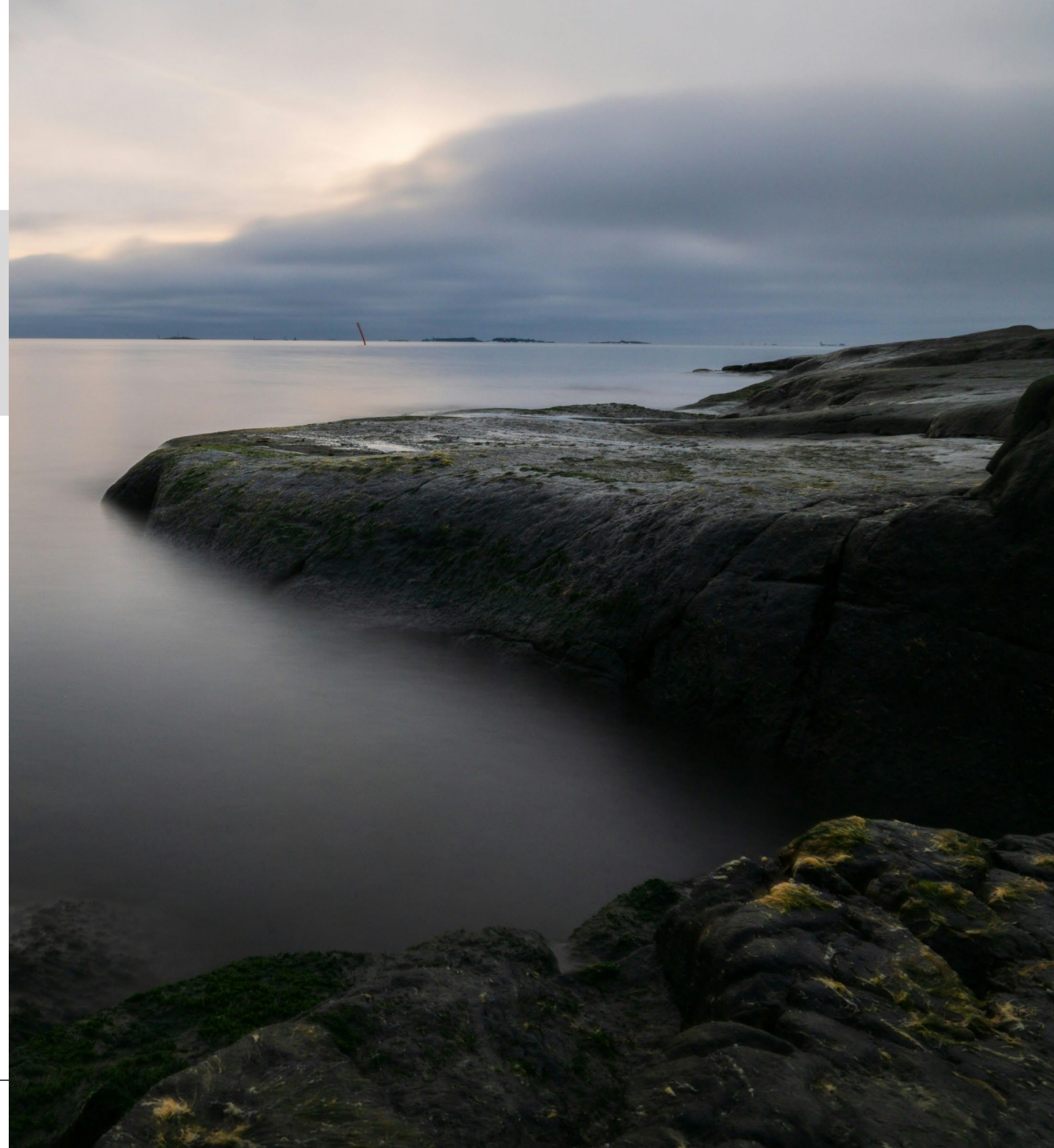
A key motivation for this research is to identify ways to attract more new industrial investments to Finland and to inform the capital market of the available investment opportunities. New types of risk sharing is needed to accommodate investors with different risk appetite as new industrial projects are a mix of an industrial start-up, project development and infrastructure investment.

Tesi team



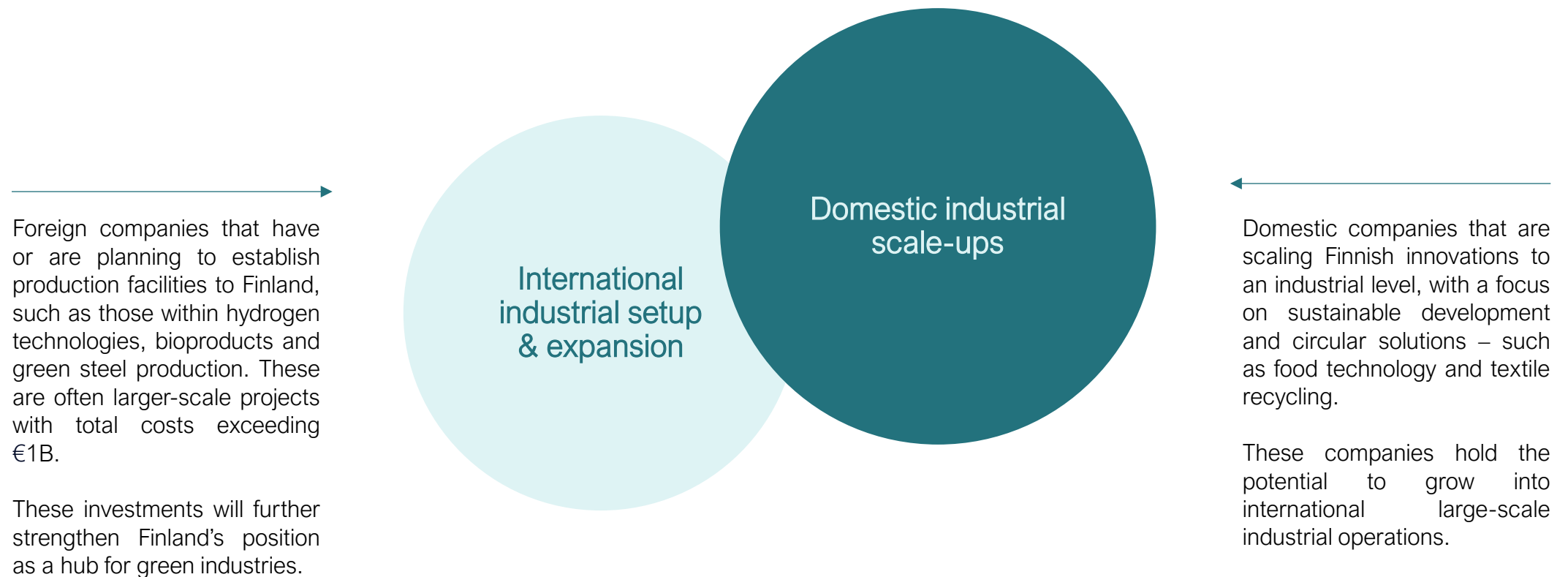
# Agenda

- Introduction
- New industrial projects in Finland
- Investor landscape
- Conclusions and summary



# New industrial projects are capital-intensive investments that focus on large-scale industrial initiatives and technologies to support the clean transition

## Tesi's new industrial project definition



# Attracting new industrial investments to Finland is critical for supporting the clean transition and meeting long-term climate goals

## Background and objectives

New industrial projects support the clean transition

- The shift toward sustainable, low-carbon economies has increased the demand for large-scale industrial investments supporting the clean transition.
- New industrial projects, characterized by high capital requirements and focus on industrial infrastructure, are crucial for supporting the clean transition.

Finland has several advantages as an industrial location

- Finland, with its access to affordable renewable energy and strong industrial capabilities, is well-positioned to attract these investments.
- Its competitive green electricity market supports green industrial production, drawing both domestic technology scale-ups and international investments.

Funding new industrial projects has proven complex around the world

- Financing these projects presents challenges due to the substantial upfront capital and the complexity of multi-phase financing structures.
- In Finland, this has led to a funding gap, as domestic investors lack the appetite and sufficient capital for large-scale industrial projects.

- This study provides an overview of how Finland can attract new industrial investments, with a focus on developing specialized investor consortia to support all stages of project development.
- We examine the challenges, financing structures and strategic approaches that enable successful new industrial project development in Finland.

# Tesi acts as a domestic anchor investor, particularly in the project development phase

## Tesi's approach for new industrial investments



### Development phase minority investor

- Tesi's involvement, typically 10-20% of funding rounds, intends to add credibility and attract other domestic and international investors.
- Tesi participates in early stages – mainly feasibility and construction – given that projects have a clear follow-on funding plan.



### Increased industrial focus in strategy

- As part of Tesi's updated investment strategy, Tesi will take a growing role in funding large-scale industrial projects.



### Market-based investments

- Tesi makes minority investments together with other investors, on market-based terms.
- We offer long term active ownership and knowledge sharing.

