ASCEND

Welcome to General Assembly 2024 in Munich

6 – 8 March 2024

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Scaling Up PCEDs: business cases and investment trends

Magnus Agerstrom, Clean tech Scandinavia

Sophie Chick, ULI

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Magnus Agerstrom

Co-founder and Managing Director
Cleantech Scandinavia

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Scaling Up PCEDs: business cases and investment trends

Investment Trends and Gaps

Magnus Agerström, CEO Cleantech Scandinavia

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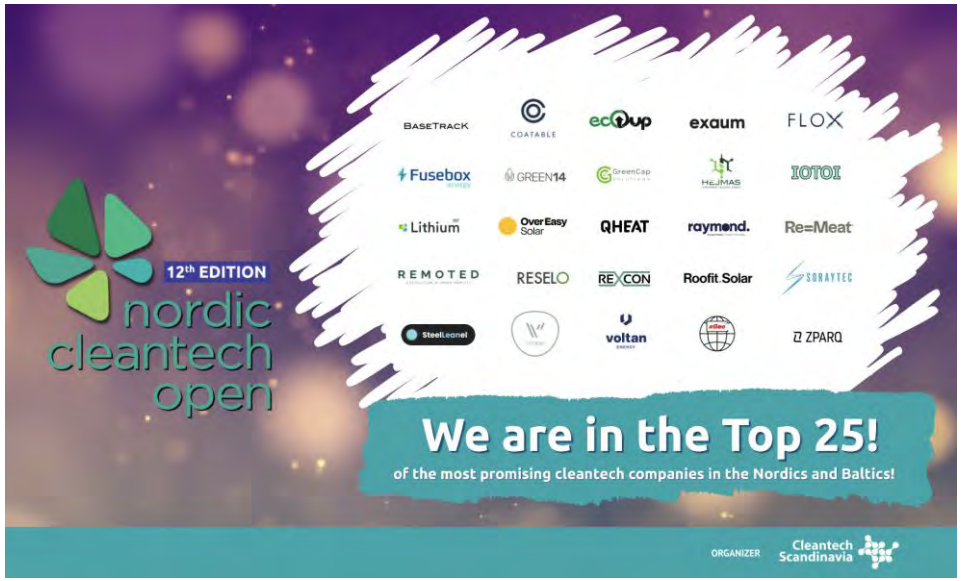
International Investors Network

