BUILDING THE FUTURE

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Executive Summary

Construction City

Challenge

The current lineral economy, in Norway, requires 5 planets worth of resources to function, therefore a more sustainable, circular economy has to be established

Strategy

The Construction City cluster will be the driving force of the circular transformation in the construction industry, through utilizing its knowledge sharing capabilities

Strategic pillars

FIRST STEPS

Establishing the technology of inspecting demolished materials

SCALING UP

Establishing the culture of reusing materials across Norway

CIRCULAR FUTURE

Establishing the future of a circular construction industry

Impacts

Short-term (until 2024)	Mid-term (until 2027)	Long-term (until 2057)
4,25 years Payback period	64% > 97% Recovery rate	12% > 46% Reuse rate

ANALYSIS

There is still high potential in circular economy that is unutilized

Construction City

Norwegian construction industry today

60% of all material is being consumed by the construction industry

The used materials are highly recyclable

Some measures have already been implemented

Resource and energy recovery

On site seperation of different debris

Waste delivered to recovery facilities

Circular economy is much more than low-grade recycling and energy recovery

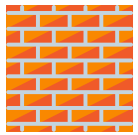
Current recovery of construction and demolition waste

1,9 million tonnes

of construction waste is generated annually

Treatment of waste generated

Recycling	Energy recovery	Landfill
34%	29%	36%
Bricks, Asphalt	Wood, Mixed waste	Bricks 70%, Polluted bricks

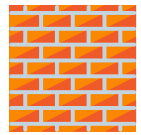


Bricks

Asphalt

Wood

Mixed waste



Bricks 70%

Polluted bricks

source: Statistics Norway

Despite the high effort to generate less waste on landfills, 36% still arrives there, mainly bricks

All stakeholders of the value chain have to work together to establish circularity

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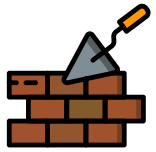
Barriers to the establishment of circular economy

Designs are not provident

Quick and incidental solutions

Architects

Clients



Components are permanently built

Hard to disassamble without value loss

Manufacturers

Contractors

Virgin materials are preferred

Earth's resources are finite

Manufacturers

Contractors

Waste materials hard to segregate

Cost effective to dump everything to landfills

Demolition companies

Down-cycling and value reduction

Economy is not circular with value loss

Recycling facilities

All stakeholders of the industry have to adapt and rethink their operations in order to establish circular economy

Either deep determination or governmental incentives are needed to reach out for stakeholder adaption, and all stakeholders have to work together in collaboration

Circular use and recovery models are more viable to implement today

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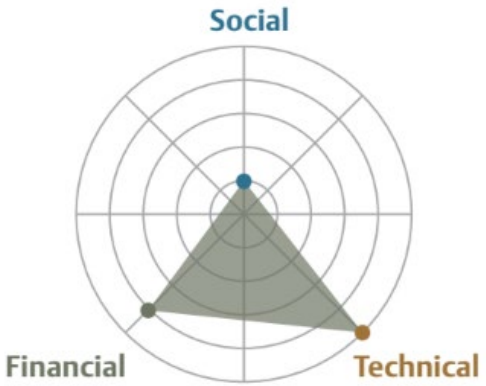
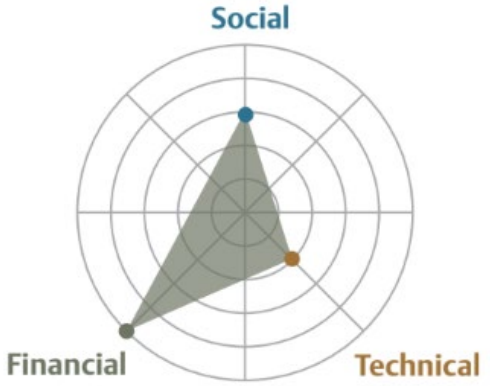
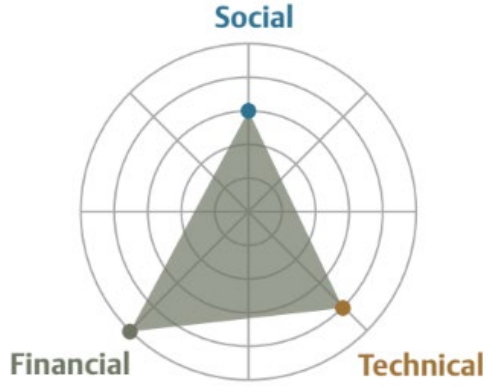
Circular Business Model (CBMs) type comparison

Analyzing factors	Circular Design	Circular Use	Circular Recovery
Social impact			
Technical impact			
Financial impact			
Social acceptance			
Technological readiness			

While business models based on circular use and recovery are already adaptable, circular design models can only be considered as a long-term goal, because of the low acceptance and readiness today

Strategic overview

Construction City

The current lineral economy, in Norway, requires 5 planets worth of resources to function, therefore a more sustainable, circular economy has to be established

The Construction City cluster will be the driving force of the circular transformation in the construction industry, through utilizing its knowledge sharing capabilities

FIRST STEPS	SCALING UP	CIRCULAR FUTURE
		
Establishing a business model and the technology to utilize demolished building materials	**Creating a culture of second hand material use by certifying processing plants across Norway**	**Preparing the industry for a circular future through R&D of materials and processes**

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FIRST STEPS

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SCALING UP

Creating a culture of second hand material use by certifying processing plants across Norway

CIRCULAR FUTURE

Preparing the industry for a circular future through R&D of materials and processes

Construction city possesses the key capabilites to transform industry

Stakeholder implementation challenges		Construction City key capability
 Required technology is not implemented industry wide		 Cluster has impact investor members

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 Low income due to low reuse and recycle rate		 Cluster has high know-how in technology

Construction city possesses the key capabilites to transform industry

Stakeholder implementation challenges	Construction City key capability
Required technology is not implemented industry wide	Cluster has impact investor members
Low income due to low reuse and recycle rate	Cluster has high know-how in technology
Lack of systemic approach to economy	Cluster has wide range of industry connections

Construction City has to start with a small project to start a real transformation into circular economy in the contruction industry

The business model will be based on selling second-hand materials

Construction City

The business model in a nutshell

Collector plant

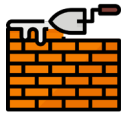
Buys material from demolitions and **inspects their reusability, certifies them**

Reusable material is put onto the online marketplace at a higher price

Marketplace

Online **second-hand market** for materials

Commission is taken at **2%** of the **transaction value**



Construction

Buys material for **ongoing construction projects**

Gets **less expensive, certified, quality assured**, second hand materials

Revenue streams

2% **Commission** per transaction

Spread between ask and bid price

Cost drivers

Technology **adaptation hours**

Cost of **building the plant**

Revenue drivers

Volume of materials sold

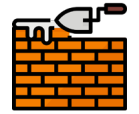
Cerfitication number

Key Process in the industry

Demolitions

Collector plant

Marketplace



Construction

Construction City must create and share the know-how of centers of excellence

Construction City

Center of Excellence

Material flow ecosystem

Each player has a clear role and **can specialize**

The system itself with its processes and relationships is valuable and can be replicated

Sharing know-how for disruption

Key drivers of sharing

Capital intensity of developing own plants

Wider impact in the industry can be realized through sharing

Faster industry wide adaptation of best practices

Construction City must share the best practices in order to facilitate change and shorten time of adaptation in the construction industry

The current lineral economy, in Norway, requires 5 planets worth of resources to function, therefore a more sustainable, circular economy has to be established

The Construction City cluster will be the driving force of the circular transformation in the construction industry, through utilizing its knowledge sharing capabilities

FIRST STEPS

Establishing a business model and the technology to utilize demolished building materials

SCALING UP

Creating a culture of second hand material use by certifying processing plants across Norway

CIRCULAR FUTURE

Preparing the industry for a circular future through R&D of materials and processes