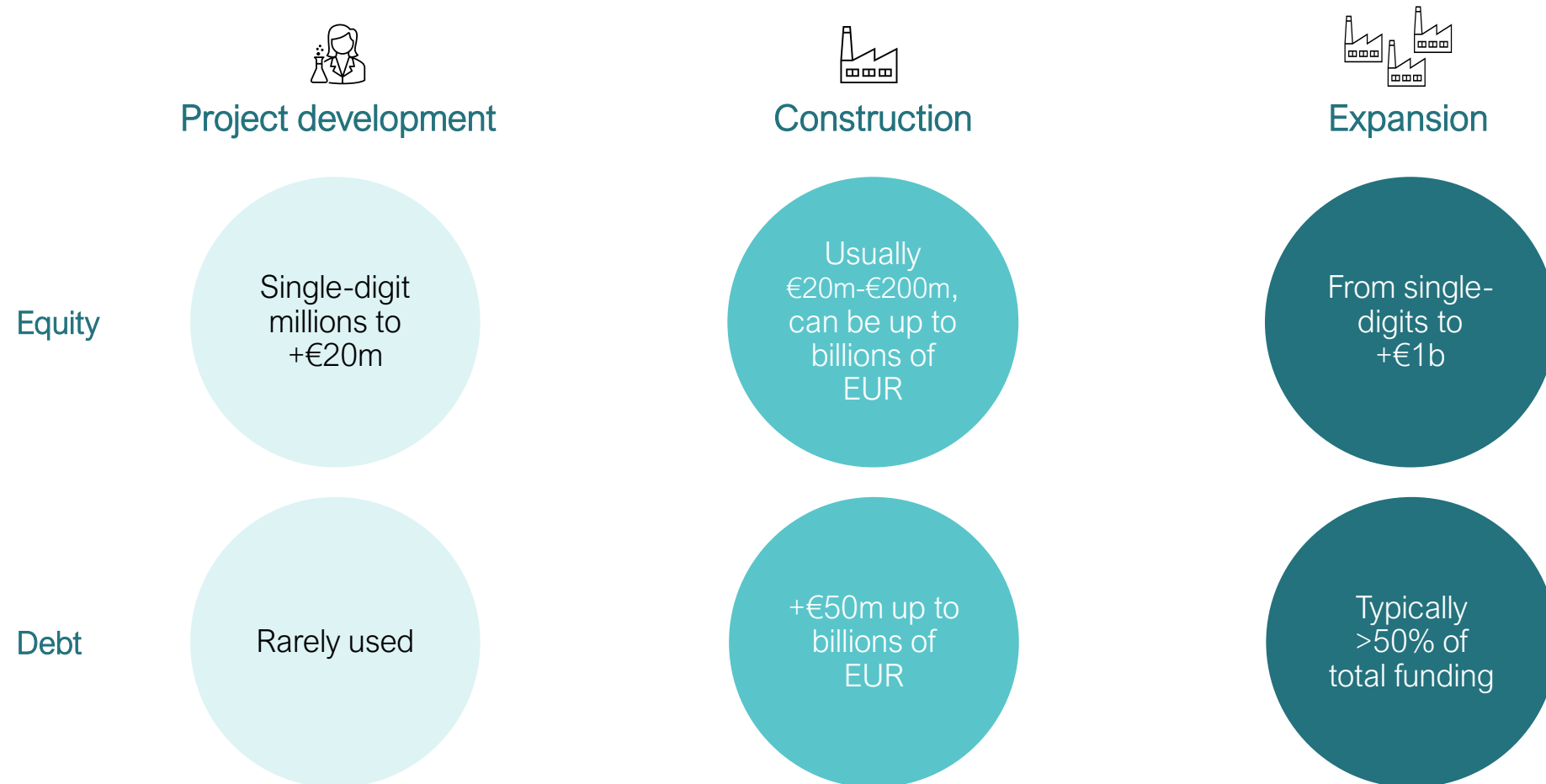


### Wide networks for further growth

- Tesi builds networks with domestic and international investors and financiers to ensure that projects have the necessary capital structure secured through all stages.

# Investment sizes in new industrial projects vary by instrument and phase

Typical ticket sizes by stage



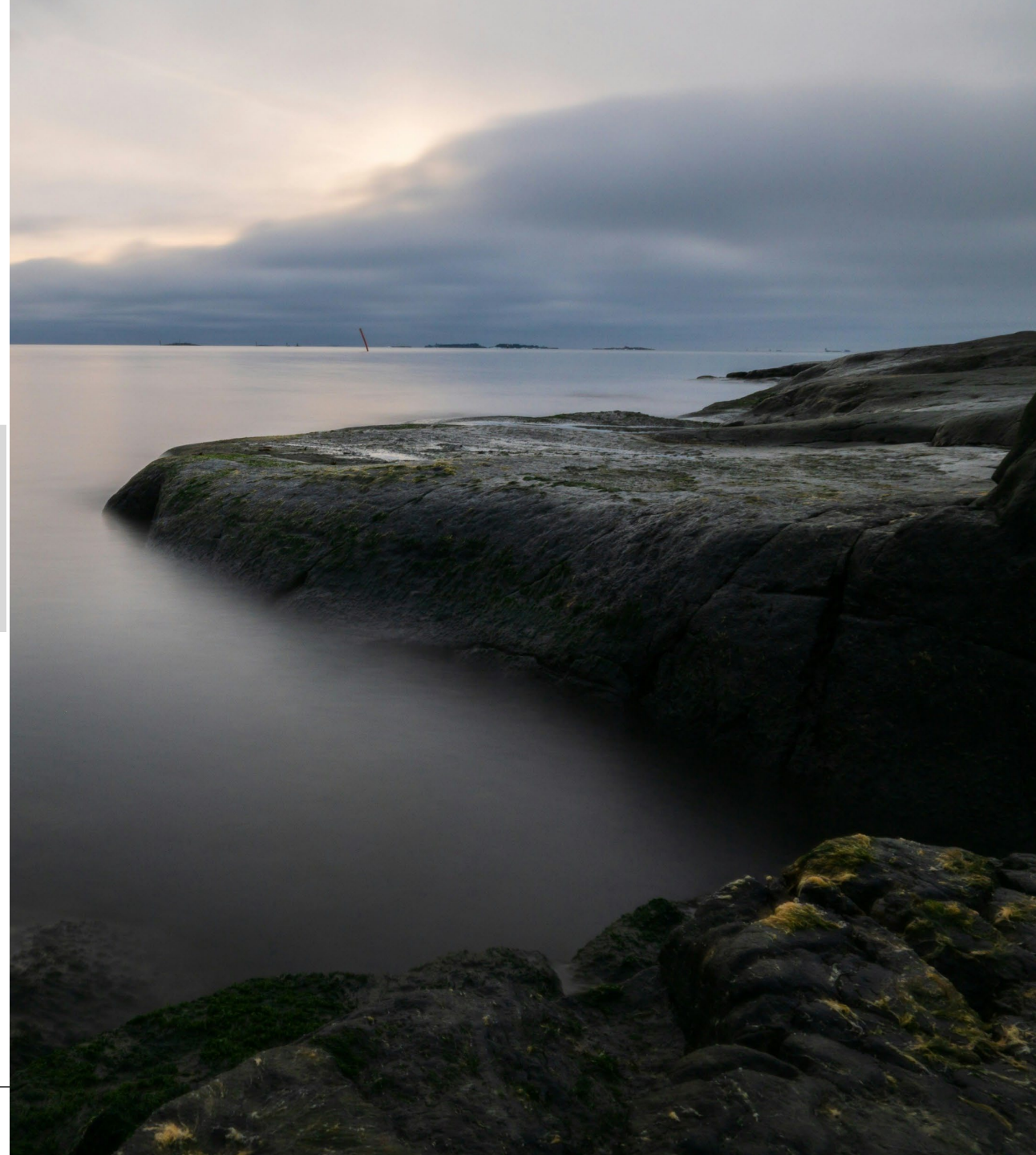
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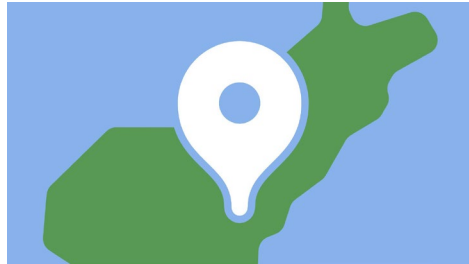
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# Project data has been gathered from the Finnish Green investments dashboard and Tesi's proprietary deal flow

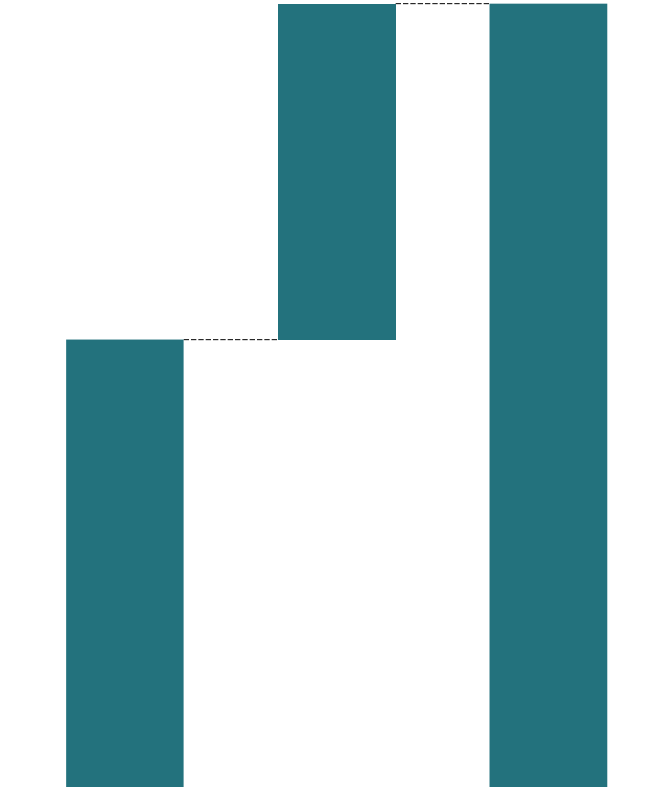
Key sources for investments analysis



Base data from The Confederation of Finnish Industries' (EK) Green investments dashboard<sup>1</sup>



Complemented by Proprietary Tesi deal flow



The scope of this study includes both foreign large-scale industrial investments in Finland, as well as domestic industrial technology scale-ups