Startup Competition



Smart,Climate Neutral Cities

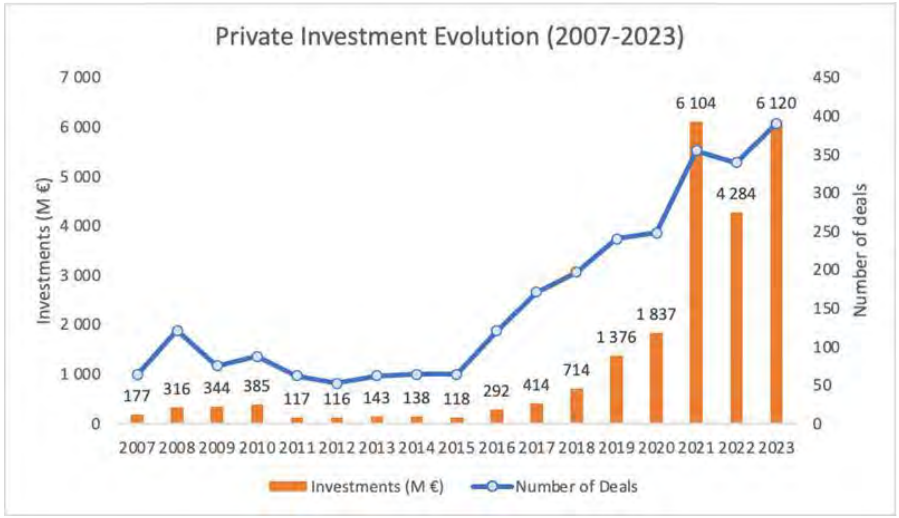
SMARTCITY business forum

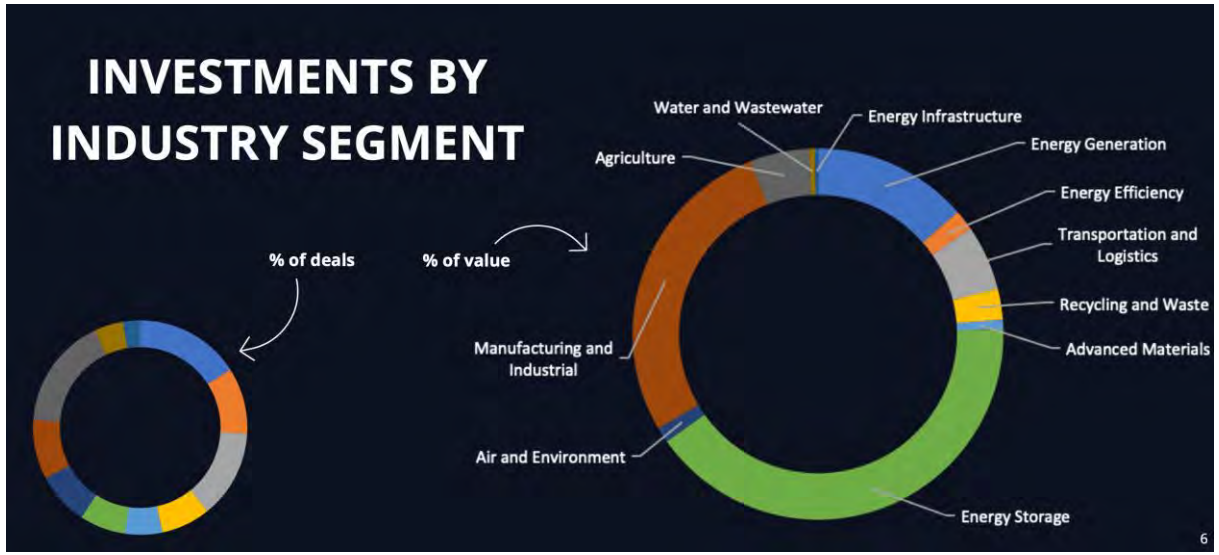
Investment Accelator

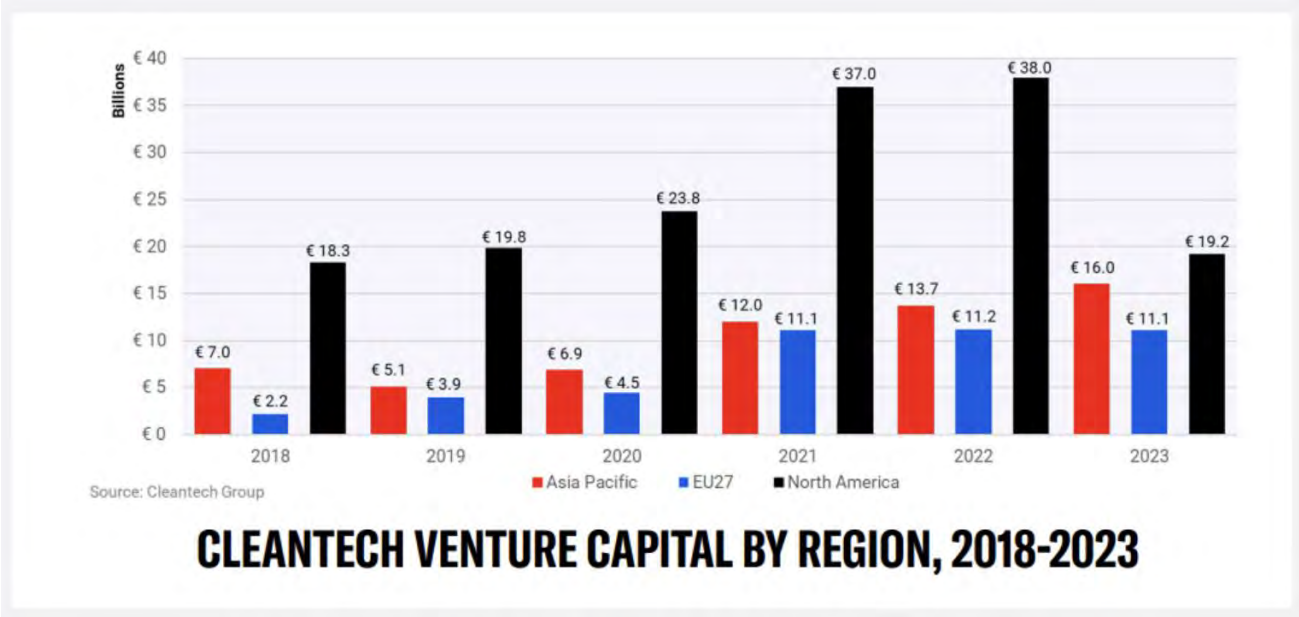
Engaging with Policy Makers

Cleantech Scandinavia

Investments in Nordic Cleantech Startups and Scaleups







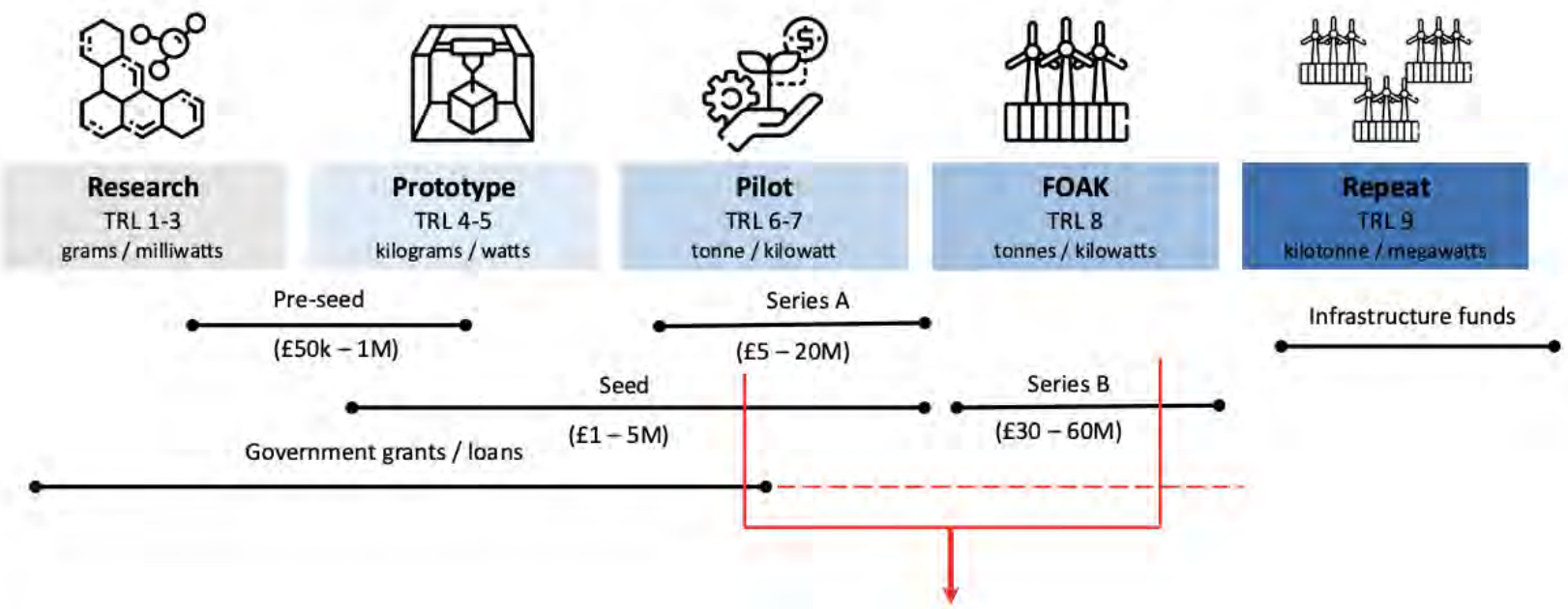
Cleantech Scandinavia

€ 50 + billion Investment Gap

- **Mobilize Capital from Institutional Investors**
- **Deploy public guarantees to de-risk cleantech investments**
- **Fit-for-purpose scale up financing**
- **Converging Investment Landscape**

Cleantech Scandinavia

Cleantech Readiness Scaling Steps



Cleantech Scandinavia

Fit for purpose financing

Equity

Debt

Grants

Guarantees

Offtake agreements and other income insurance measures

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Sophie Chick

Vice President, Research & Advisory Services, Europe
Urban Land Institute

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2024

Europe

EMERGING TRENDS IN REAL ESTATE®

Urban Land Institute

pwc

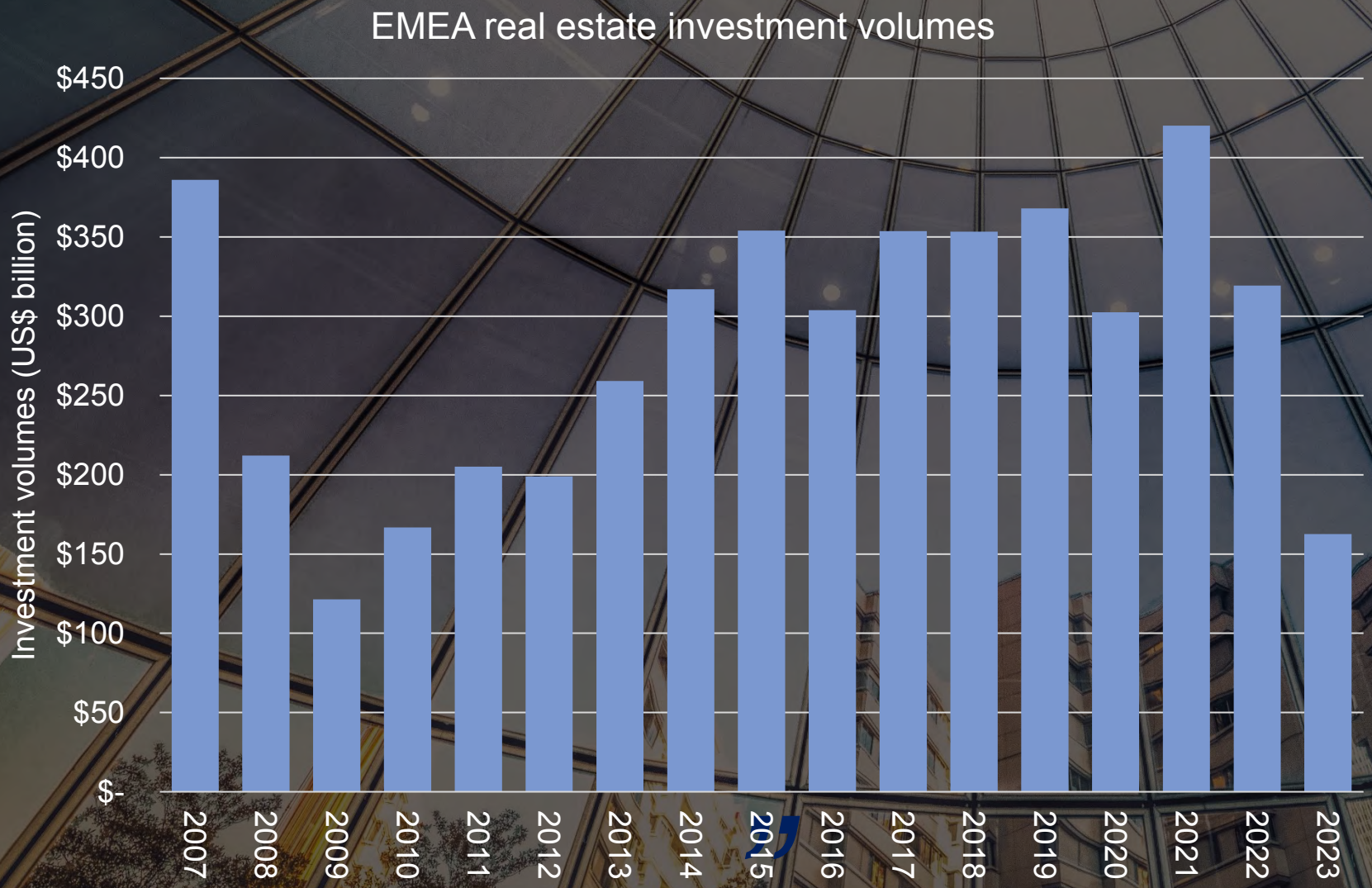
Emerging Trends in Real Estate

#ETRE24

- Joint publication by Urban Land Institute and pwc
- Published annually since 2004
- Reflects the views of thousands in the real estate and land use industry
- In-depth workshops, roundtables and interviews
- Key indicator of sentiment in real estate investment and development trends