The biggest challenges lie within geographical and stakeholder constraints

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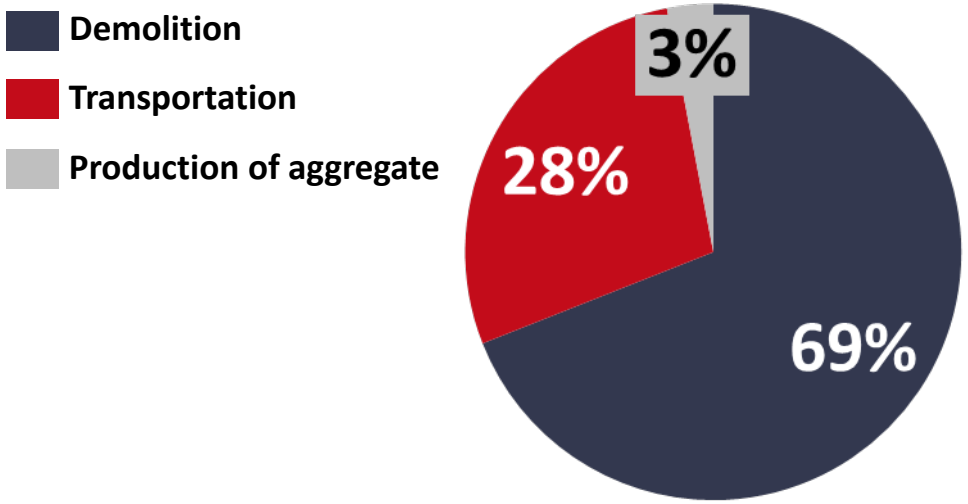
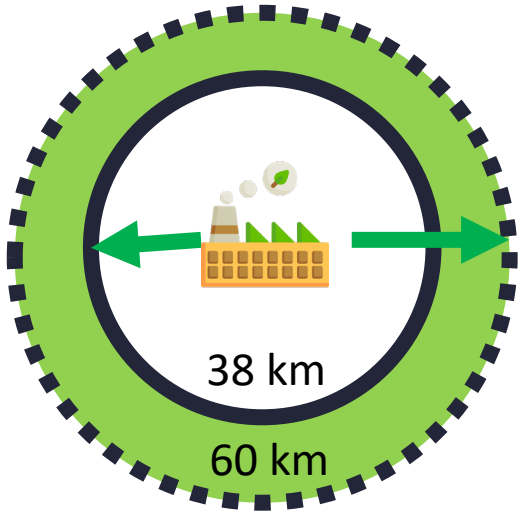
Environmental constraints of scalability





Best case

Even with optimized truckload, the **maximum** distance of transportation can be **60 km**

Stakeholder constraints of scalability

Cost

Lump sum **investment** into infrastructure upfront

Incentive

Lack of financing and **no government subsidy**

Knowledge share

No use case, nor anyone knowledgable to cerfity

Construction City must come through the challenges by sharing best practices and acting as a certifier, with the support of the government

Two incentive plans will be introduced to enable the spead of the system

Construction City

Objective
To maximize plant owners that will undergo the certification process and enter into the second hand marketplace, hence creating the basis for scalability

	Investment-based incentive plan	Utilization-based incentive plan
 **Government subsidy based on:**	Money invested in the needed **technology** to undergo certification	**Number of second-hand materials** sold on the marketplace
 **Subsidy type**	**One-time** subsidy	**Recurring,** volume-based subsidy
 **Targeted corporations:**	**SMEs with limited capital** to invest	Large companies looking for **stable cashflows**

Construction City needs the support of government to spread its system across Norway, and by helping, the government also benefits from the impact

Certified partners will assess quality of demolished components throughout Norway

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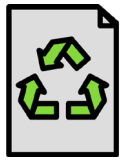
Eligibility criteria



Up to **40 km** distance from recycling plants

Up to **20 km** distance from a major city*

Willingness **to invest** in the equipment

Certification Process

Evaluate **technological readiness**

Staff evaluation based on use of technology

Quality monitoring of goods by **random sampling**

* Major city is either in the top 30 most populated cities of Norway, or the biggest one in its county

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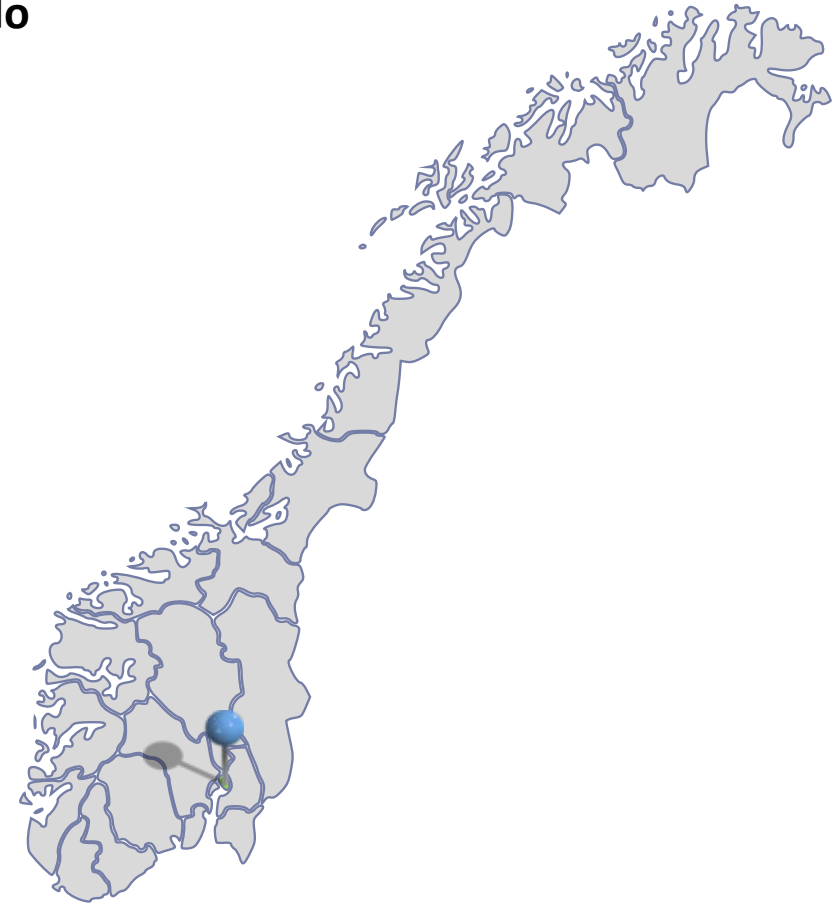
Roadmap to scaling the business model

Phase 0: The plant is fully operational in **Oslo**



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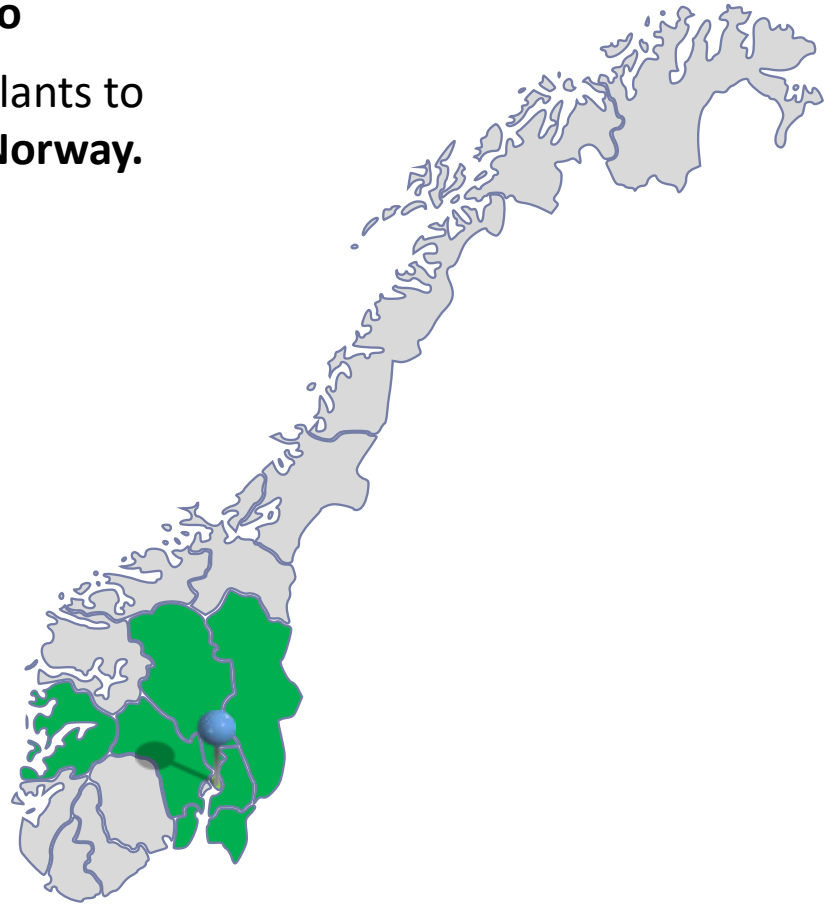