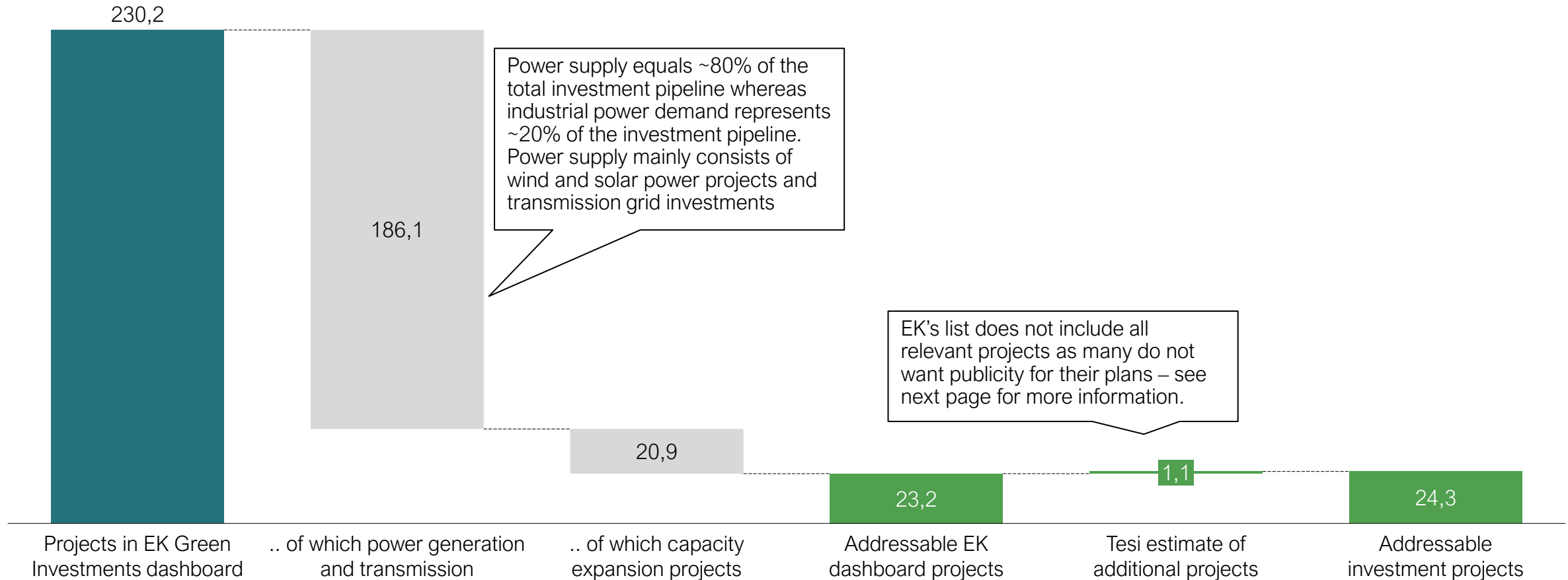
Study scope in brief: Companies

Origin	Finnish		International	
Investment type	Greenfield	Brownfield	Conversions of existing facilities	Capacity expansions of large existing companies
Sector	Manufacturing		Other	
Funding	Equity	Debt	Grants and subsidies	Existing cash flows
Total investment	>20me		<20me	

# The Confederation of Finnish Industries lists +200 €b of planned green investments, but most of them are energy generation

## Addressable investment pipeline

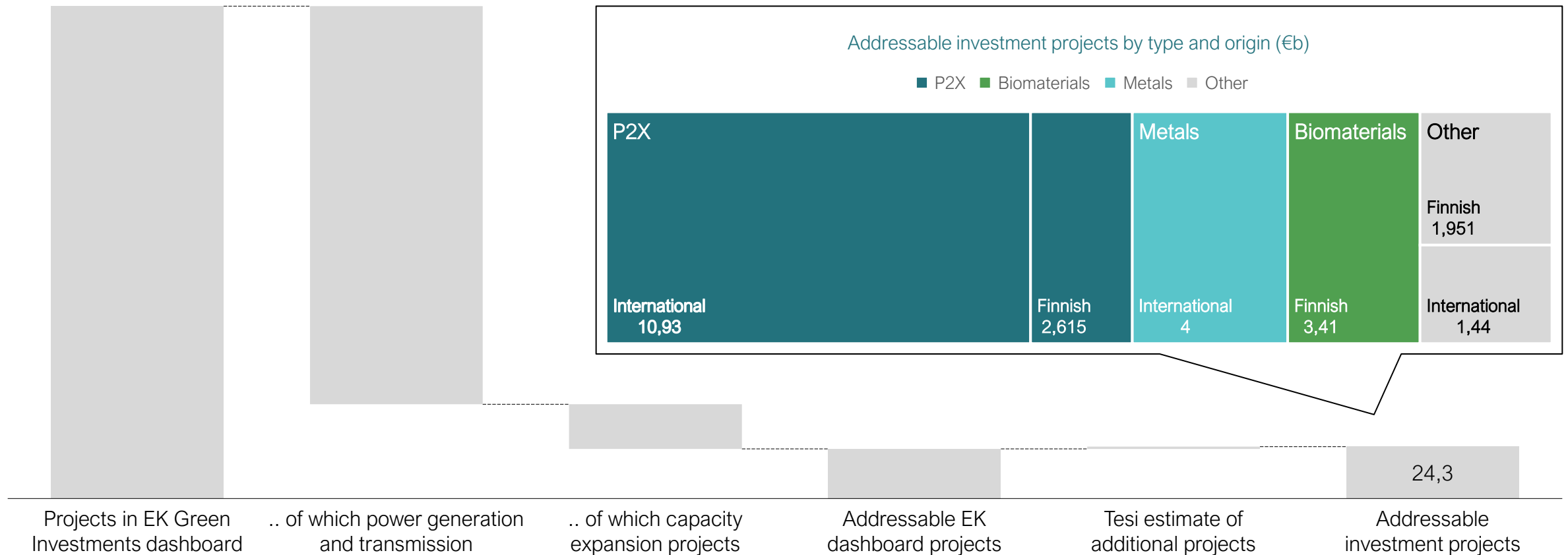
Total investment value (€b)



# P2X projects represent roughly half of the pipeline; metals and biomaterials other significant verticals

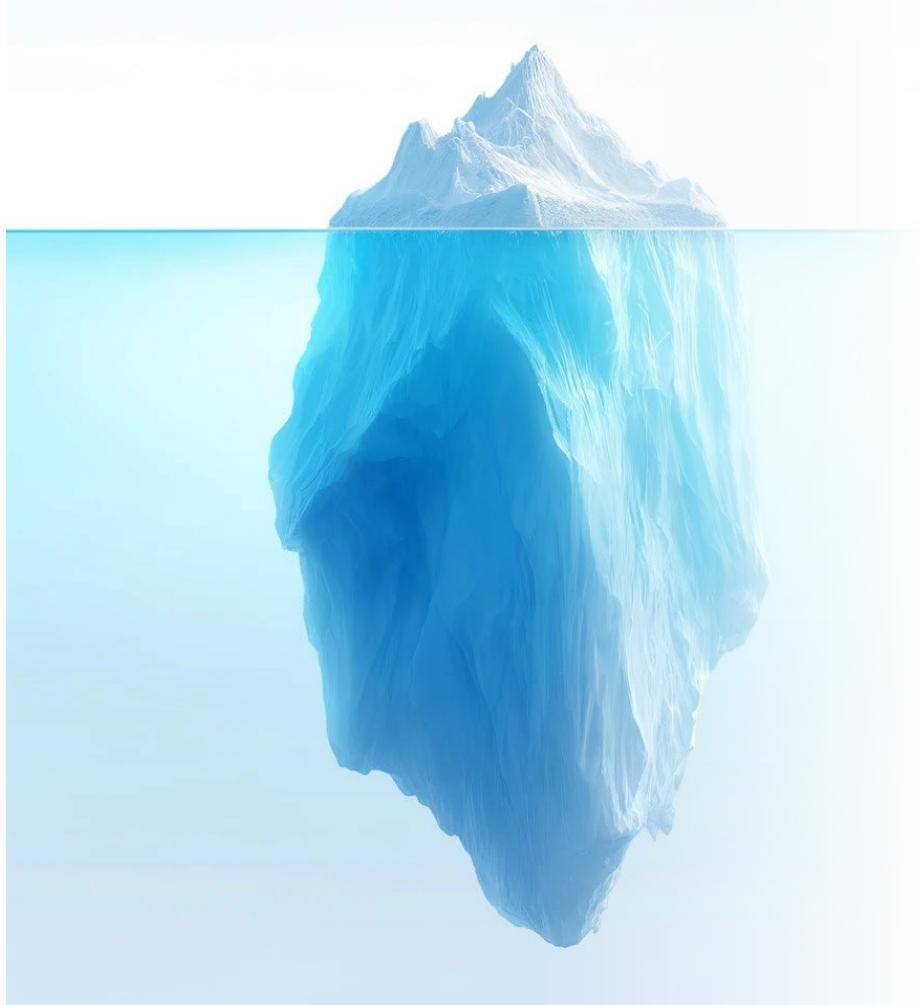
## Addressable investment pipeline by project type

Share of total investment pipeline (% of €b)



# Background: EK's data dashboard doesn't include all addressable projects, as not everybody wants their project to be public knowledge

## Publicity of planned industrial projects







### Only few industrial projects are public ahead of secured funding

- Although it is evident from many companies' business idea that they will, sooner or later, require a commercial scale demonstration factory, being open about their plans does not necessarily do them any favours
  - The projects being publicly announced early in the planning and fundraising process often share a few elements:
    - Larger than usual projects typically require both extensive funding (to which publicity gives further marketing), and lengthy environmental impact assessments (that are public information)
- Industries with first mover advantages, e.g. in terms of land area, grid capacity or biomass supply, may shield their constrained resources by publicity – a second biomass factory is unlikely in an area where one is already planned, as the supply wouldn't suffice for both
- On the other hand, there are elements that lead to most planned projects not being public early on:
  - Early-stage planning may lead to changes in plan – being public too early on may lead to outsiders thinking that the initial plan failed
  - If the project only needs a few equity investors and the company deems likelihood of finding them as high, publicity only generates extra work rather than significant benefits


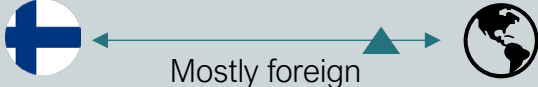
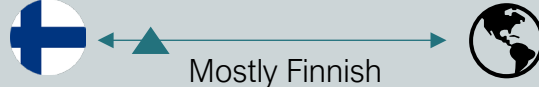
# Hydrogen and derivatives, various metal production technologies and biomaterials are the most notable new industrial project categories in the market at the moment