Historically low levels of investment activity

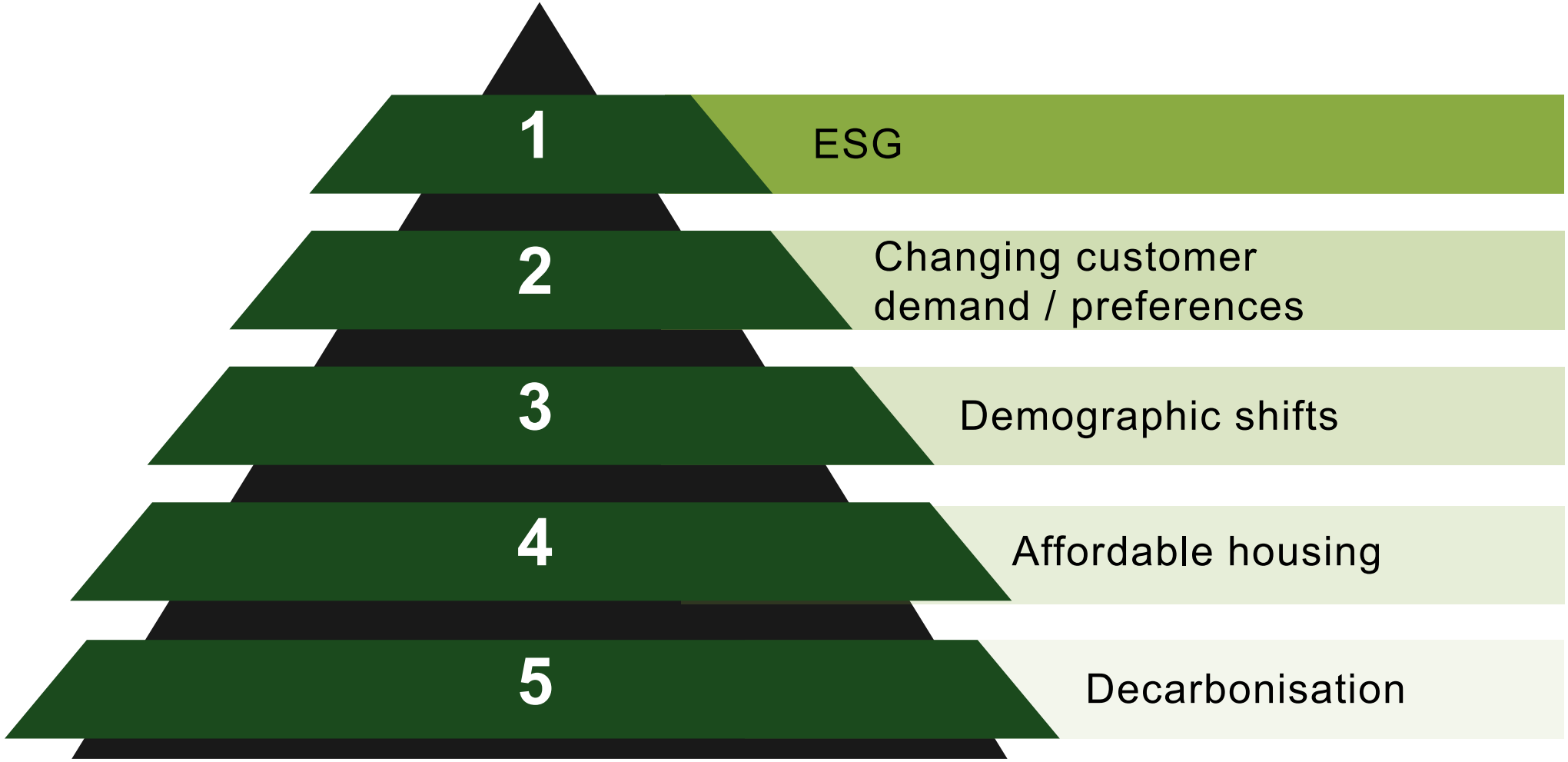
#ETRE24



"If investors have a choice to sit on their hands, they're doing it"

Top themes driving real estate investment decisions/strategic planning

#ETRE24



Top 5 themes which will drive real estate investment decisions and strategic planning

Some stats on ESG investment

90%	Running an environmentally and socially sustainable business is the most important factor for a successful organisational transformation within the real estate industry by 2050
37%	Would forgo financial return in exchange for having greater social or environmental impact
76%	Current valuations do not properly reflect all challenges and opportunities impacting real estate
79%	ESG credentials will have a material effect on property valuations in the next 12-18 months

City Rankings 2024: Investment and Development Prospects

#ETRE24

1. London —
2. Paris —
3. Madrid ▲
4. Berlin ▼
5. Amsterdam ▲
6. Milan ▲
7. Munich ▼
8. Lisbon ▲
9. Frankfurt ▼
10. Barcelona ▼

▲ Went up ▼ Went down — No Change

Megatrends drive sector prospects

Sector Rankings 2024: Investment and Development Prospects

1. New energy infrastructure
2. Data centres
3. Healthcare
4. Student housing
5. Retirement/ assisted living
6. Self storage facilities
7. Logistics facilities
8. Co-living
9. Serviced apartments
10. Private rented residential

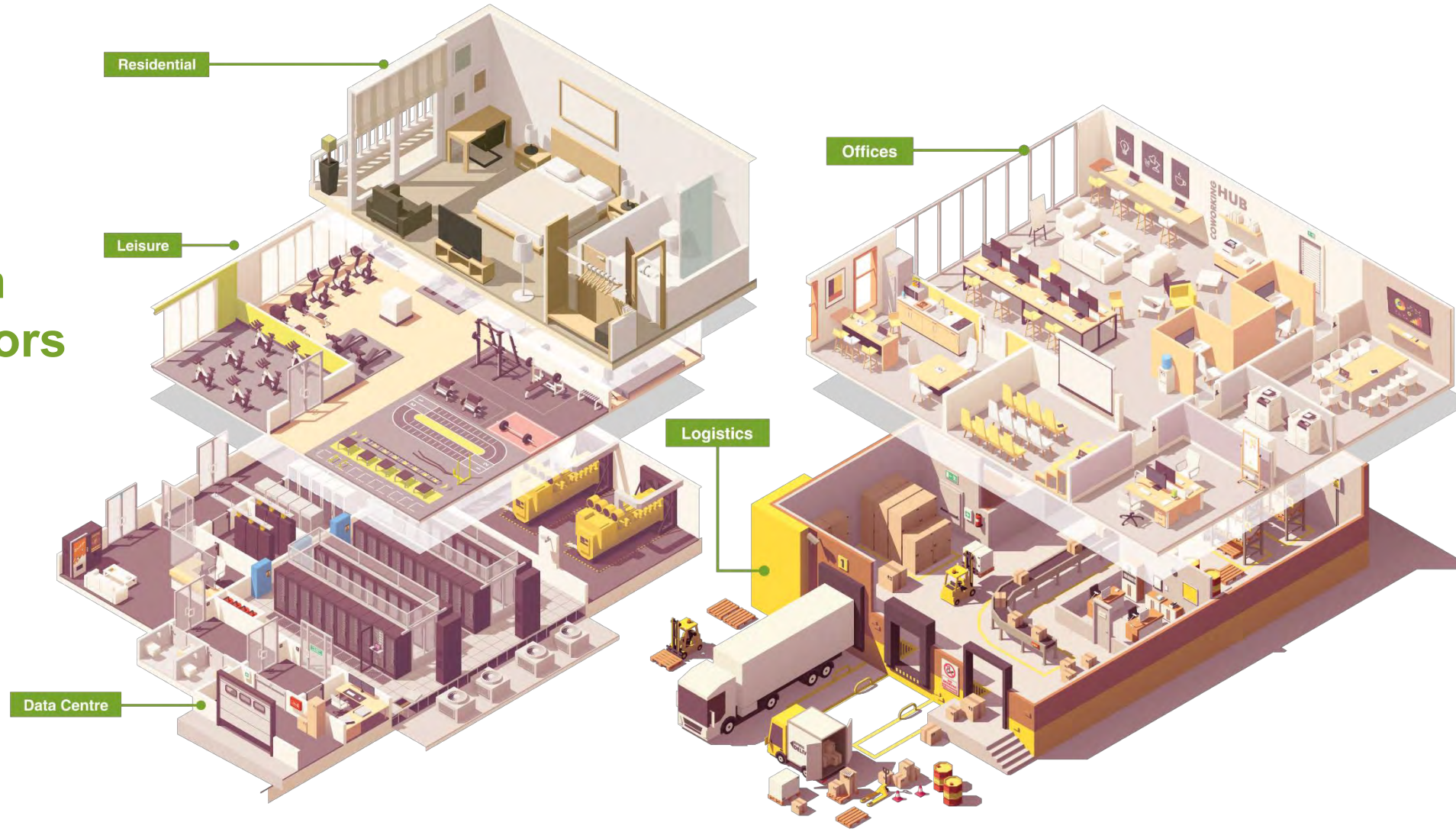
> *"The industry is developing a more sophisticated understanding of what drives rental income and value in real estate occupation."*

> *"The people who make money over the next decade will be the people who solve the problems of society."*

Mixed-use on the increase

8 in 10

expect co-location of real estate sectors to increase



"More office buildings will incorporate different alternative uses including life sciences, data centres and serviced-apartments"

C is for come on board and join the movement.