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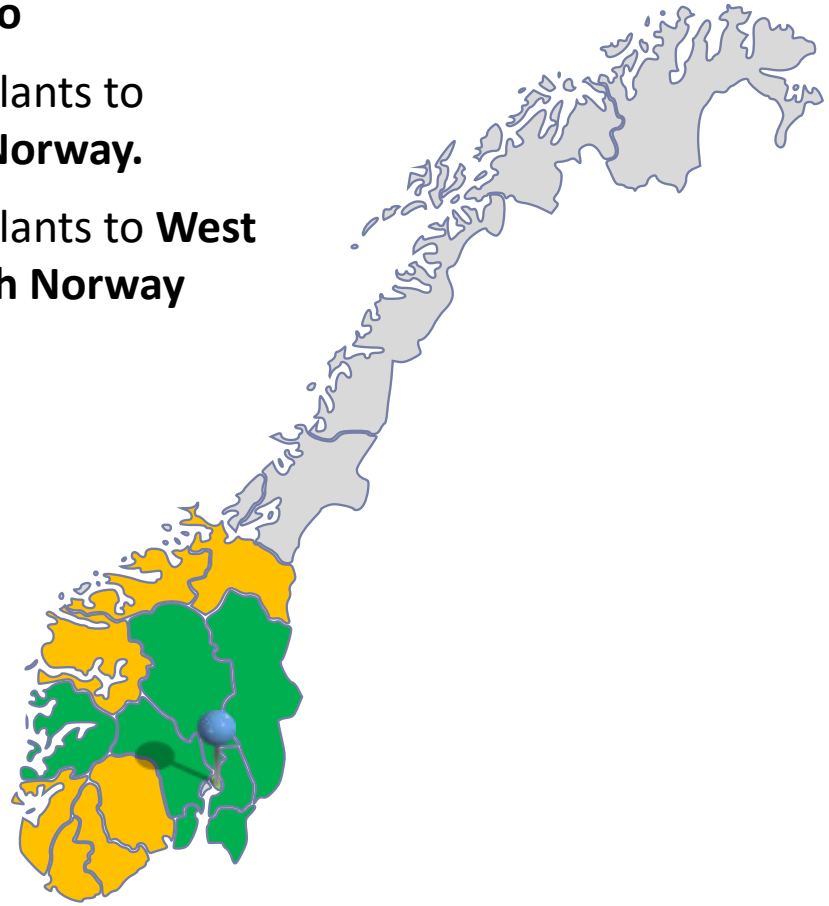

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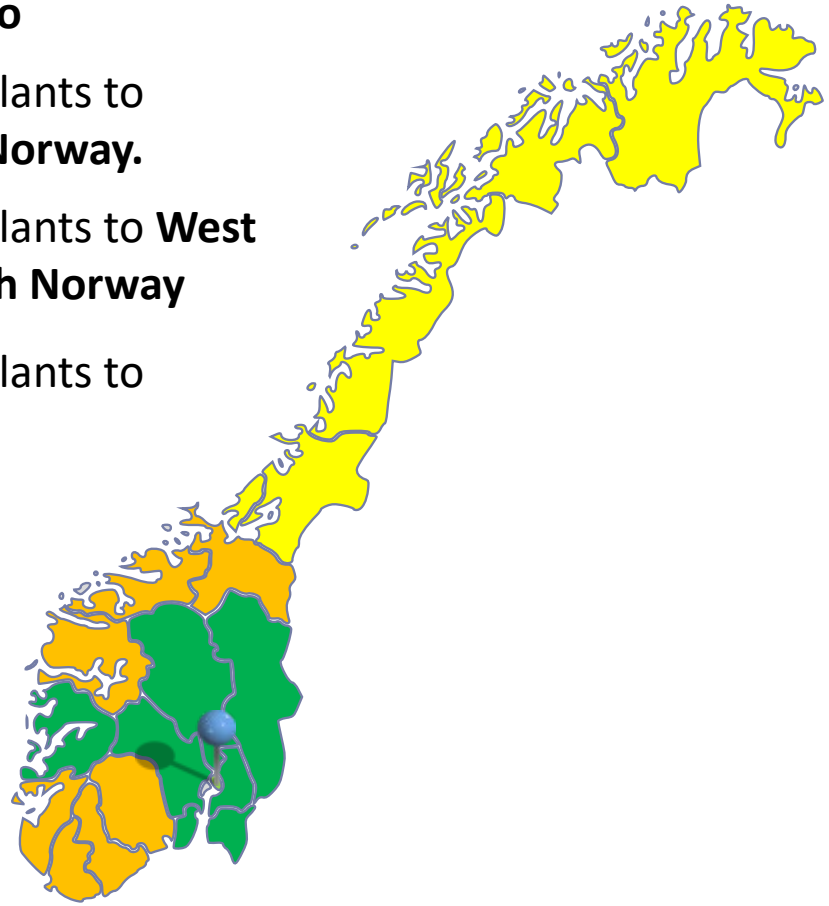
Phase 2: Placing plants to **West Norway and South Norway**

Phase 3: Placing plants to **Northern Norway**



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FIRST STEPS	SCALING UP	CIRCULAR FUTURE
		
Establishing a business model and the technology to utilize demolished building materials	Creating a culture of second hand material use by certifying processing plants across Norway	Preparing the industry for a circular future through R&D of materials and processes

Short-term actions bring about limited effects, lacking a systemic view of assets

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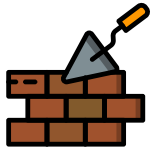
Expanding Circular Use and Circular Recovery do not provide a comprehensive, lasting solution

Designs are not provident

Quick and incidental solutions



Components are permanently built

Disassembly involves value loss

Virgin materials are preferred

Increasingly scarce resources

Used materials hard to segregate

Landfilling is more cost-effective

Down-cycling reduces value

Energy recovery is more convenient

Since the problems across the value chain remain partially or fully unresolved, circular economy is still no truly established in the Norwegian construction industry

Circular economy can be established in the long run, through R&D

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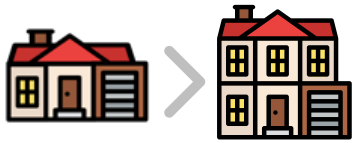
Potential future solutions for the root causes

Problem 1: Structures are built to be permanent

Modular construction systems built of premanufactured volumetric units



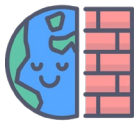
Possibility to adapt

Possibility to relocate

Sustainable deconstruciton

Problem 2: Designs are not provident

Proper end-of-life planning for buildings and materials built inside



Sustainable materials used

Less virgin material used

Utilizing residual value

Research and development is required to:

- Create sustainable materials that can be used in modular systems
- Establish product passports to track materials built inside the structures