## Key new industrial project categories in the Finnish market

Power-to-X	Metals	Biomaterials	Other
<p>Companies developing hydrogen or its derivatives, including alternative fuels such as methanol, methane and ammonia.</p> 	<p>Companies developing alternatives to energy-intensive metal production, such as green steel.</p> 	<p>Companies developing biofuels and biomaterials, such as biocoal, as well as those involved in the refining of biomass.</p> 	<p>Companies including industrial technology scale-ups, developing solutions for climate tech, alternative materials, sustainable food, or other similar categories.</p> 

# Projects vary in many dimensions, but the challenge of getting lead investors acts as a common issue

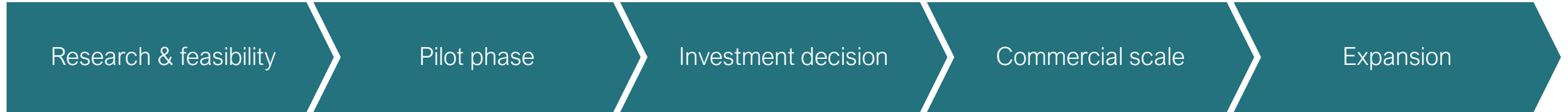
## State of the market in key industries

Vertical	P2X	Metals	Biomaterials
Ongoing projects	Several	Few	Some projects within different applications
Typical size	€250m-€500m	+€1b	€50m-€1b
Typical project origin	 Varies	 Mostly foreign	 Mostly Finnish
Current investors	Infrastructure funds, energy companies, airlines, technology providers	Strategic investors, OEM's, off-takers	Strategic investors, venture capital funds, off-takers
Funding structure	Depends on the phase, often project development TopCo's and Project Co's	TopCo's and investments into foreign structures from which funds are channelled to Finland	Mostly simple structures
Funding rounds	Project development rounds €10m-€25m	Raising €30m-€150m rounds	Raising €5m-€150m rounds depending on stage
Vertical development	Some final investment decisions (FID) during 2025, First projects secured permits, construction likely to start in 2025	Pre-feasibility stage Projects 2-3 years from construction	Some projects already in commercial scale up phase, while others still in early permitting phase
Key risks	Securing off-takes, high required green premium, EU regulation reliability	High capex, modest green premium, Securing PPA's	Investor syndicates, technology maturity
Key challenges	Carbon capture, distribution infrastructure, PPA's	Local zoning, enforcement of CBAM regulation	Offtakes, long value chains, new applications
Returns	Infra-like, higher if DevEx risks are taken	3 - 7x, dependant on DevEx risk	3-5x early on, later lower
Key investors	Infrastructure funds, energy firms	Industrial and strategic investors	Financial, industrial and strategic investors
Technology risks	CO2 capture	Limited	Specifications of output
Offtakes	First offtakes announced	First offtakes announced	Challenging, need to produce sufficient volumes

# Multi-stage financing model for new industrial investments allows for proper risk management throughout the project

## Typical development stages of a new industrial project

Illustrative



- Detailed feasibility study to evaluate the project's technical, financial, and operational viability
- The funding mainly consists of equity as the project is still high-risk. Projects may also secure grants and subsidies

- In the pilot phase, the project's technology is validated
- Majority of large-scale industrial projects in Finland are in feasibility and pilot phases
- Engagement with strategic partners and offtakers to secure market interest
- Depending on project pilot phase not always necessary

- Large-scale funding agreements are finalized
- Regulatory approvals are in place
- Offtake agreements or LOIs are secured
- A clear timeline for commercial operations developed

- Investments are directed towards full-scale production and broader commercialization
- Often includes a mix of debt and equity financing. Lenders typically become involved once the project has been de-risked

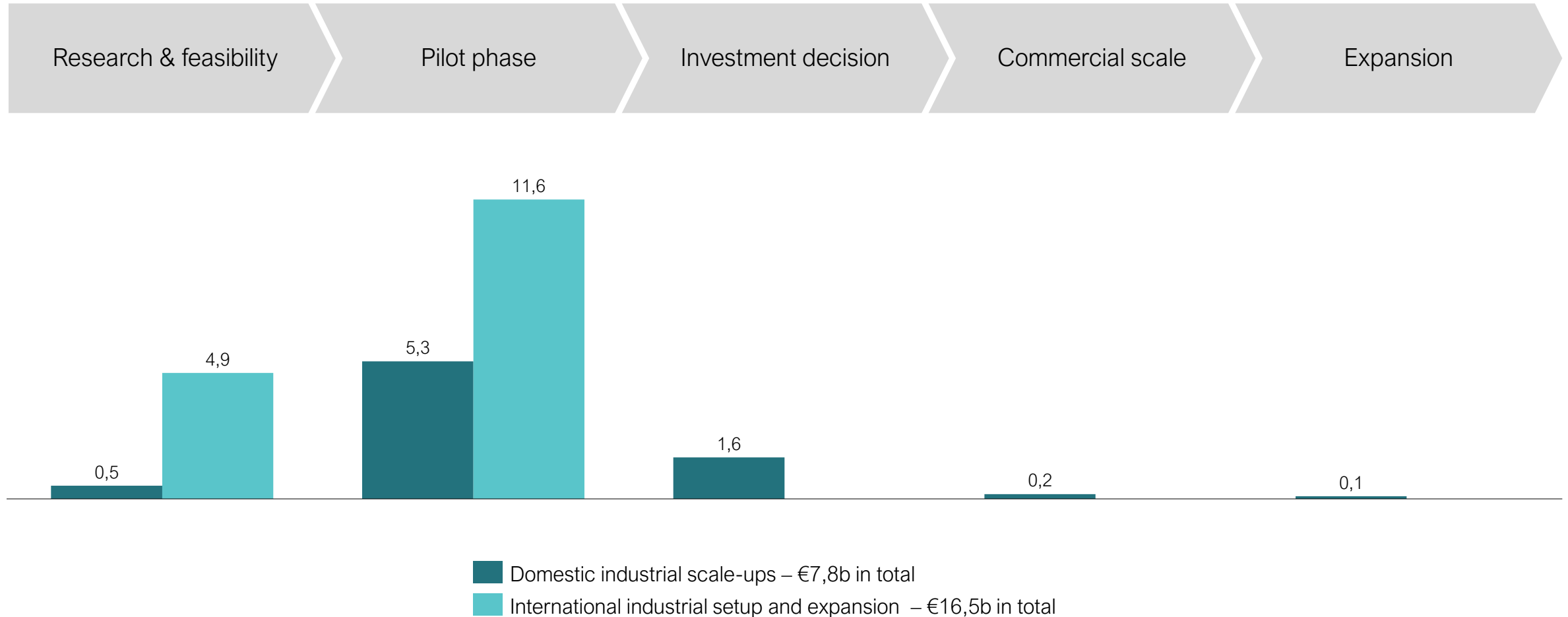
- Scaling the model: New production facilities are designed and built based on existing blueprints and operational frameworks
- Optimize for local conditions while ensuring scalability, cost-efficiency, and compliance with regulatory requirements



# Many early-stage development projects, but progress remains cautious

## Announced investments by project stage

€b

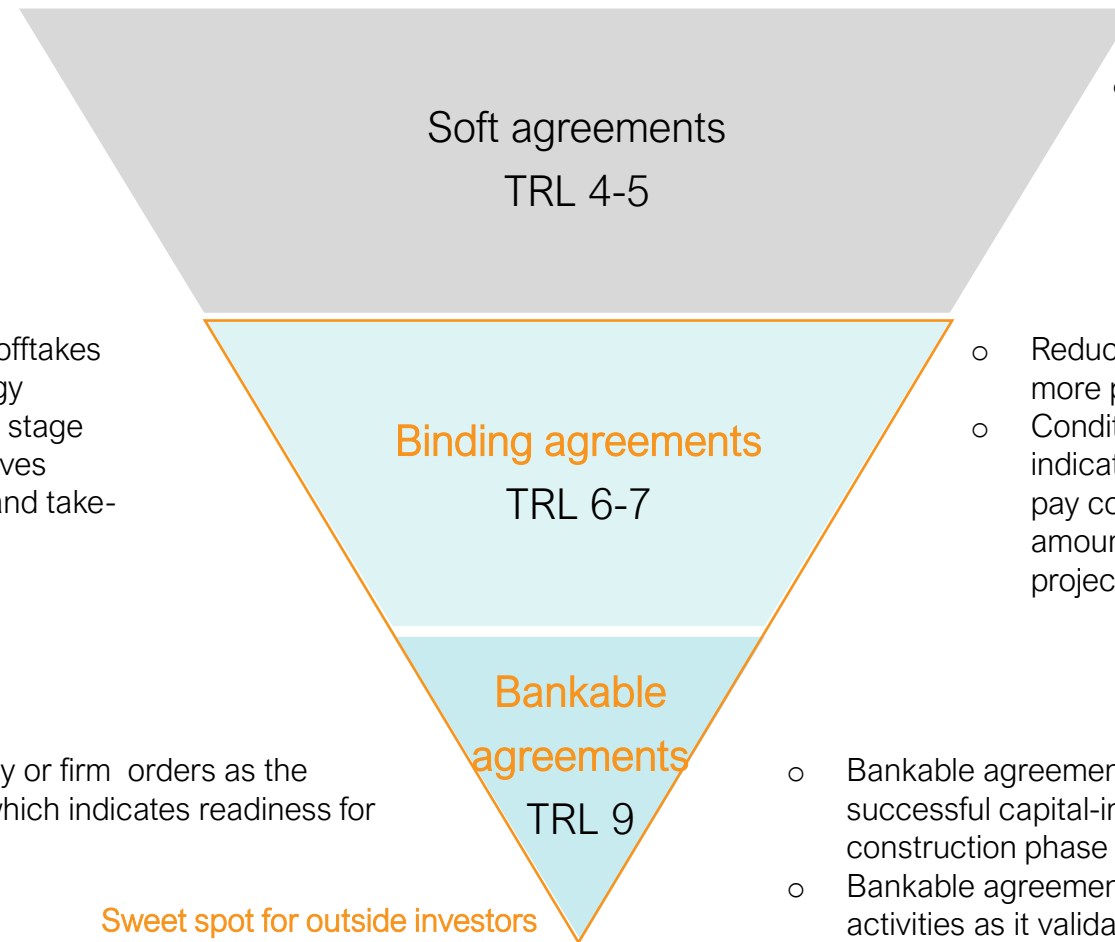


# International industrial setup and expansion: There are only a few projects that have been able to gain binding or bankable agreements

Memorandum of understandings and letter of intents. The stage can be characterized as prototype building with a technology readiness level (“TRL”) of 4-5.