Workshop two: February 2024

Leveraging ULI's advisory services panel approach

- Workshop one set the groundwork for a five -day panel in Berlin in February 2024
- Panel will examine two areas in Berlin to focus on transformative city -scale solutions
  - One area relates to the transformation of social and affordable housing and the importance of applying solutions at scale
  - Second area is focused on a city centre edge where decarbonisation is part of a bigger urban transformation challenge related to new ways of working and shopping
- Recruitment drive to find 8 -10 panellists to bring diverse skillset together: public/private financing, Large-scale regeneration, housing (social and affordable), public and private infrastructure including energy and transport, system -led innovation

Scaling Up PCEDs: business cases and investment trends

Part 2: Smart City Business Model and Financing State of the Art

Damian Wagner-Herold

Andrea Geyer-Scholtz

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Andrea Geyer- Scholz

Managing Director
Smart Cities Consulting GmbH

Damian Wagner-Herold

Managing Director
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Scalable Cities

„Mind the Piloting Trap“

Assessment Smart City Business Models

Ascend Conference, Munich

7 March 2024

Damian Wagner-Herold | Andrea Geyer Scholz

UrbanDynamIQs

smartcities consulting

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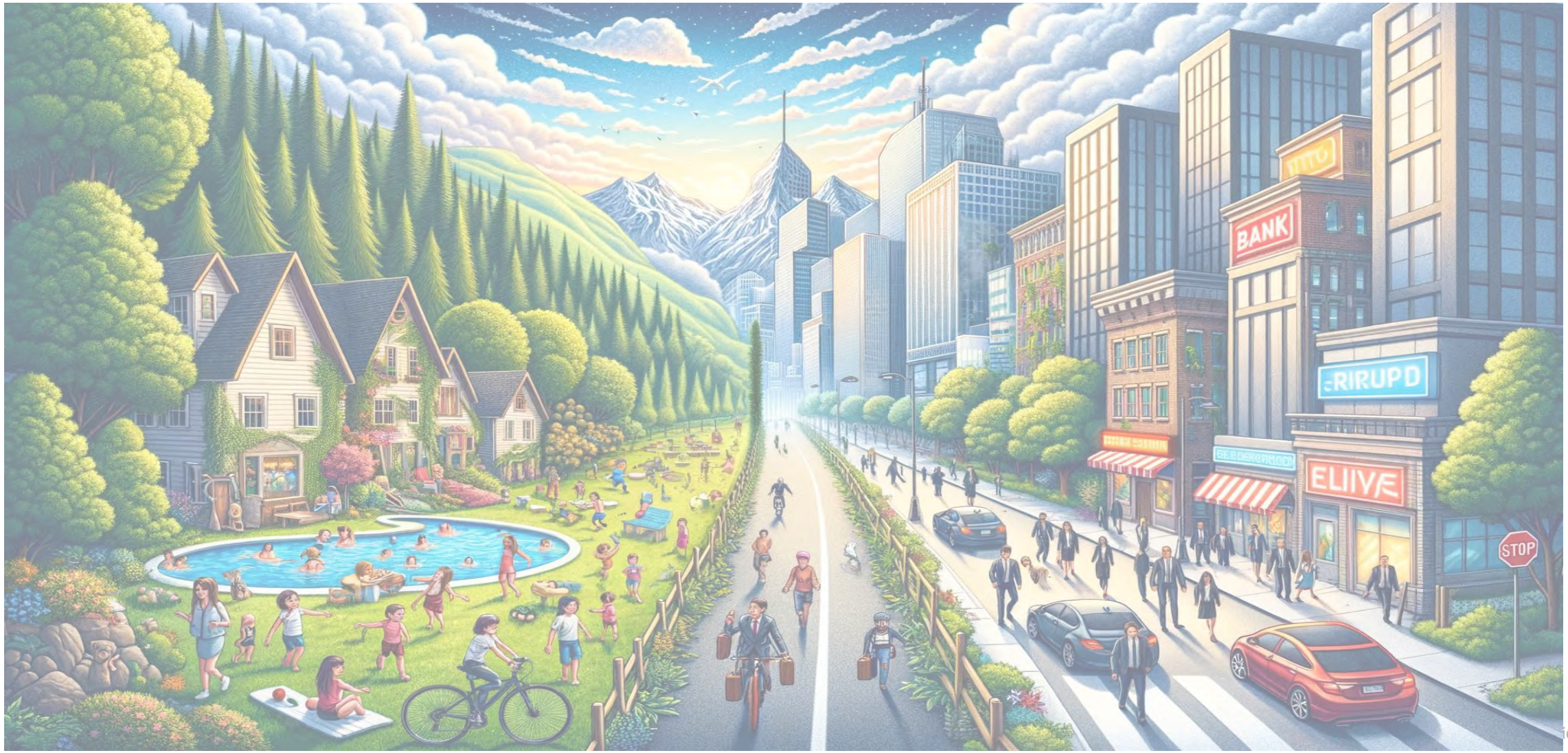
Municipal use case VS. business case?



Findings: State of the European Smart Cities Business Cases

✅ Cities have **little focus on business models & profits** but **operation** (financing) & **value creation**

👉 **Unterstanding value chains & role of cities /regulators**

✅ PED eco-system made of **various solutions, partnerships & collaborations, success depends on interoperability**

👉 **Service Models & integrating technologies/mgt. Systems**

✅ Cases **create impact** for cities & **risk reduction** for business

👉Accelerate up-scaling: Cities to set the framework and **moderate/intermediate local innovation eco-system**

Damian Wagner-Herold & Andrea Geyer Scholz

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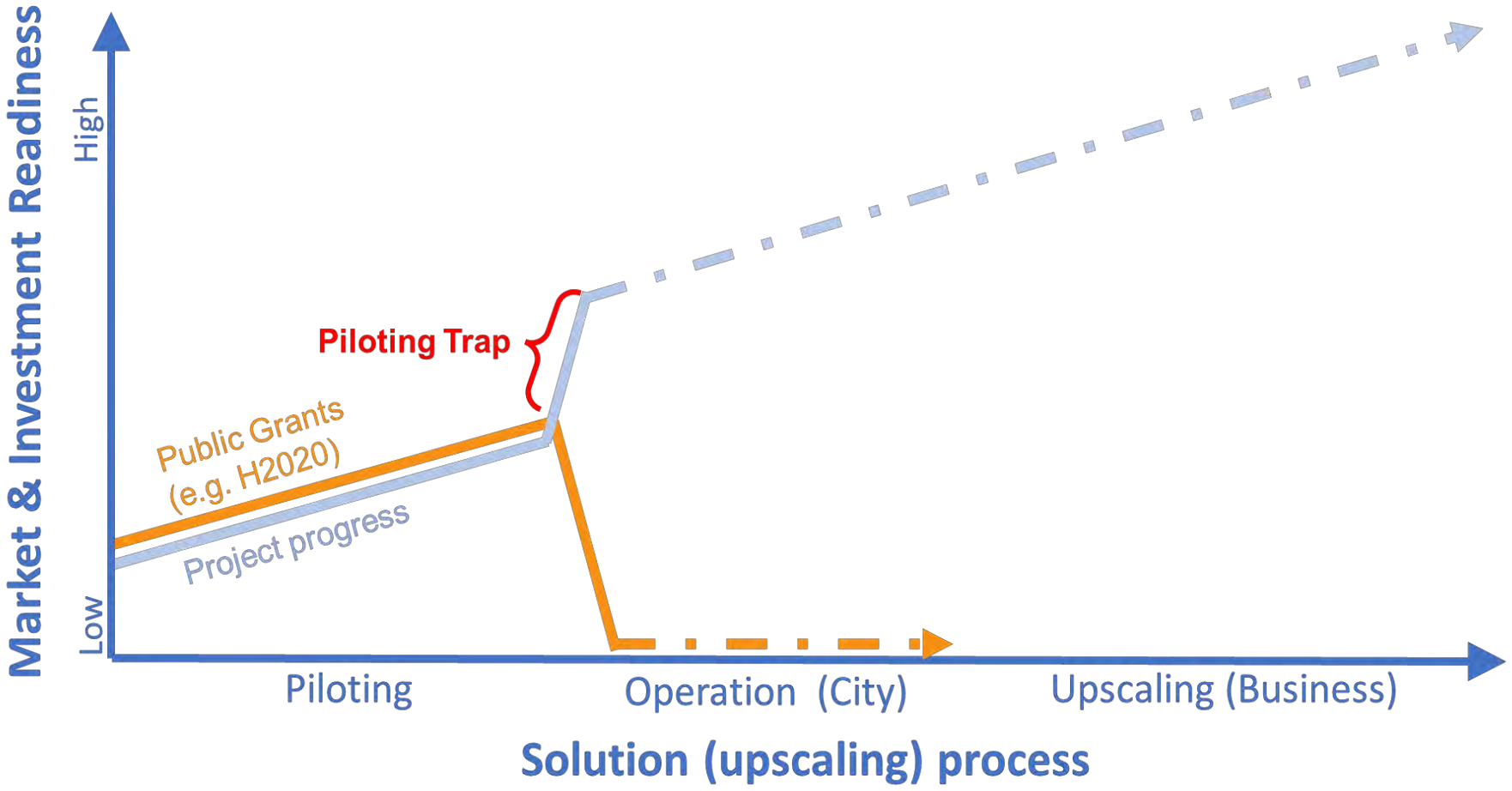
Mind the piloting Trap …