Creating a value chain that supports adaptable and reusable designs will solve the root problems of the current system and transform the industry to truly fit in circular economy

Circularity in the industry provides invaluable benefits to all participants

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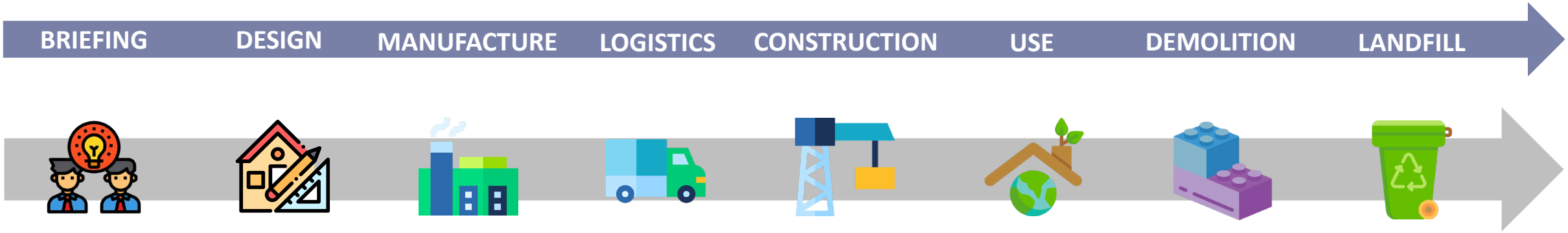


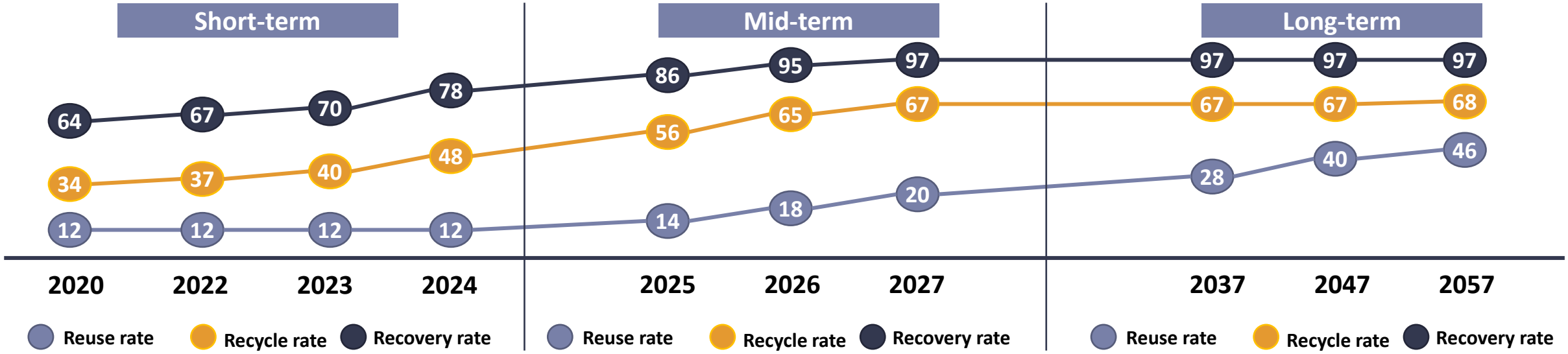
Client	Architects	Manu-facturers	Suppliers	Contractors	Owners	De-construction	Processing plants
Better interest rates	Knowledge transfer	New source of revenue	Protection from scarcity	Reduced safety risks	Max efficiency and comfort	New business model	Revenue growth

IMPACT

Our project will earn sustainable revenue to drive circular economy KPI

Construction City

Timeline of KPIs



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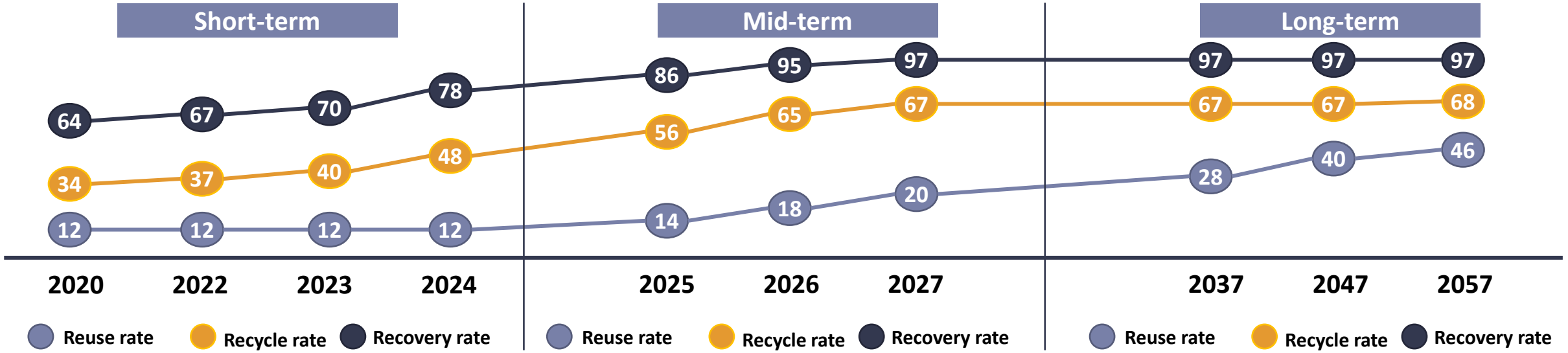
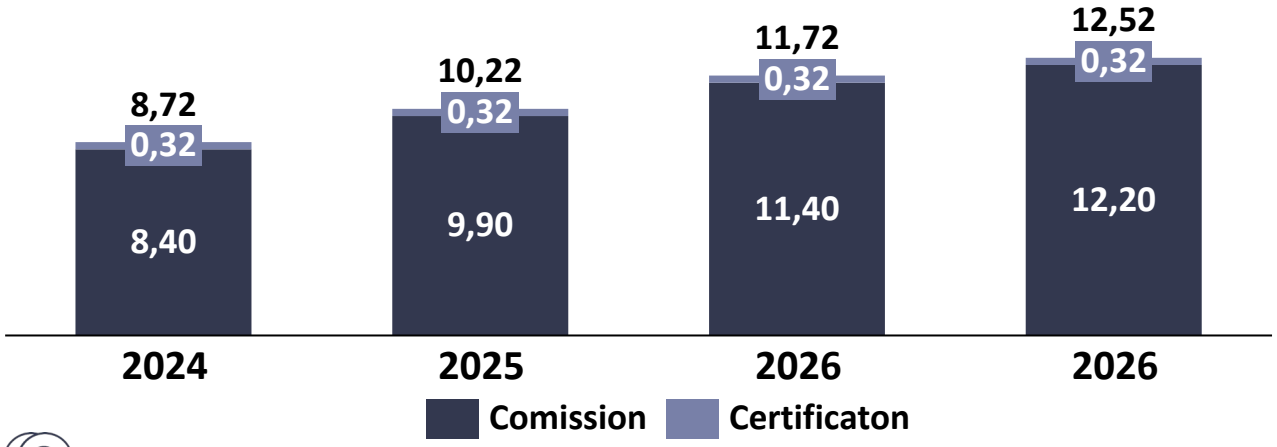
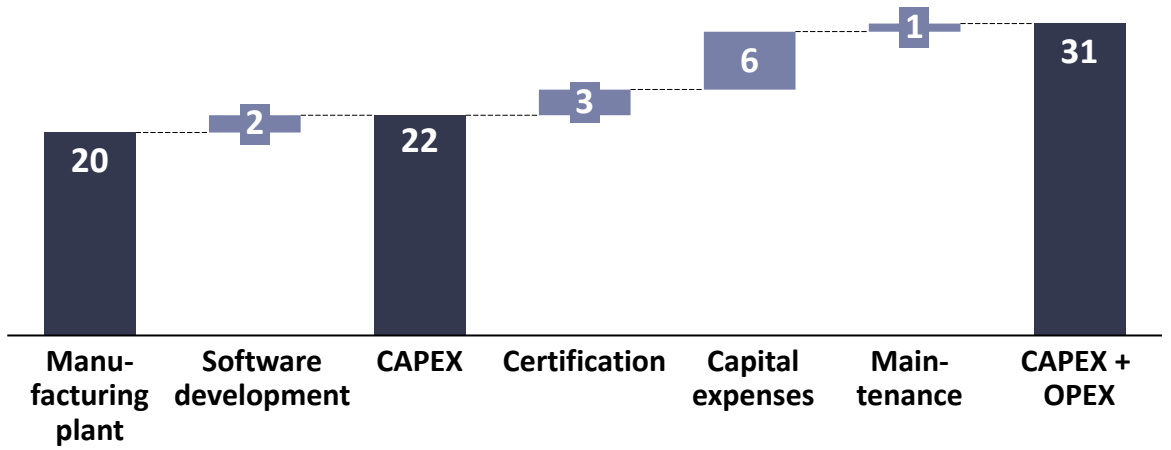