Binding agreements consist of conditional offtakes and take-and-pay contracts. The technology readiness level is 6-7 when at pilot & demo stage and conditional offtakes. As the project moves forward to the technology level is about 8 and take-and-pay contracts become feasible

Bankable agreements comprise take-or-pay or firm orders as the project’s technology is proven and TRL 9 which indicates readiness for full commercial deployment



- Highly risky deep tech venture capital or project development stage

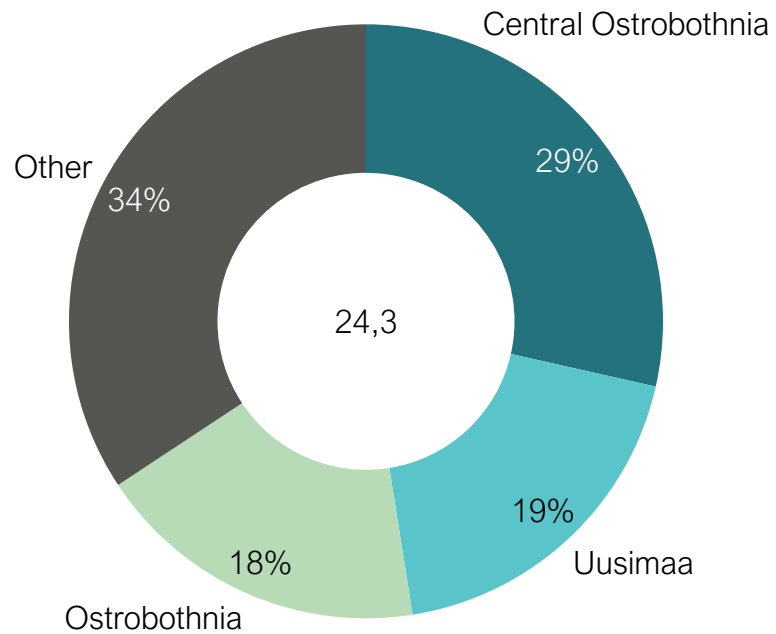
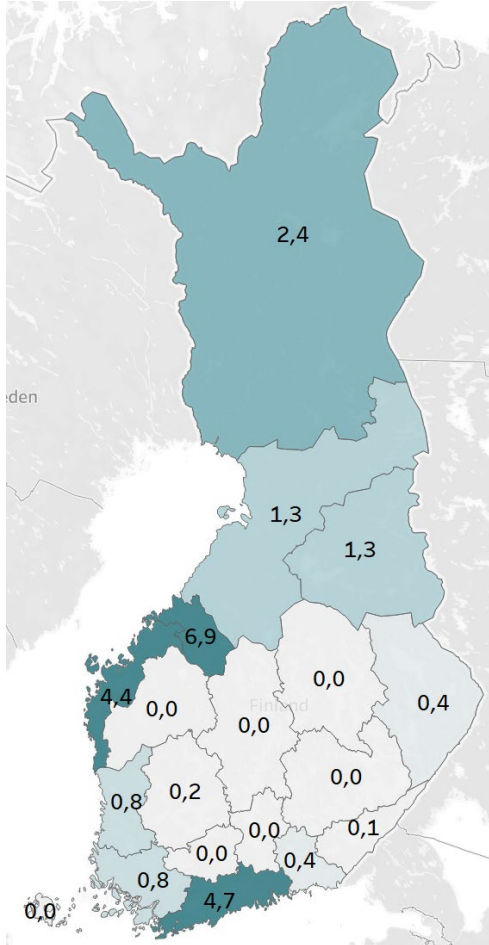
- Reduced risk level compared to the soft stage, as more proof of technology is available.
- Conditional offtakes (early purchase commitments) indicate real interest and feasibility, while take-and-pay contracts (commitment to purchase a certain amount regardless of use) become feasible as the project approaches market-readiness.

- Bankable agreements can be viewed as a leading indicator for a successful capital-intensive project moving forward towards construction phase
- Bankable agreements bring together a multitude of development activities as it validates the product-market-fit and suitable conditions for its production

# Projects heavily weighted towards coastal regions

## Development projects by region

b€

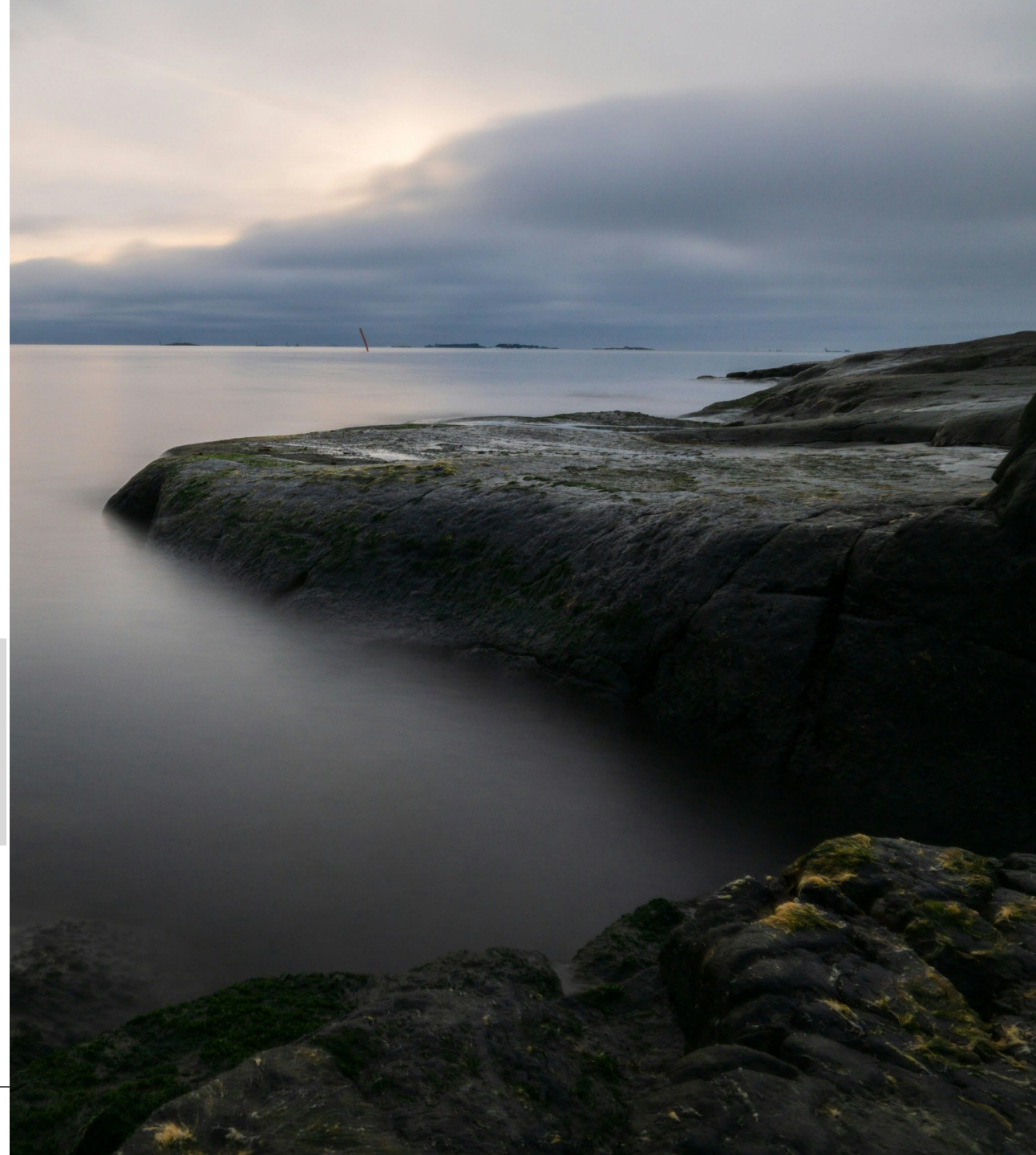


### Explaining factors

- Most wind power production exists on the west coast
- Existing energy grid also tilted towards the west coast
- Easy seaport access
- Strong industrial clusters

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# Many different investor types, each with their advantages and limitations

## Investor breakdown

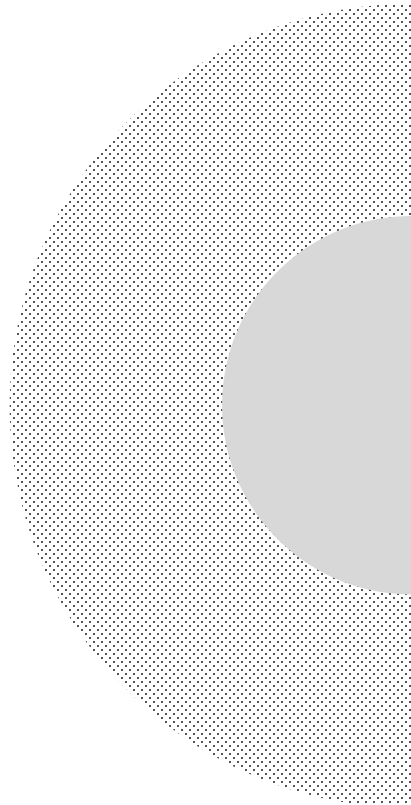
Investor type	Expected annual return	Advantages	Limitations
Venture Capital	~30-50%	Early-stage funding, expertise	Focuses on high-growth, scalable tech startups
Growth Equity	~20-30%	Supports scaling companies	Focuses on rapid growth, may avoid capital-intensive projects
Buyout	~15-25%	Large capital, operational expertise	Prefers established companies, shorter investment horizons
Corporate VC	~10-20%	Industry knowledge, strategic partnerships, offtakes	May have conflicting interests with parent company
Impact Investors	~10-20%	Aligned with sustainability goals	Often smaller investment sizes
Infrastructure Investors	~5-15%	Long-term investment horizon, large capital	Prefer established technologies, lower risk
Project Finance	~5-15%	Structured for large-scale projects	Requires predictable cash flows, extensive due diligence
Debt Financing	~5-10%	Non-dilutive capital	Requires collateral, steady revenue streams
Government Grants	0%	Non-dilutive funding, supports early-stage research	Limited amounts, bureaucratic processes



- No single perfect investor type for new industrial projects with pockets that would be deep enough
- Successful financing requires syndication
- Successful projects require diverse funding with different risk-sharing models to align equity investors, industrial players, infrastructure investors, and debt providers within the same deal, ensuring balanced risk-return profiles across phases.