Damian Wagner-Herold & Andrea Geyer Scholz

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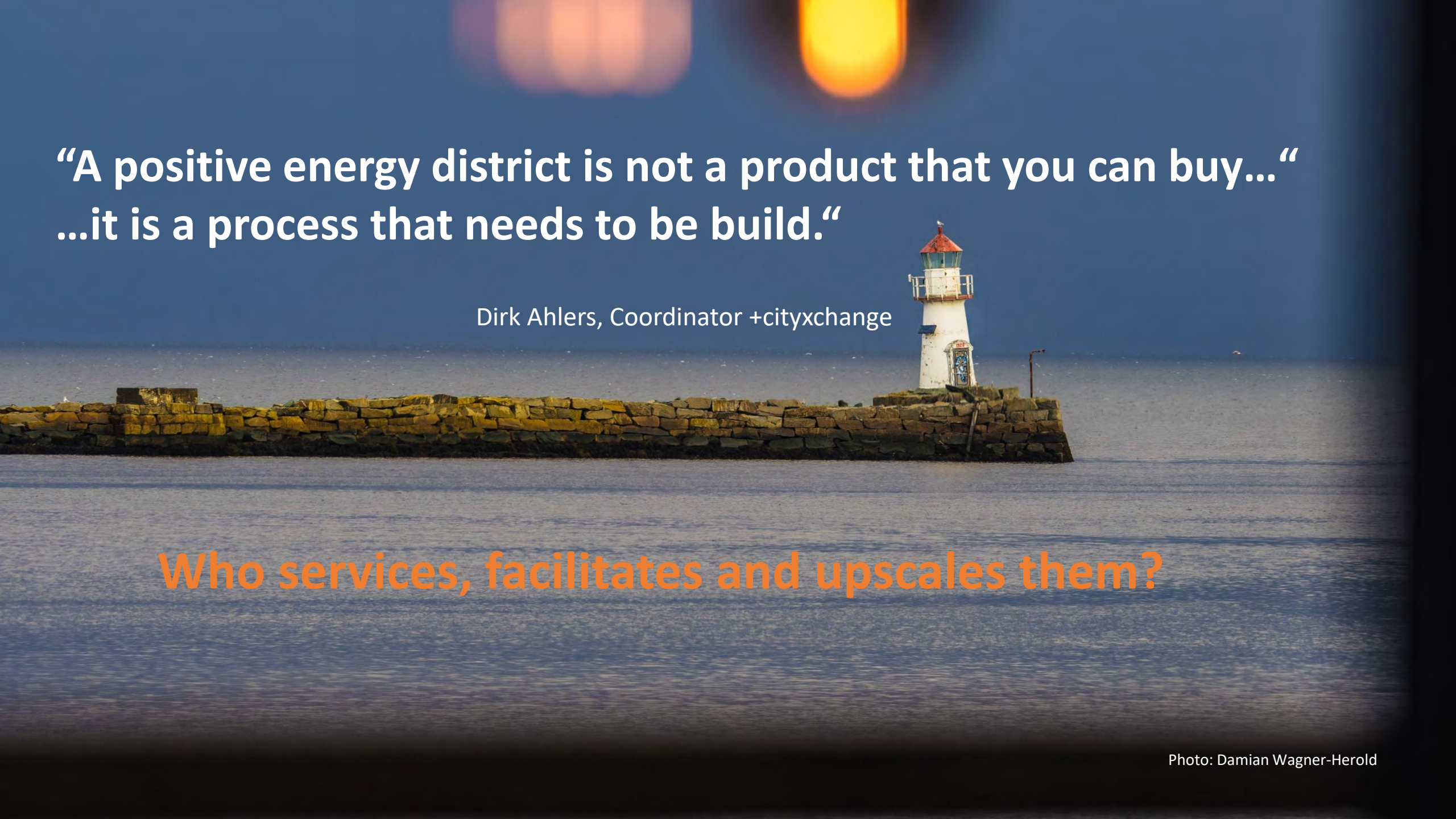

“A positive energy district is not a product that you can buy…“
…it is a process that needs to be build.“

Dirk Ahlers, Coordinator +cityxchange

Who services, facilitates and upscales them?

Photo: Damian Wagner-Herold

Mastering the Piloting trap … towards upscaling

Damian Wagner-Herold & Andrea Geyer Scholz

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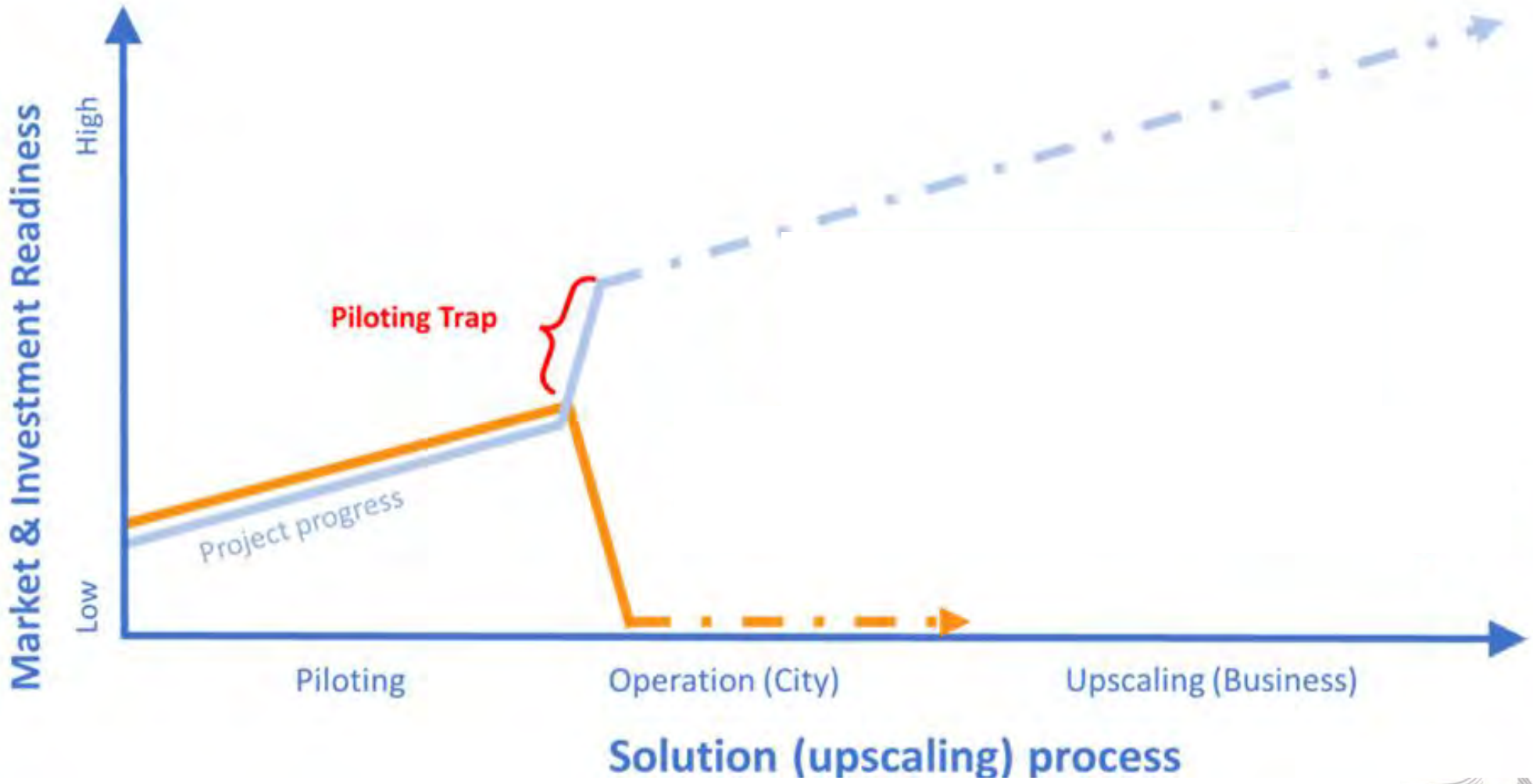
Mastering the Piloting trap … towards upscaling