Project revenue in million NOK



Project expenses in million NOK



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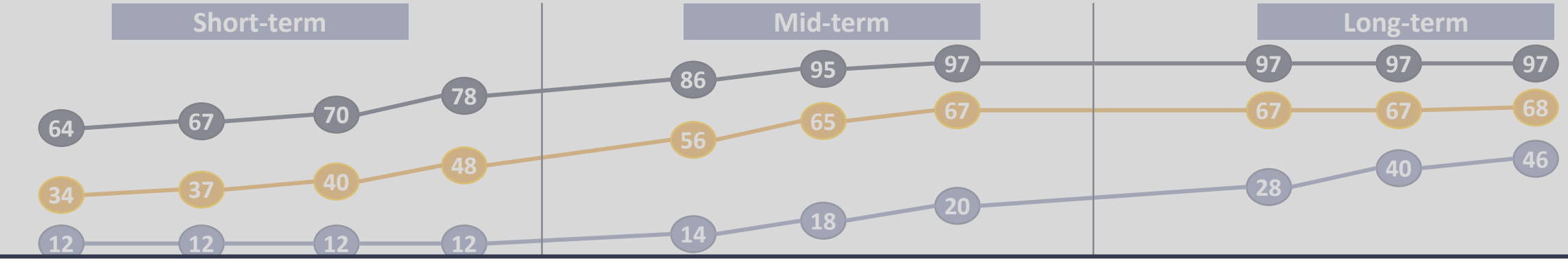
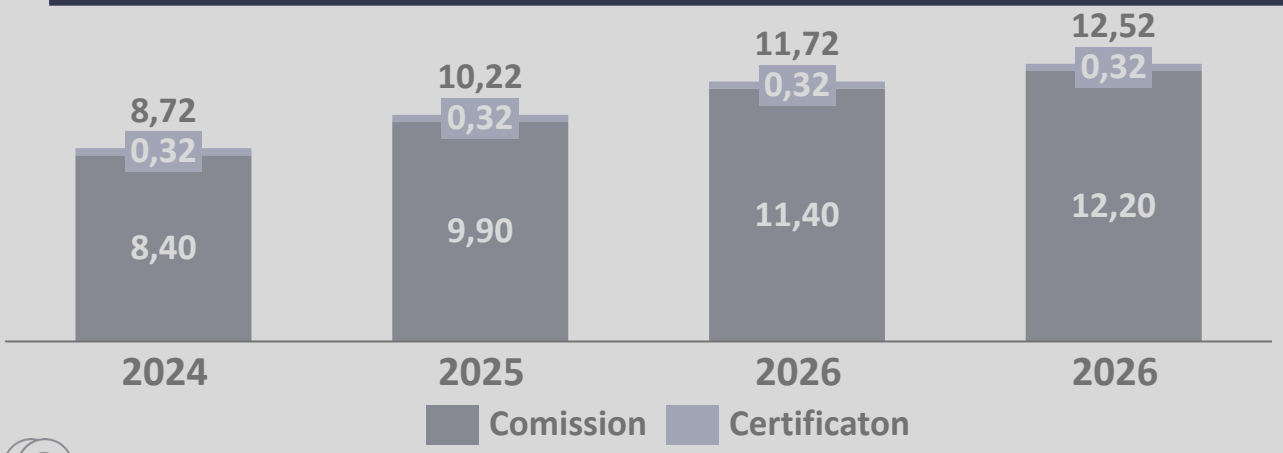
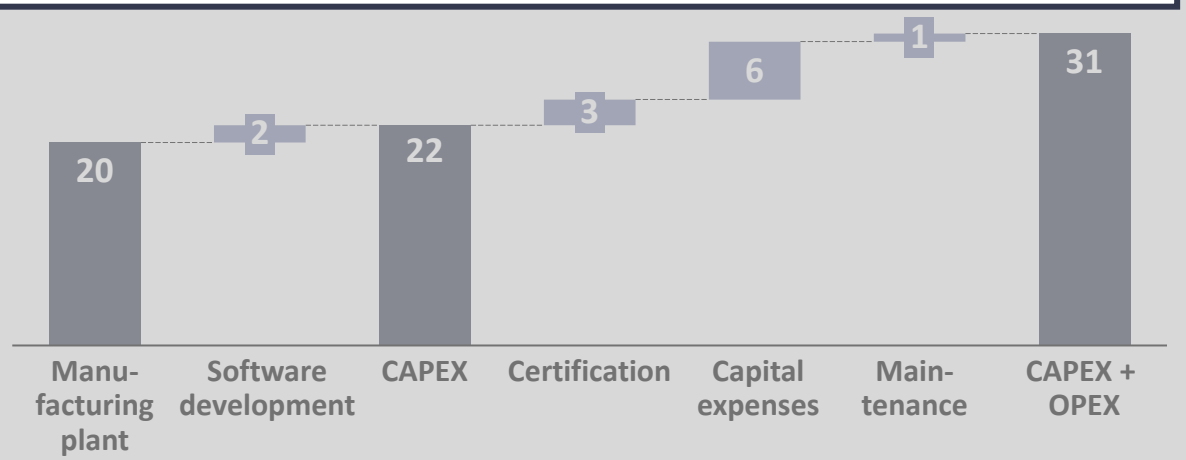


The Project pays back in 4 years





Implementation Schedule

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Implementation Timeline										
Actions	Short-term				Mid-term			Long-term		
	2020	2022	2023	2024	2025	2026	2027	2037	2047	2057
FIRST STEPS										
Building the first plant	→	→	→	→						
Setting up the marketplace		→	→	→						
Contract with demolisher companies			→	★						
SCALING UP										
Developing checklist and curricula					→	→				
Informing potential plants					→	→				
Certification of plants						→	→	→	→	→
CIRCULAR FUTURE										
Research and Development	→	→	→	→	→	→	→	→	→	→

★ First system is ready

Executive Summary

Construction City

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The current lineral economy, in Norway, requires 5 planets worth of resources to function, therefore a more sustainable, circular economy has to be established

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The Construction City cluster will be the driving force of the circular transformation in the construction industry, through utilizing its knowledge sharing capabilities

Strategic pillars

FIRST STEPS

Establishing the technology of inspecting demolished materials

SCALING UP

Establishing the culture of reusing materials across Norway

CIRCULAR FUTURE

Establishing the future of a circular construction industry

Impacts

Short-term (until 2024)	Mid-term (until 2027)	Long-term (until 2057)
4,25 years Payback period	64% > 97% Recovery rate	12% > 46% Reuse rate

THANK YOU FOR YOUR ATTENTION!