# There are hundreds of investors suitable for Finnish new industrial projects

## Investor breakdown



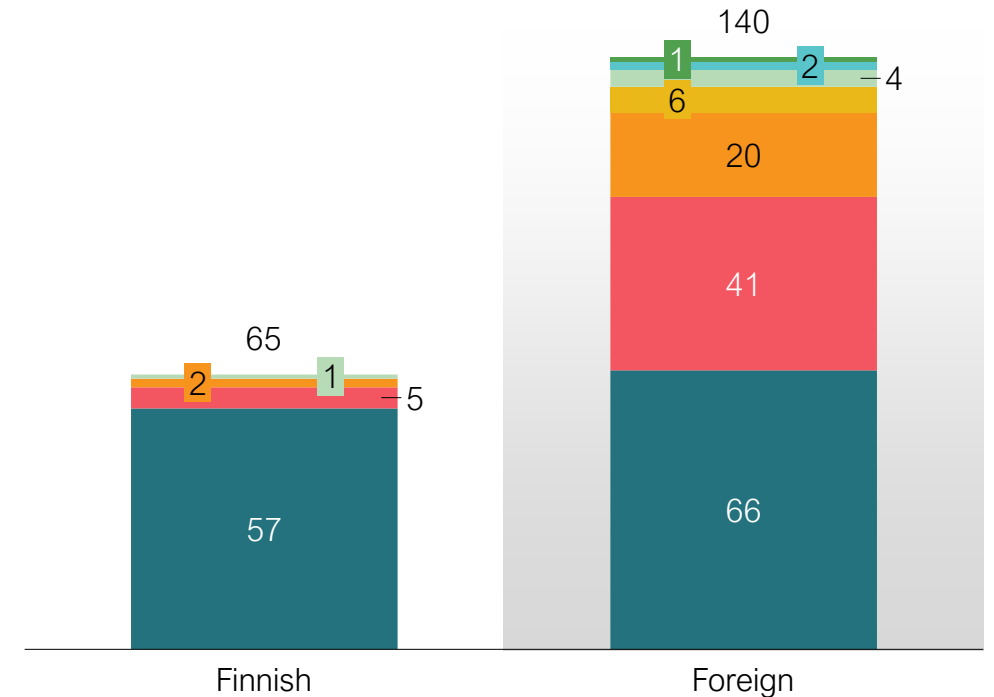
### Current investors

- Investors with public track record of new industrial investments in Finland **n=33**
- Investors involved in (unclosed) past or currently ongoing new industrial investment negotiations in Finland **n=30**

### Potential investors

- Investors with public track record of new industrial investments in Sweden **n=114**
- Selected investors with assumed appetite for new industrial investments in Finland **n=28**

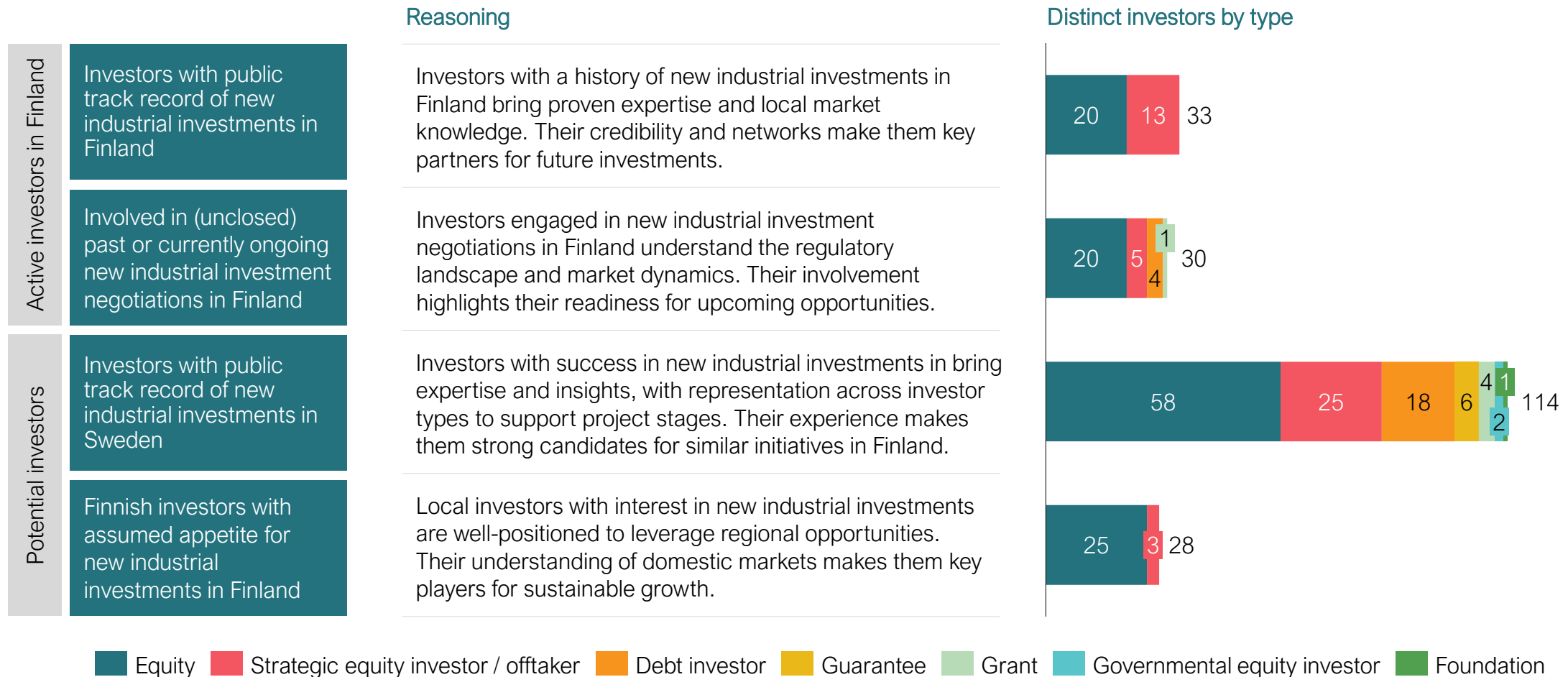
Sample weighted towards Swedish investors (n=41); in reality most European investors above a certain category-specific size threshold could be interested in investing in Finland



■ Equity 
 ■ Strategic equity investor / offtaker 
 ■ Debt investor 
 ■ Guarantee 
 ■ Grant 
 ■ Governmental equity investor 
 ■ Foundation

# Investors with experience in Sweden's new industrial projects could be key partners for similar initiatives in Finland















## Investor breakdown



■ Equity 
 ■ Strategic equity investor / offtaker 
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# There's a wide range of possible investor types for new industrial projects