Damian Wagner-Herold & Andrea Geyer Scholz

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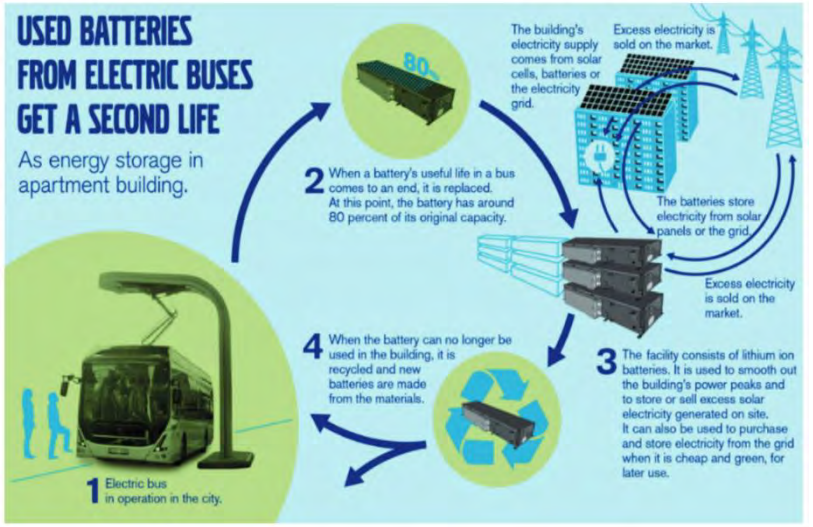
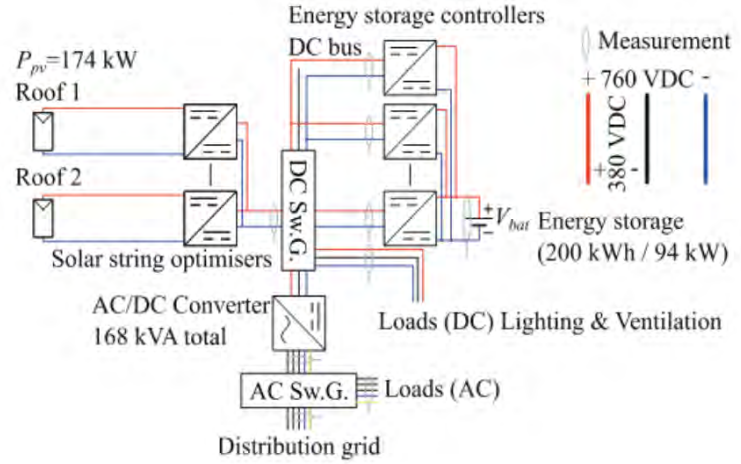
Upscaling? Making a (business) case…

Photo: Damian Wagner-Herold

Case 1: 2nd Life Battery Storage Gothenburg
for locally produces PV electricity

Case	Store electricity from local PV and recycle and reuse Bus batteries from heavy-duty vehicles (buses), save resources, circular economy
Roles & Operation	lease batteries to energy cooperations/energy service providers integration in grid for load balancing by local utility.
Value	peak shaving, district/urban micro grids- scalable solution from building to district level, virtual grid Ease batteries to real estate owners,
Lessons Learnt	"Private sector initiatives speed up market proof and drive innovations in value chain." "Transforming cities into de-regulated innovation spaces" *Gothenburg (Sweden)*





Damian Wagner-Herold & Andrea Geyer Scholz

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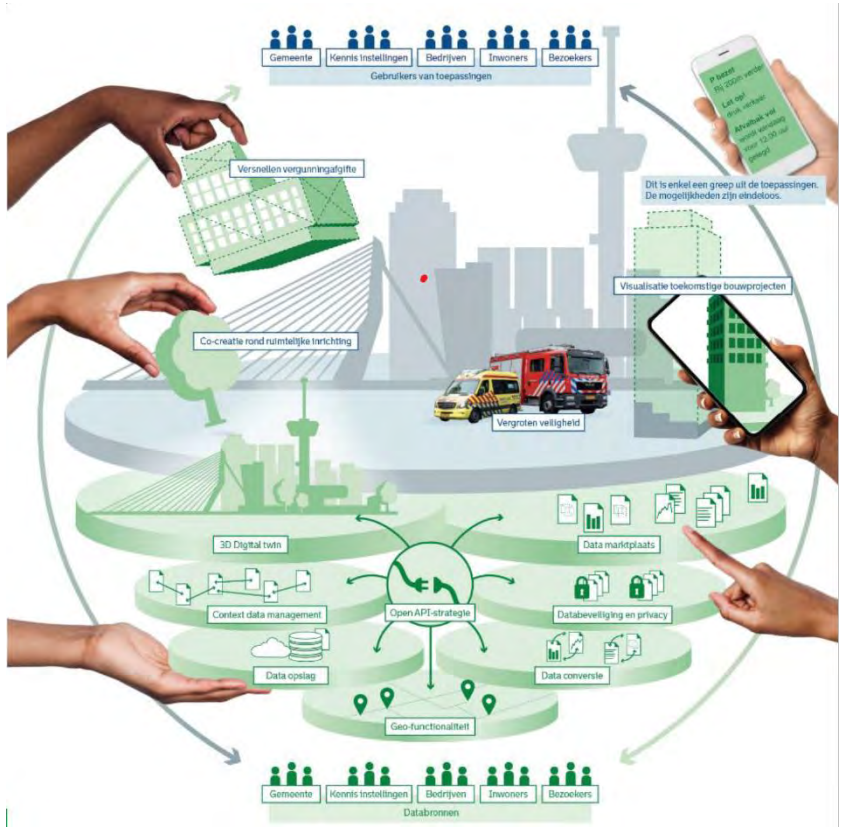
What Role do Cities take…?