Main slides

ANALYSIS	FIRST STEPS	SCALING UP	CIRCULAR FUTURE	IMPACT
4. Industry today	11. Key capabilities	15. Challenges	23. Root causes	27. KPIs
5. Barriers	12. Business model	16. Incentives	24. Solutions	28. Project finance
6. CBMs	13. Know-how share	21. Partners	25. Benefits	30. Timeline

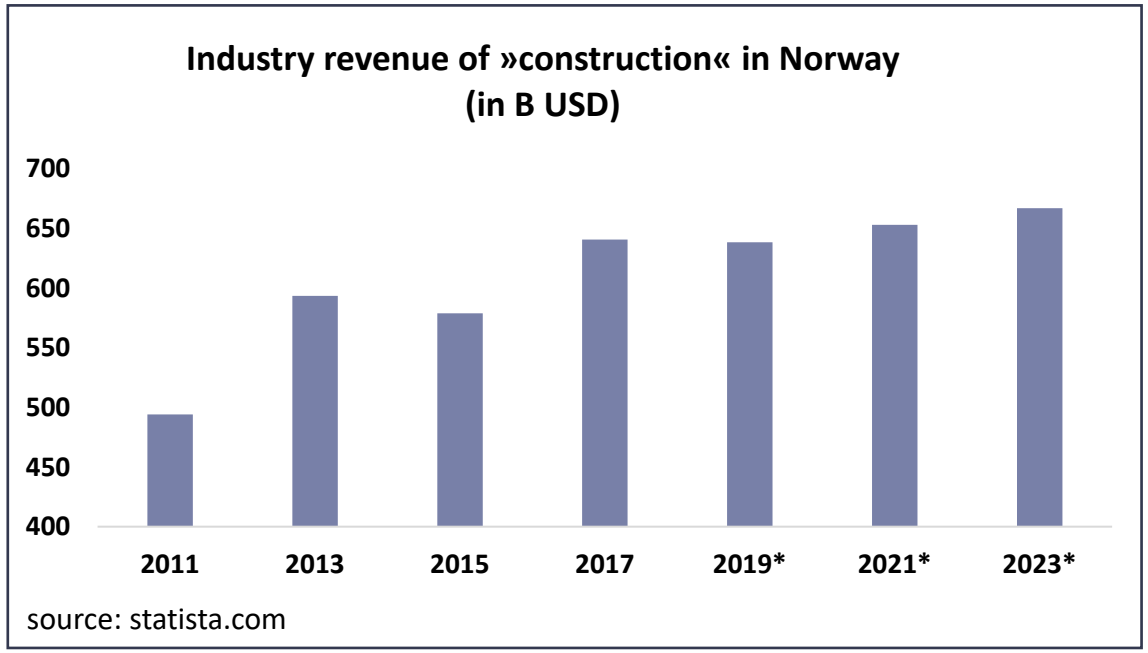
Appendix

33. Industry backup	39. Benefits backup 1	44. Waste recycling 2	50. Model canvas	55. Stakeholders
34. Recovery rates	40. Marketplace dev.	45. Main barriers	51. Modular systems	56. Circular future
35. Construction ind.	41. Material flow	46. Waste treatment	52. Utility in constr.	57. KPI timeline
36. Waste of industry	42. Waste handling	47. Scale alt. Approach	53. Today and future	58. Stakeholder cost
37. Buildings Oslo	43. Waste recycling 1	48. Certification 1	54. Scenarios	59. Break-even
38. Core competences		49. Certification 2		60. Risk and mitigation