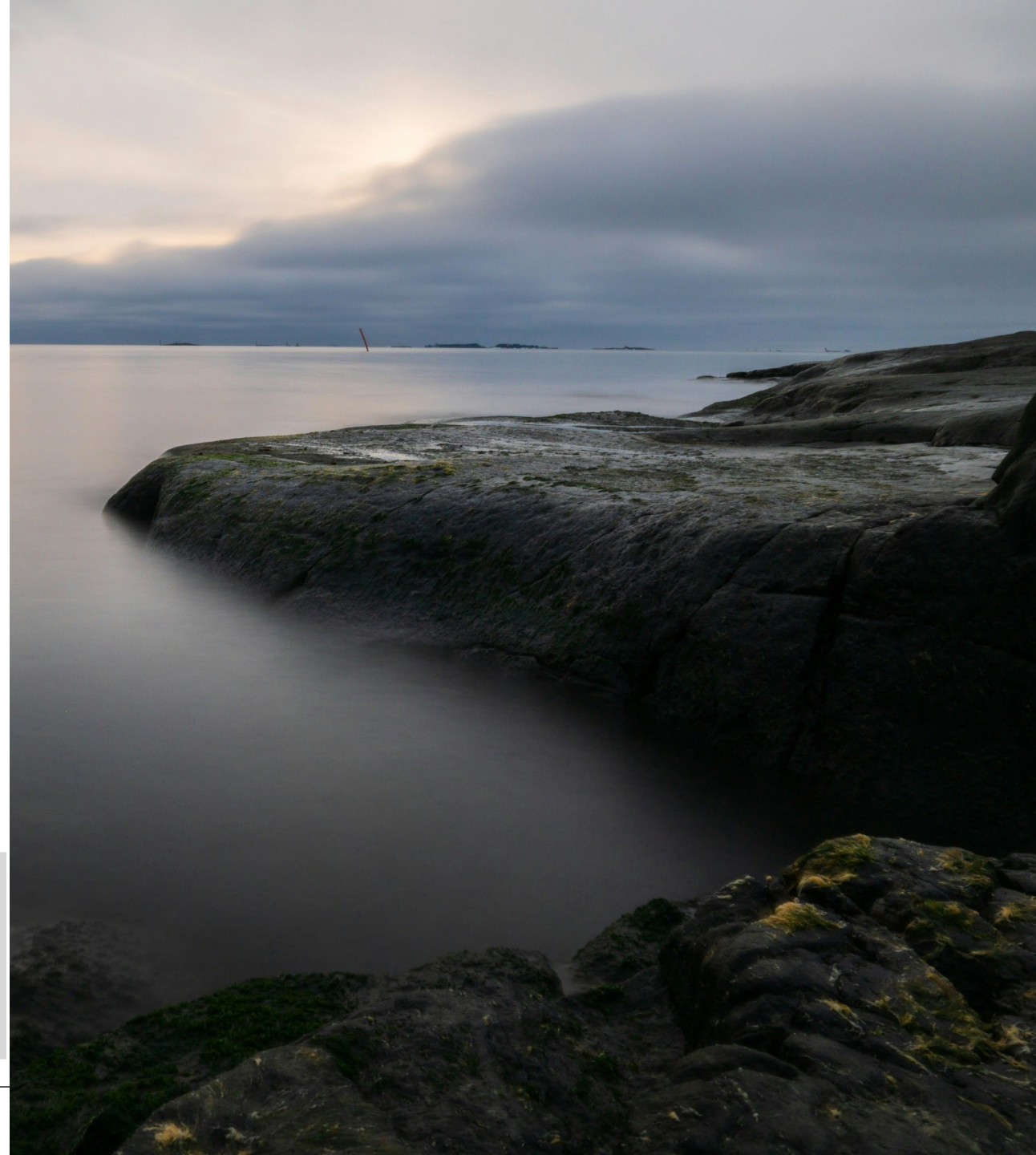
## Investor types

Investor type	Equity	Strategic equity investor / offtaker	Governmental equity investor	Grant	Guarantee	Foundation	Debt investor
Examples	  	 		 	 		  
Rationale	Accelerates project scaling with growth-oriented, strategic capital.	Aligns financial and operational interests to ensure project success.	Signals public-sector confidence to attract private co-investment.	Drives early-stage development of impactful projects.	Reduces risk to unlock financing for high-potential projects.	Supports high-impact projects addressing social and environmental challenges.	Provides cost-effective financing for large-scale project implementation.
Role	Invests in implementation and scaling of commercially viable projects.	Invests equity and commits to purchasing project outputs.	Provides equity funding for strategically valuable or impactful projects.	Offers non-repayable funding for research, pilot, and commercial phases.	Enhances project bankability with risk-mitigation instruments.	Provides philanthropic funding for research and feasibility phases.	Offers loans or credit facilities to reduce capital costs.
Typical phases	<ul style="list-style-type: none"> <li>Investment decision</li> <li>Commercial scale</li> </ul>	<ul style="list-style-type: none"> <li>Investment decision</li> <li>Commercial scale</li> </ul>	<ul style="list-style-type: none"> <li>Pilot phase</li> </ul>	<ul style="list-style-type: none"> <li>Research &amp; feasibility</li> <li>Commercial scale</li> </ul>	<ul style="list-style-type: none"> <li>Pilot phase</li> <li>Investment decision</li> </ul>	<ul style="list-style-type: none"> <li>Research &amp; feasibility</li> </ul>	<ul style="list-style-type: none"> <li>Expansion</li> </ul>
Ticket size	€1m to +€30m	€1m to +€500m	€1m to €30m	€500k to +€50m	€1m to +€200m	€500k to +€5m	€5m to +€500m



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# Key topics that impact the investor sentiment with new industrial investments in Finland

## Key considerations



### EU regulation and its consistency

- Finland's regulatory framework, while solid, can be difficult to navigate, particularly for emerging technologies.
- EU regulation is the common nominator for most of industrial decarbonization or energy transition business models, where predictability and transparency is the key to derisk the investment cases



### Green premiums vs. discounts

- Clean transition business models often assume green premiums, a price that the customer is willing to pay for the decarbonized products
- Investors need to believe that i) green premiums are sustainable and ii) unit cost advantage is sustainable at the time when the company starts commercial operations



### State subsidy competition

- Competition is intense between EU members states and the US to attract the largest and leading transition technologies
- Finland can't compete with direct subsidies and aggressive industry policy, but can build its competitive advantage based on renewable power, grid biogenic CO2 supply and predictable political environment



### Funding gaps

- Funding gaps remain when companies move from pilot to first-of-kind commercial set up
- New types of risk sharing is needed to accommodate different style of investors to same cap table
- Offtakers, supply chain partners and OEM's can play role in the early equity rounds where private investors are still hesitant.



### Permits and zoning

- Environmental permitting processes for large-scale industrial projects have often been slow and delayed by appeals of stakeholders with limited direct interest in the projects.
- Local level municipality decision makers have major impact on the zoning process and need to be managed diligently.



### Skilled workforce

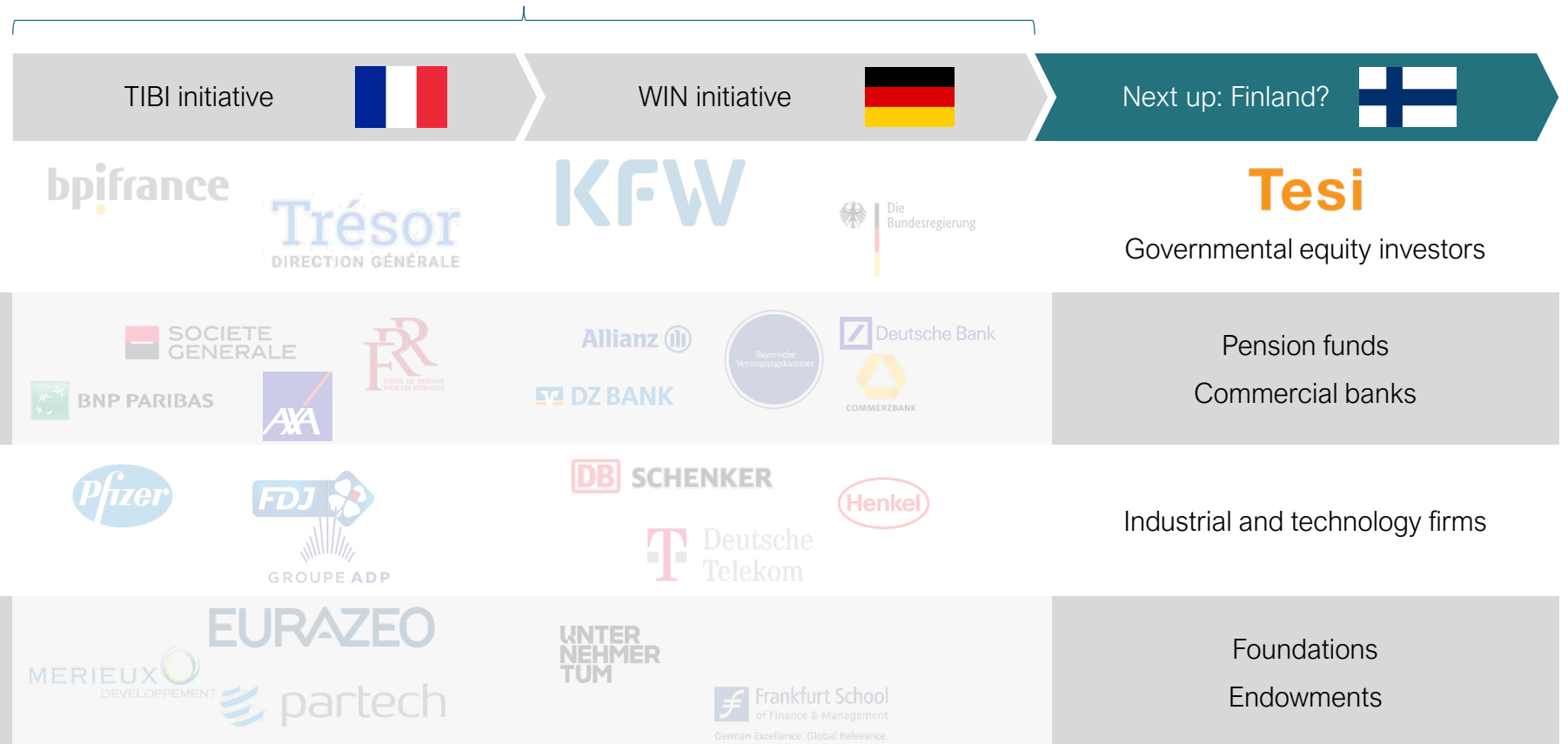
- Finland is experiencing a shortage of specialized labor in sectors like renewable energy and advanced manufacturing.
- The mismatch between high-skilled labor and available workforce is slowing the progress of new industrial projects.

# Could more new industrial projects become a reality by mobilizing a wide network of Finnish institutions?

## Innovation funding mobilization possibilities

Illustrative

National initiatives aiming to mobilize tech and innovation investment through funding commitments by signatories



# The new industrial investments offer a new growth path for the Finnish economy within the clean transition

Domestic and international funding required to secure the successful development of projects



## The new industrial investments offer growth potential

- By attracting new industrial investments to Finland we can boost growth and accelerate the clean transition
- Large projects offer long-term employment opportunities and tax income
- Finland has clear competitive advantages such as clean energy, reliable grid and transparent legislation



## Attractiveness from investor perspective

- Industrial investment have characteristics of start-ups, project development and infrastructure investments.
- Investors participating early on may secure attractive returns. Different risk / return profiles available dependent on project phase
- EU regulation reliability and assumed green premium drive value
- Risk mitigation through different funding rounds and diversified investors from different parts of the value chain
- Project development and value creation takes time. No quick results available.