Photo: Damian Wagner-Herold

Case 2: Open Urban Platform Rotterdam - and the role of the city administration

Case	Public data platform and digital twin serves as portal and marketplace for urban data services and applications from trusted providers.
Roles & Operation	Infrastructure and operation by corporate partner, with the city governing **data frameworks and enforcement.** Independent from specific software
Value	Open data platform with pay-per-use models for revenue.
Lessons Learnt	"Innovation requires both technological and organizational changes." "Government & Cities trusted regarding data and governance/ethics but not trusted to build reliable data infrastructure" *Rotterdam (Netherlands)*



City of Rotterdam, Ruggedised

Damian Wagner-Herold & Andrea Geyer Scholz

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Action…

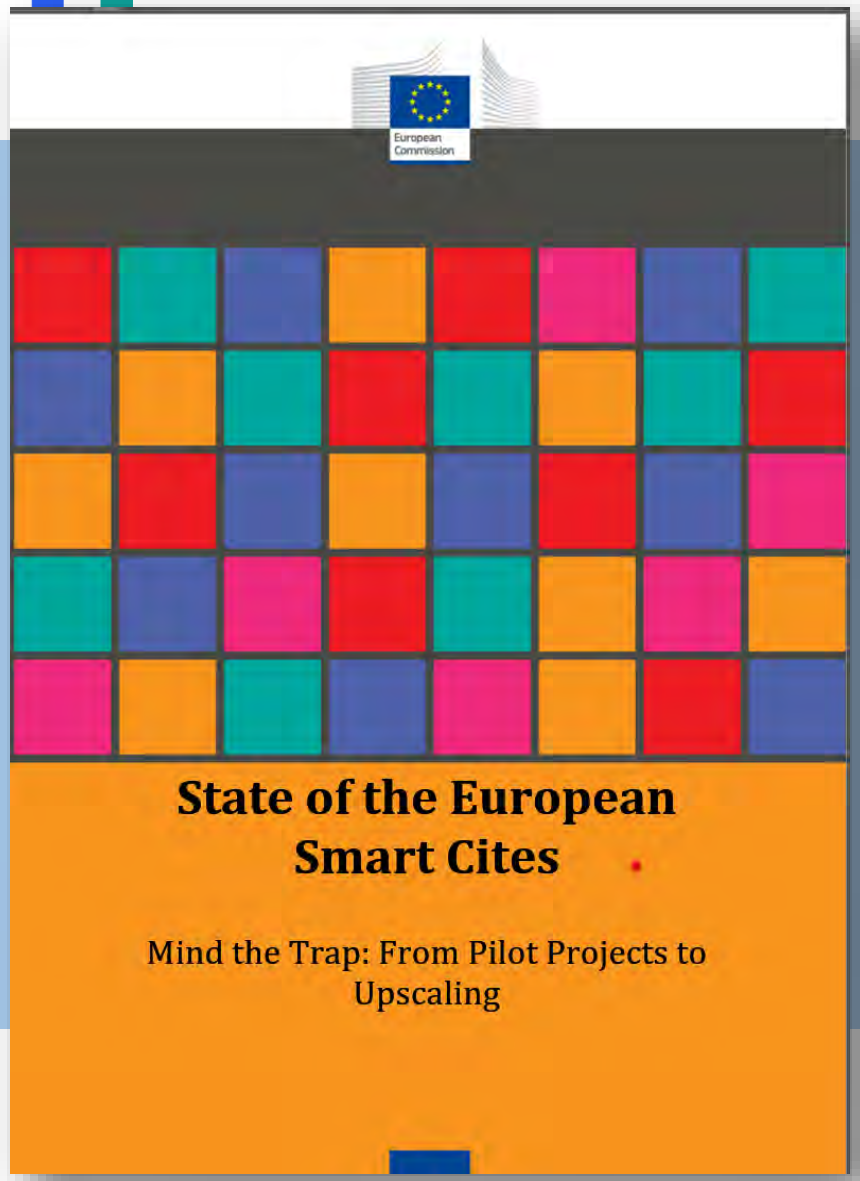
👉 **Foster Market Readiness by Establishing Organizational and Financial Vehicles and innovative Procurement Processes**

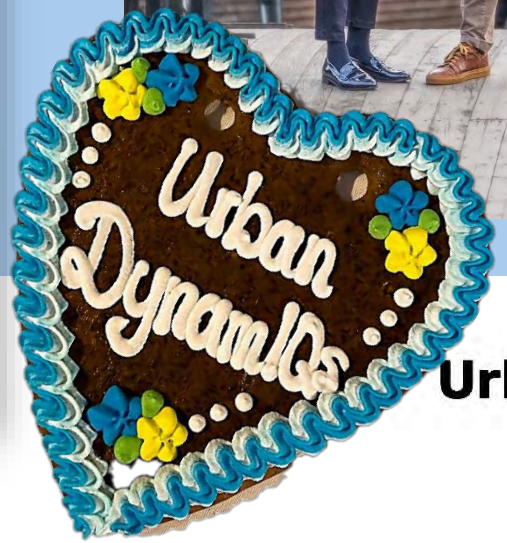
👉 **Establish cross-platform & cross-program advisory boards and more efficient formats**

53 of the 120 “Climate Neutral and Smart Cities” are SCC Lighthouse cities and about 80 Smart Cities are under development in Germany“

Damian Wagner-Herold & Andrea Geyer Scholz

Experts & Report





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	Case	Short Description	Project & City
1	**Smart energy management and infrastructure (heat)**	Smart Infrastructure and management in private buildings using smart valves and applications for (end) users	**SPARCS 2020-2025** Leipzig, DE Partner: CENERO Energy GmbH
2	**Financial Risk Sharing Model**	Financial Scheme to reducing risk for investors or building and neighbourhood measures	**+CityxChange 2018-2023** Trondheim, NOR Partner: Officinae Verdi Spa
3	**V2G EV charging network**	Smart charging infrastructure integrating rooftop PV and load management	**IRIS 2017-2023** Utrecht, NL Partner: LomboXnet
4	**Smart infrastructure, energy management and local trading platform**	Smart infrastructure/microgrid and management and local trading platform linking PED and national energy market	**Atelier 2019-2024** Amsterdam, NL Partner: Banlieu BV
5	**E-Bus Charging System full Service Model**	Full service model for public e-bus charging including infrastructure, software, maintenance	**SPARCS 2020-2025** Espoo, FIN Partner: Plugit Finland Oy
6	**PED Energy Management tool box and AI based optimization**	Smart Infrastructure and management including AI based prediction and optimisation and energy community for RE self-consumption	**RESPONSE 2020-2025** Dijon, FRA Partner: EDF France
7	**Heat as a service model including storage in buildings**	RE generation within student village from heat pump upcycling district cooling flows, thermal storage and smart energy management development of a full-service model	**RESPONSE 2020-2025** Turku, FIN Partner: Turku Student Village Foundation
8	**Open Urban data platform and service marketplace**	City provides a data platform and portal (BIM & 3D Models, real-time data) and marketplace for urban data services and applications offered by providers; city sets and enforces governance framework	**Ruggedised 2016- 2022** Rotterdam, NL Partner: FutureInsight
9	**Urban Digital Innovation Executive Leadership Programme**	The training program which a university manages introduces the building blocks for successful digitalization and innovation strategies for communities, cities and regions	**Ruggedised 2016- 2022** Rotterdam, NL Partner: Erasmus University Rotterdam
10	**2nd Life Battery Storage**	Refurbished batteries from heavy duty vehicles (buses) get assembled into electric storage units in buildings and smart energy system integrates local RE	**IRIS 2017-2023** Gothenburg, SWE Partner: Volvo Buses

2	+CityxChange 2018-2023	Classification:	Status: completed
Financial Risk Sharing Model	**Trondheim, NOR (Lighthouse City)** **Lead Partner: Officinae Verdi Spa**	Financial Scheme **Corporate**	**Upscaling potential:** Medium

Assessment and calculation of potential benefits and/or financial and investment risks for retrofits and local renewable generation for Positive Energy Districts, distributed among a cluster of stakeholders reaching a common goal, guidance on how to avoid potential investment losses and reduce financial exposure to risks. The analysis of risks and potential revenues is put in relation each stakeholder with local market assets and flexibility and measures the financial value of each asset of the project. The sharing of the risk-benefit constructs involved in such projects can attract investors and stakeholders because the individual risk is shared by a larger number of institutions.

Development, Innovation and Operation	Business-/service model & Value Creation	Lessons learned
• Impact measuring by quantitive assessment of indicators • The Financial Risk is an indicator that measures how each player/investor, in terms of percentage, risks to lose money on its own business or investment decision. The total value is a product of summing up and integrating all assets and interventions in a single economic, financial, environmental, and social assessment process, based on indicators suitable to measure the investment against its global direct and indirect impacts. • Applicable for all PED related infrastructure investments (including ICT systems) • The City of Trondheim leads and coordinates all the PEB implementation phases involving all the stakeholders and asset owners participating in the process. Each stakeholder can share and operate within this tool.	• Auxiliary service - consultancy, financial service, cost centre • Link the investment to the ESG effects in a relationship model; investment is seen as "seed money" and a precondition for the ESG impacts achievement. This approach allows to capture total value both across linear PEB development (ie. from implementation to impact generation) and across themes (economic-financial aspects + ESG). • Method and its results has been applied to various business cases and energy investments within the PEBs • PEB should be considered a common area of business (Strategic Business Unit - SBU). For this reason, each of the parties involved in the (Trondheim) PEBs should avoid evaluating it independently. Gold upscaling/replication potential for service	• Broader understanding and more transparent approach to costs and risks involved between the different participants in a project • Rationale: sharing of financial risks reduces the potential total loss for everyone; especially important in the energy sector, where (market) risks are increasingly hard to foresee and benefits might take a certain time to unfold.