Construction industry backup

Construction City

Construction industry is expanding

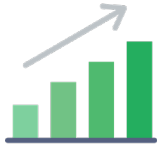


source: statista.com

633 bn NOK

industry revenue

2,7%

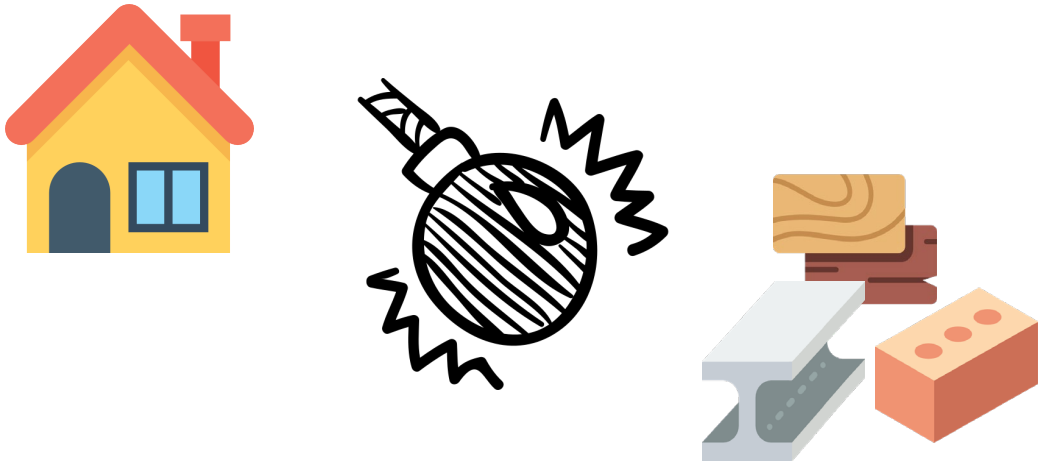


growth rate

30.000

new buildings annually

20.000 buildings are demolished per year



1,9 million tonnes

of construction waste is generated annually

only **64% is recovered**

source: Statistics Norway

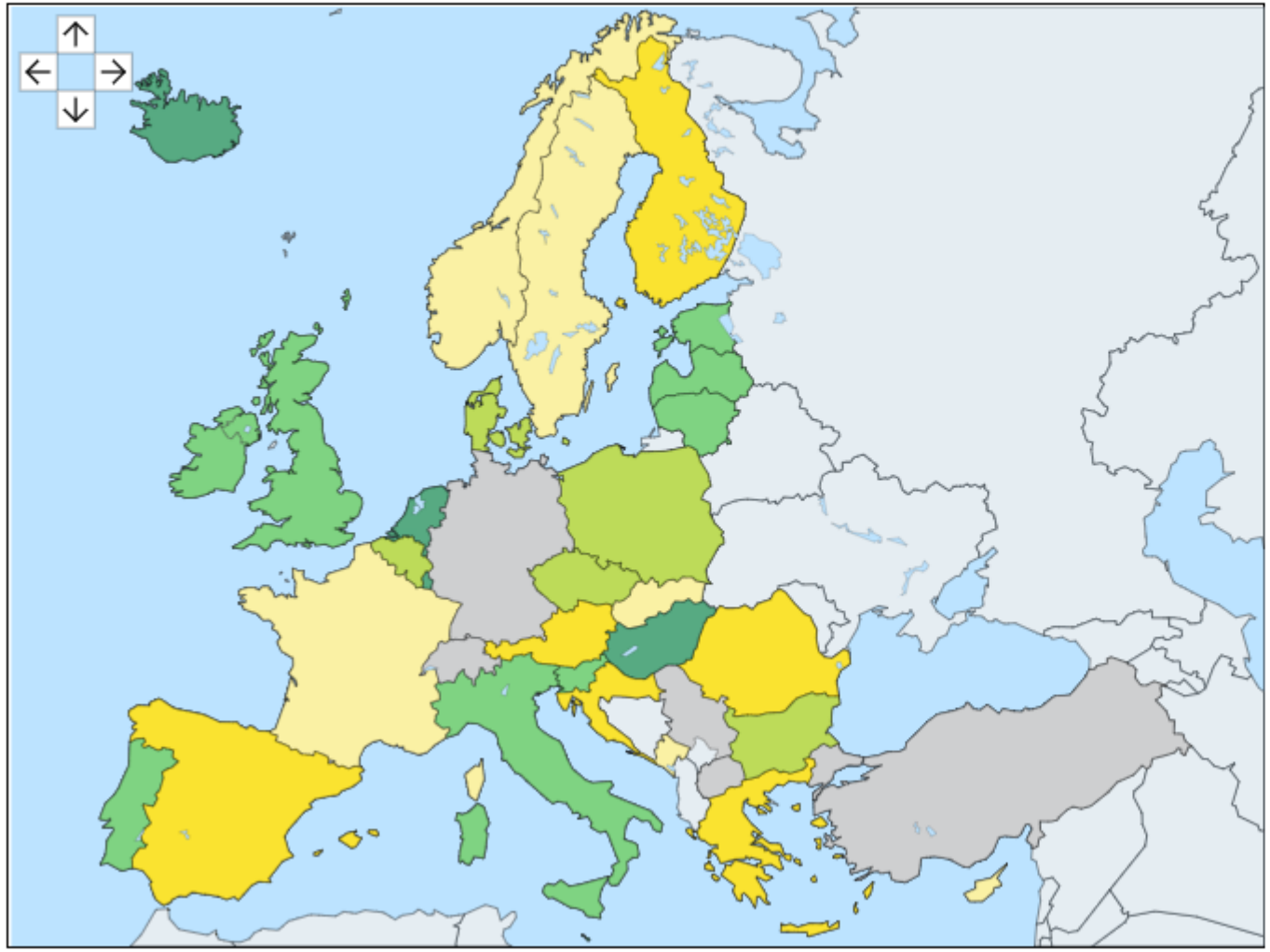
Recovery rates in Europe

Construction City

Recovery rate of construction and demolition waste

% of construction and demolition mineral waste recycled

The indicator is the ratio of construction and demolition waste which is prepared for ... more



Open toolbox

Data for 2016

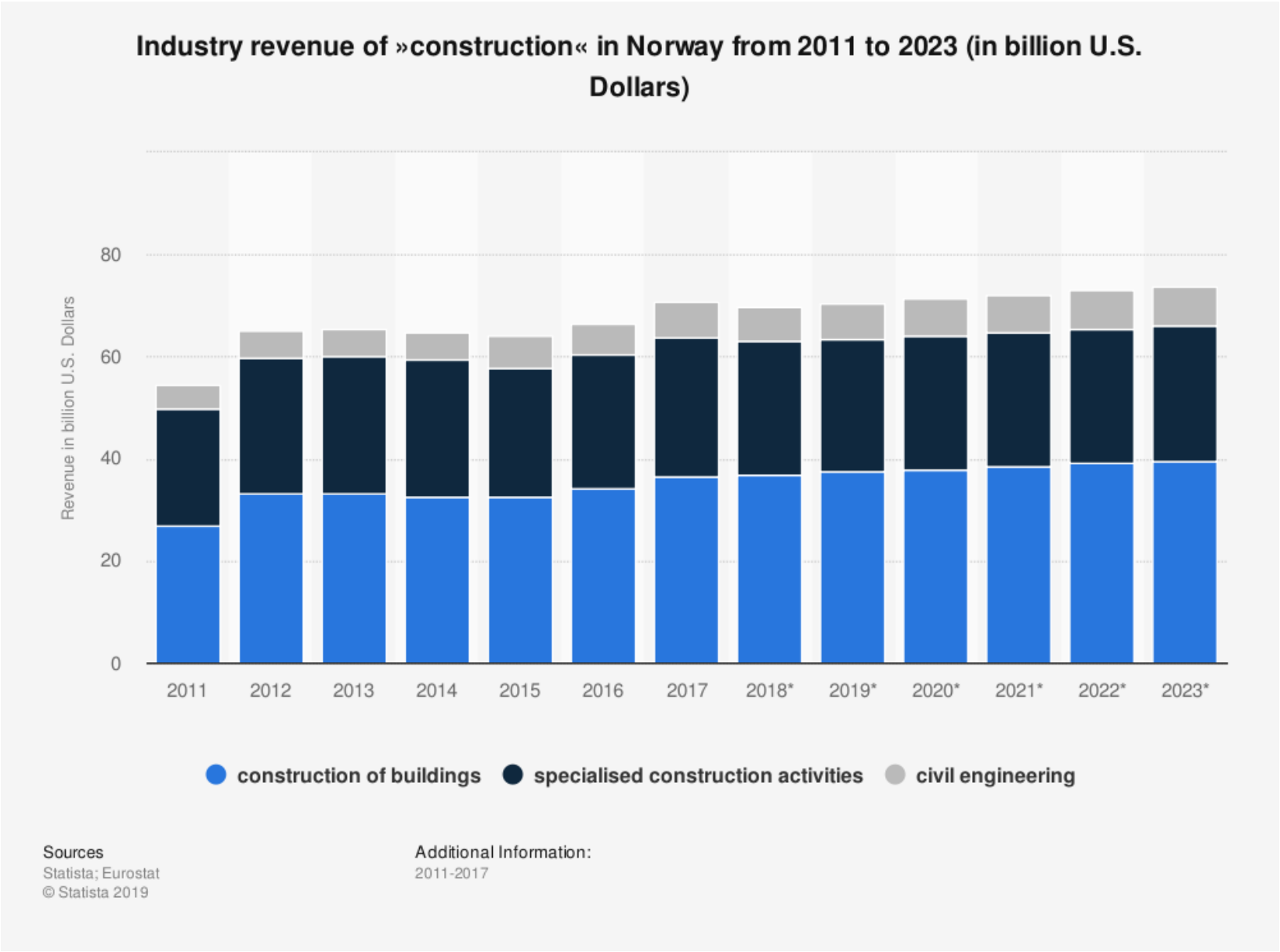
Legend	Cases
0 to 71	6
71 to 88	7
88 to 95	5
95 to 98	8
98 to 100	5
Data not available	7

Minimum value: 0
Maximum value: 100

: = not available
c = confidential
e = estimated

Source: Eurostat, 2018

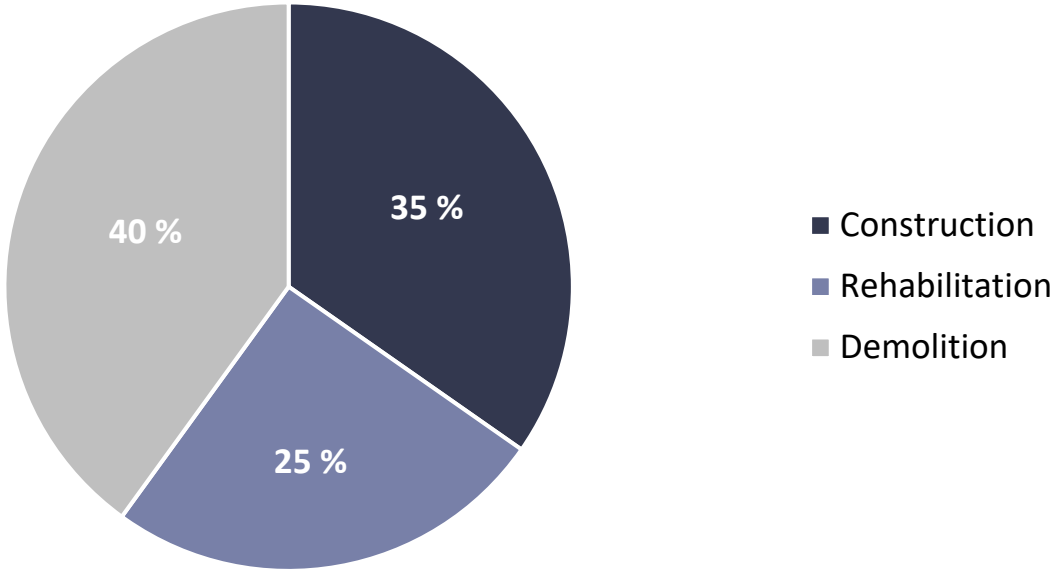
Revenue of construction industry in Norway