## Increased acceptance through domestic ownership

- Local acceptance of the new industrial investments can be increased through domestic ownership
- Higher credibility in the eyes of international investors through domestic anchor investors
- New ways to structure and share risk are required to attract risk averse institutional capital
- Deep pocket domestic investor syndicates can fund projects early on.
- Tesi's new strategy supports this but role is limited and supports private investors
- Investment subsidies and tax reliefs important but benefits still restricted

# For more information, please contact



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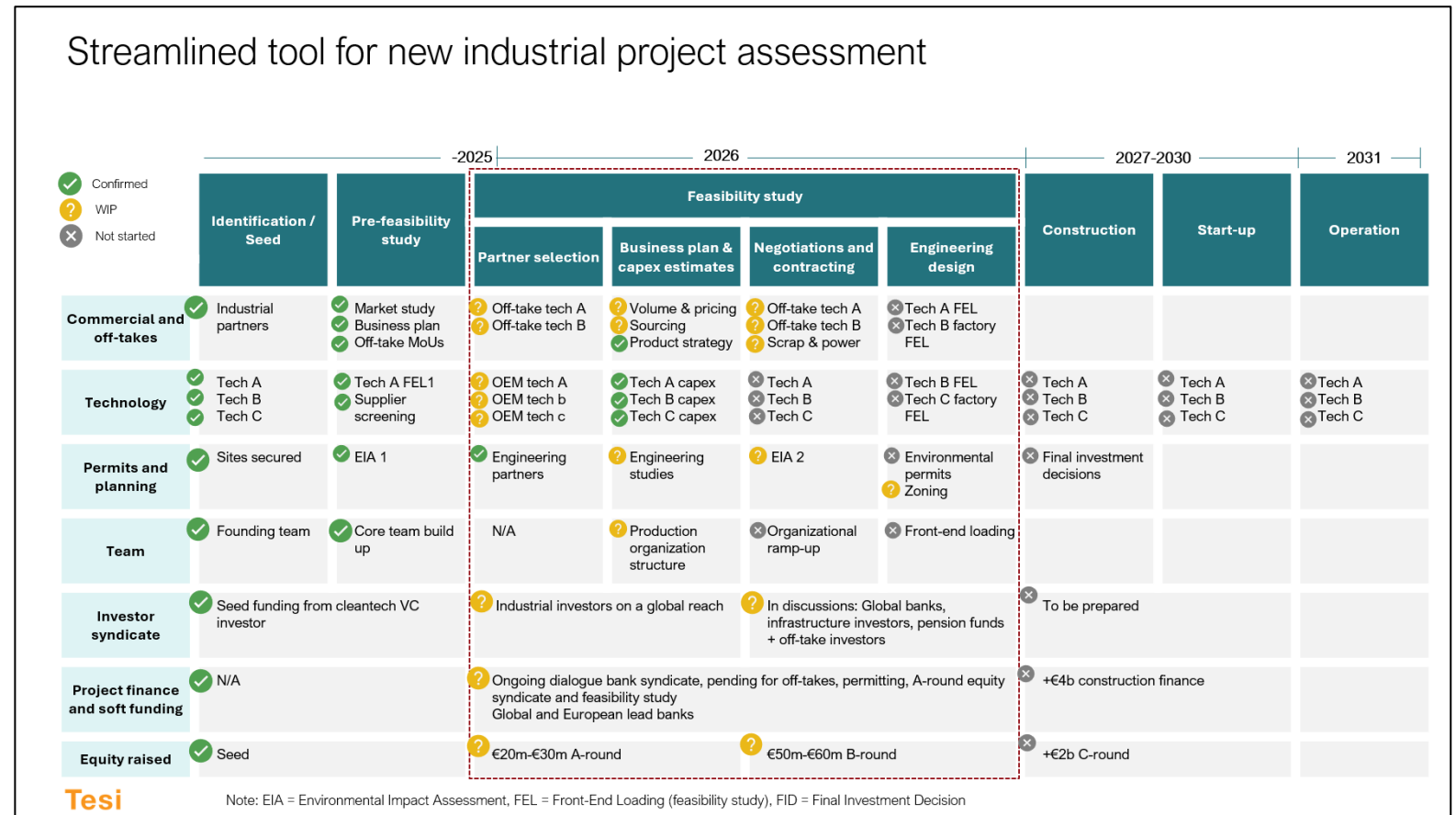


**Esa Koponen**  
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# Appendix: We have created a streamlined tool for investors assessing new industrial projects

## Tesi's new industrial project tool in brief

- The tool is designed to simplify the tracking of new industrial projects in a single, unified platform.
- It was created to allow both the project team and investors to monitor progress in the simplest way possible, encompassing all necessary perspectives.
- The tool enables users to follow the project's key metrics, milestones, and overall development at each stage, providing insights into the project's performance, risk factors, and future requirements. It consolidates data to create a transparent view, streamlining communication and facilitating better decision-making.
- The tool is beneficial for project teams, investors, and any stakeholders who need insights into the project's status, reducing complexity and enhancing visibility.
- The tool is best used by integrating it into the project's regular reporting . Users can update progress, flag issues, and monitor milestones as they occur, allowing all involved parties to maintain a current, holistic view of the project's standing and future steps.



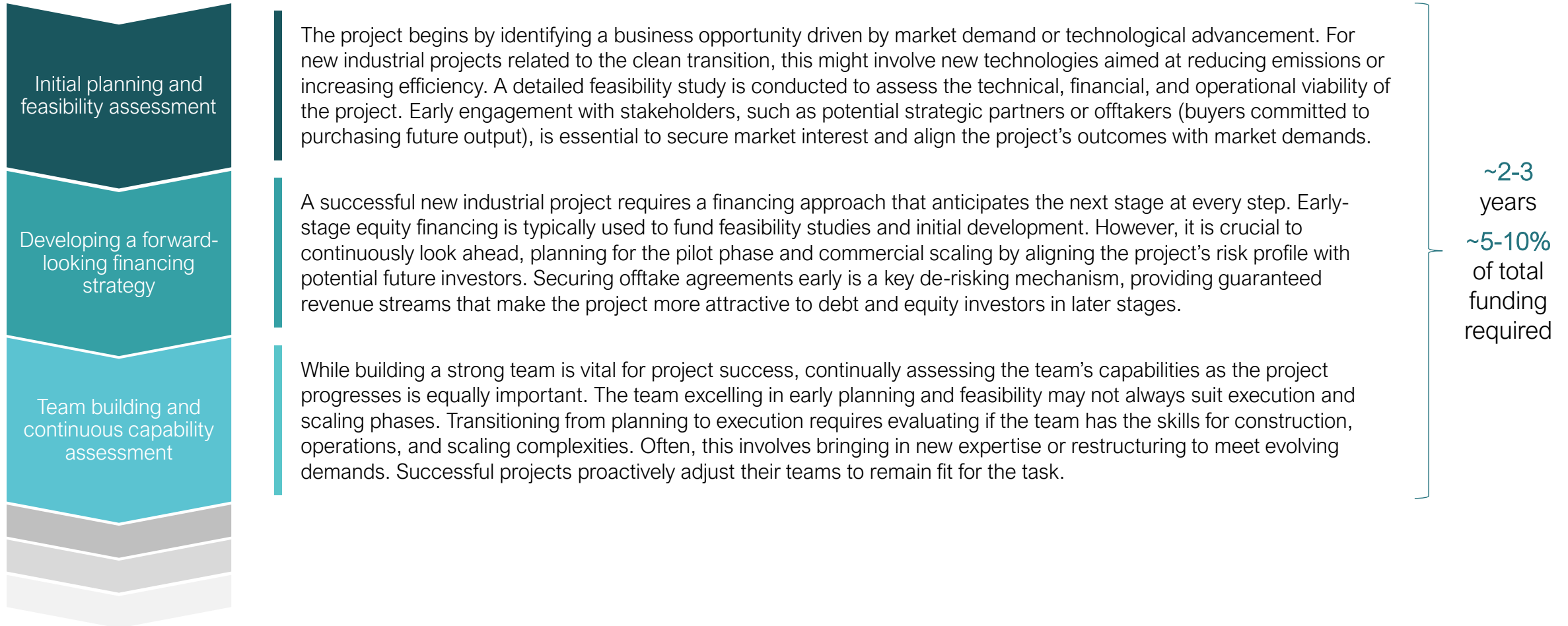
Tool on next page

# Streamlined tool for new industrial project assessment

	-2025		2026				2027-2030		2031
	Identification / Seed	Pre-feasibility study	Feasibility study				Construction	Start-up	Operation
			Partner selection	Business plan & capex estimates	Negotiations and contracting	Engineering design			
<b>Commercial and off-takes</b>	✓ Industrial partners	✓ Market study ✓ Business plan ✓ Off-take MoUs	? Off-take tech A ? Off-take tech B	? Volume & pricing ? Sourcing ✓ Product strategy	? Off-take tech A ? Off-take tech B ? Scrap & power	✗ Tech A FEL ✗ Tech B factory FEL			
<b>Technology</b>	✓ Tech A ✓ Tech B ✓ Tech C	✓ Tech A FEL1 ✓ Supplier screening	? OEM tech A ? OEM tech b ? OEM tech c	✓ Tech A capex ✓ Tech B capex ✓ Tech C capex	✗ Tech A ✗ Tech B ✗ Tech C	✗ Tech B FEL ✗ Tech C factory FEL	✗ Tech A ✗ Tech B ✗ Tech C	✗ Tech A ✗ Tech B ✗ Tech C	✗ Tech A ✗ Tech B ✗ Tech C
<b>Permits and planning</b>	✓ Sites secured	✓ EIA 1	✓ Engineering partners	? Engineering studies	? EIA 2	✗ Environmental permits ? Zoning	✗ Final investment decisions		
<b>Team</b>	✓ Founding team	✓ Core team build up	N/A	? Production organization structure	✗ Organizational ramp-up	✗ Front-end loading			
<b>Investor syndicate</b>	✓ Seed funding from cleantech VC investor		? Industrial investors on a global reach		? In discussions: Global banks, infrastructure investors, pension funds + off-take investors		✗ To be prepared		
<b>Project finance and soft funding</b>	✓ N/A		? Ongoing dialogue bank syndicate, pending for off-takes, permitting, A-round equity syndicate and feasibility study Global and European lead banks				✗ +€4b construction finance		
<b>Equity raised</b>	✓ Seed		? €20m-€30m A-round		? €50m-€60m B-round		✗ +€2b C-round		

# Deep dive: Initial phases in new industrial project development

## Typical development stages of a new industrial project, 1/2





# Deep dive: Later phases in new industrial project development

## Typical development stages of a new industrial project, 2/2



The background of the image consists of several overlapping, light orange, semi-transparent arcs of varying radii. These arcs are arranged in a way that they create a sense of depth and movement, with some appearing to be in front of others. The overall effect is a soft, abstract pattern that fills the frame.

**Tesi**