6	RESPONSE 2020-2025	Classification:	Status: ongoing
PED Energy Management toolbox and AI based optimization	**Dijon, FRA (Lighthouse City)** **Lead Partner:** EDF France	Energy Management **Corporate**	**Upscaling potential:** medium

The energy managing solution (covering electricity and district heating, DH) aims to drive the fuel switch towards RES and reduce energy demand through local energy production, energy storage and smart thermostats (developed by a start-up) combined with energy management. An AI based demand prediction seeks to optimize the system. Additionally, energy communities shall help to increase the self-consumption ratio of electricity in the concerned public buildings.

Development, Innovation and Operation	Business-/service model & Value Creation	Lessons learned
• Thermostats crucial front end: - Reduce energy consumption in the apartments - 15% of energy saving targeted - Reduce peak demand of district heating network reducing gas consumption • Prediction system "Clevery" at TRL 8-9; APIs developed within Response; • Clevery collects real-time data from sensors but also AI modeling from which further business models will be developed • System to contribute to grid flexibility, test peak shaving and optimized operating command to storage equipment for higher self-consumption ratio • PV panels on the roofs for energy production, linked to the batteries • Storage solutions: multiple technologies • The system will be operated by EDF during the prorect	• Also used to pilot wind power plant; operation model • Paying customer - B2B: public bodies, housing associations, facility management businesses; • User: inhabitant/tenant with installed smart thermostats (costs: ca 800-1000€ per flat) • Costs but also income from surplus energy sales will be passed on to building owners/inhabitants • „Installer" buys the solution, e.g building owner • Retail business: panels, tools for energy communities, toolbox for building owners • Project address energy poverty in buildings operated byi Dijon Social Housing Company Possible additional case: storage as a service	• Building flexibility is the next "elephant" in the room • Importance of resident onboarding, acceptance of generalized use, nudges (e.g. adopting the „out of home switch", prudent data sovereignty concept • ECs Huge market, lot of demand for energy flexibility, stability for 20 years demanded; turning passive users to active prosumers • Embrace innovation more - cooperation with start-ups, research

Scaling Up PCEDs: business cases and investment trends

Part 3: Where we stand: State of the Art feedback

Selina Lorenz, USG

Monica Barosso, USG

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ASCEND

Selina Lorenz

Project Manager and Research Associate

Sustainability Innovation Lab, University of St.Gallen

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Objectives of the State-of-the-Art Assessment

- **Common understanding** of the state-of-the-art between internal and external stakeholders (e.g., project partners, representatives of other cities, public sector consultants)
- **State-of-the-Art Assessment** of the 6 SPs, evaluated from **5 standpoints**:
  1) Technological
  2) Business model
  3) Funding mechanisms
  4) Procurement procedures, incl. PPPs and SPVs
  5) Governance models and policies

  → Risk assessment of digital tools, baseline assessment of SP cost effectiveness, scaling drivers and barriers
- Facilitation of ASCEND's **further development**

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Results: Solutions from ASCEND Cities

	Munich	Lyon	Multiplier City
SP1	Digital Twin	CMS Urban Data Platform	**Prague:** Urban data platform (Golemio)
SP2	Photovoltaics Tenant Electricity Project	YDEAL Confluence	**Porto:** Asprela + Sustentável
SP3	Refurbishment with prefabricated elements	Super-efficient buildings	**Budapest:** Heat exchanger with potable water
SP4	Mobility Points	Micro hub	**Alba Iulia:** Car charging infrastructure
SP5	Climate Council	Building Operating System (BOS)	**Stockholm:** Scaling Smart City Solutions
SP6	Integrated district approach	SPL Lyon Confluence	**Charleroi:** Igretec

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State-of-the-Art Example: Budapest Waterworks (SP3)

- **Publicly-owned** water utility service provider (SPV)
- **Innovative technology** aimed at harnessing the excess heat capacity of potable water
- Integration of heat exchanger for drinking water into **standard** heat pumps
- Provides **sustainable heating technology**, which coupled with solar panels, can potentially reach **zero emission**
- **Highly replicable** to other locations, subject to local availability of the heat source and the necessary water pipe dimension/minimum flow rate close to the target building

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State-of-the-Art Example: Golemio Urban Data Platform, Prague (SP1)

- **City-owned** company (SPV) focused on smart city solutions
- Setup as an independent company enables **high-quality IT talent acquisition** and an **innovation-oriented business logic** at the service of public interest
- **Open-source data platform,** which also provides business intelligence(BI), and customized web applications for municipal departments and citizens
- **Scalable by design.** The source codes are available to be adopted by other potentially interested stakeholders

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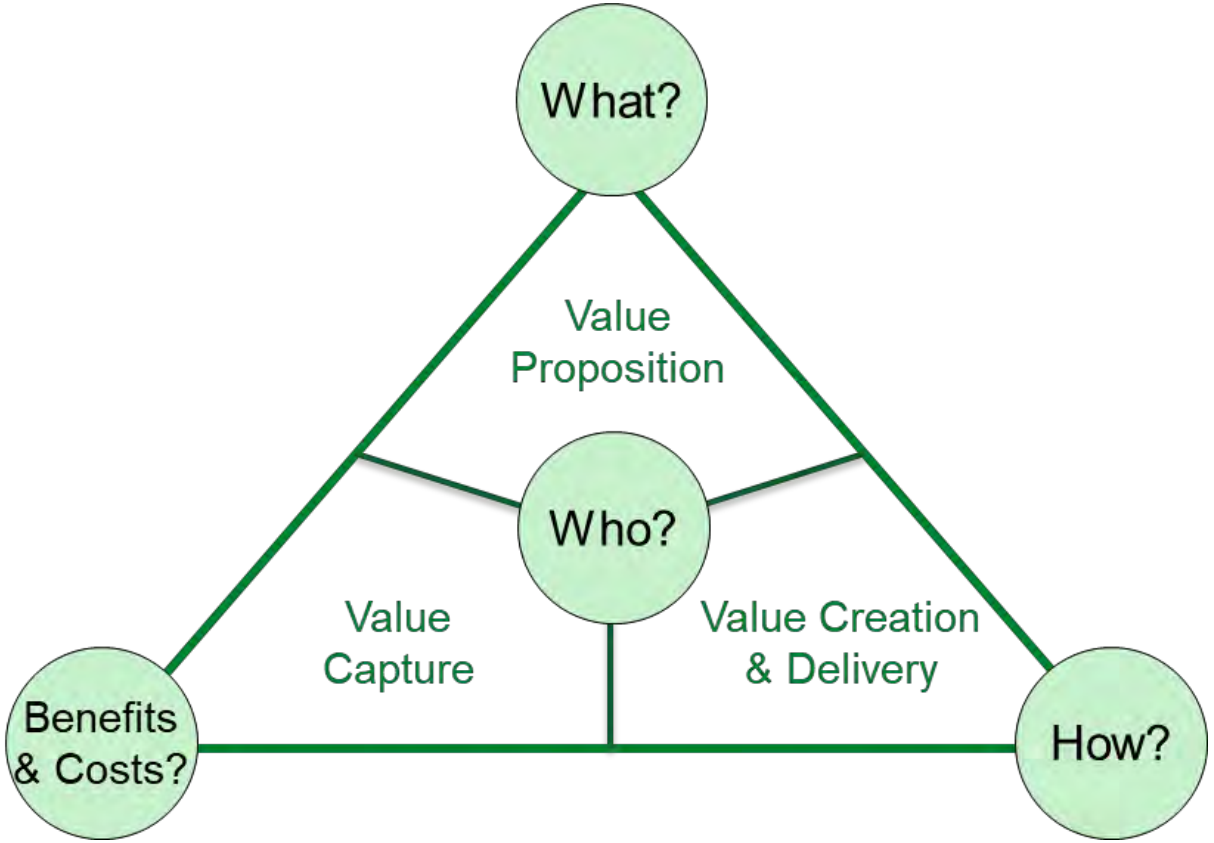
Outlook



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Scaling Up PCEDs: business cases and investment trends

Part 4: Discussion between the Advisory Board, speakers and the attendance

Moderation: TWE, BLS

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