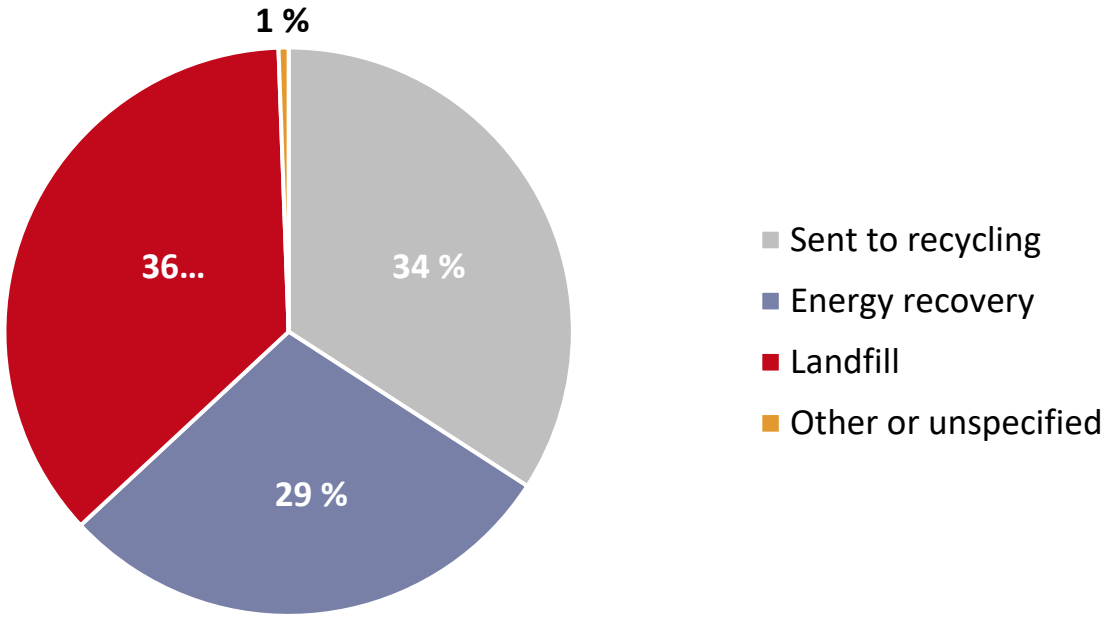
Waste of the industry

Construction City

Generated waste amounts from construction, rehabilitation and demolition of buildings

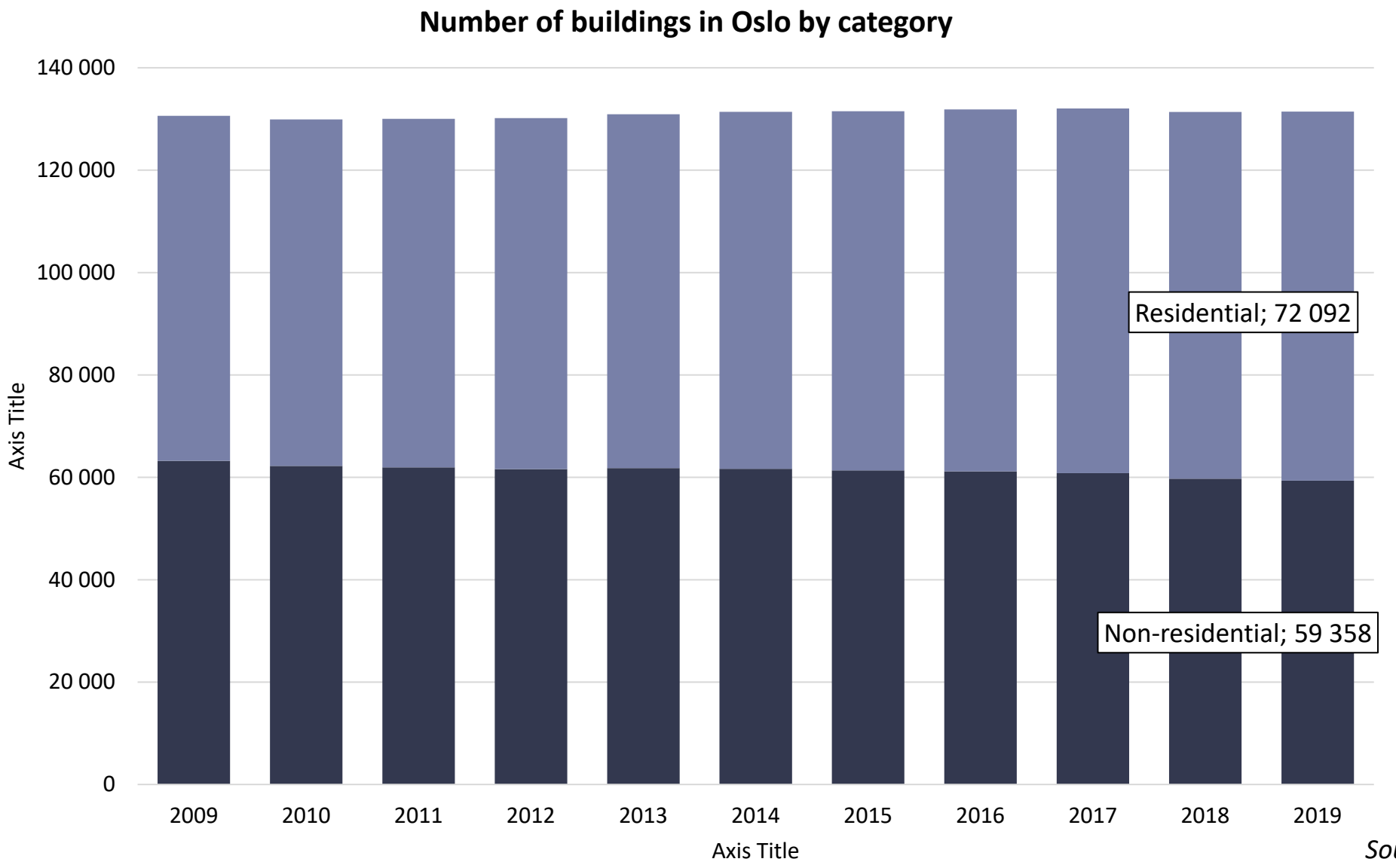


Treatment of waste from construction, rehabilitation and demolition of buildings



Source: Statista, 2019

Buildings in Oslo



Source: Statista, 2019

Construction City core competences

Construction City

Core Competences of the Cluster

Diverse Network of 50 Companies

Coverage of the Whole Value Chain

Leading Community of Industry Experts

Viral Knowledge Transmission

The Cluster can make a fundamental change in its industry due to its wide network and connection with diverse companies.

Stakeholder benefits

Construction City

Demolition

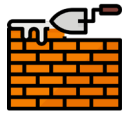
- **Stable demand** for materials
- Gets the **most value** for the materials
- **Motivated** to disassemble more carefully
- „**Disassembly exper**” status

Collector plant

- Pays based on **quality**
- **Certified** status
- Gets the **spread** of the bid and ask price
- „A **bridge** between linear and circular economy”

Marketplace

- **Minimizes impact on environment** on all different dimentsions
- Gets paid **based on volume** in commission
- „The **facilitator** of the new way”



Construction

- **Less expensive** input prices
- **Quality assured** second-hand materials
- Stable, **predictable flow** of materials
- „The **enablers** of the new way”

Microsoft will develop and operate the Marketplace

Construction City

Development and Operation

Current member of the Cluster

Microsoft

Benefits

Tangible

Participating plants will get hands-on experience using Microsoft products

Possible bundling of other services

Upsell Cybersecurity and other goods

Intangible

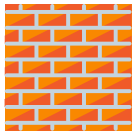
Increased goodwill

Microsoft will be associated with waste reduction

Cutting edge experience in construction, ability to use knowledge elsewhere

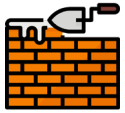
Construction City

Material flow in practice



Collector plant

Marketplace



Construction

Customer will deliver bought goods from the plant

Inspection

Recycle

Reuse

Processed or delivered in bulk to a recycling facility, depending on the plant

Uploaded onto the Marketplace

Levels of environmental impact from alternative waste handling

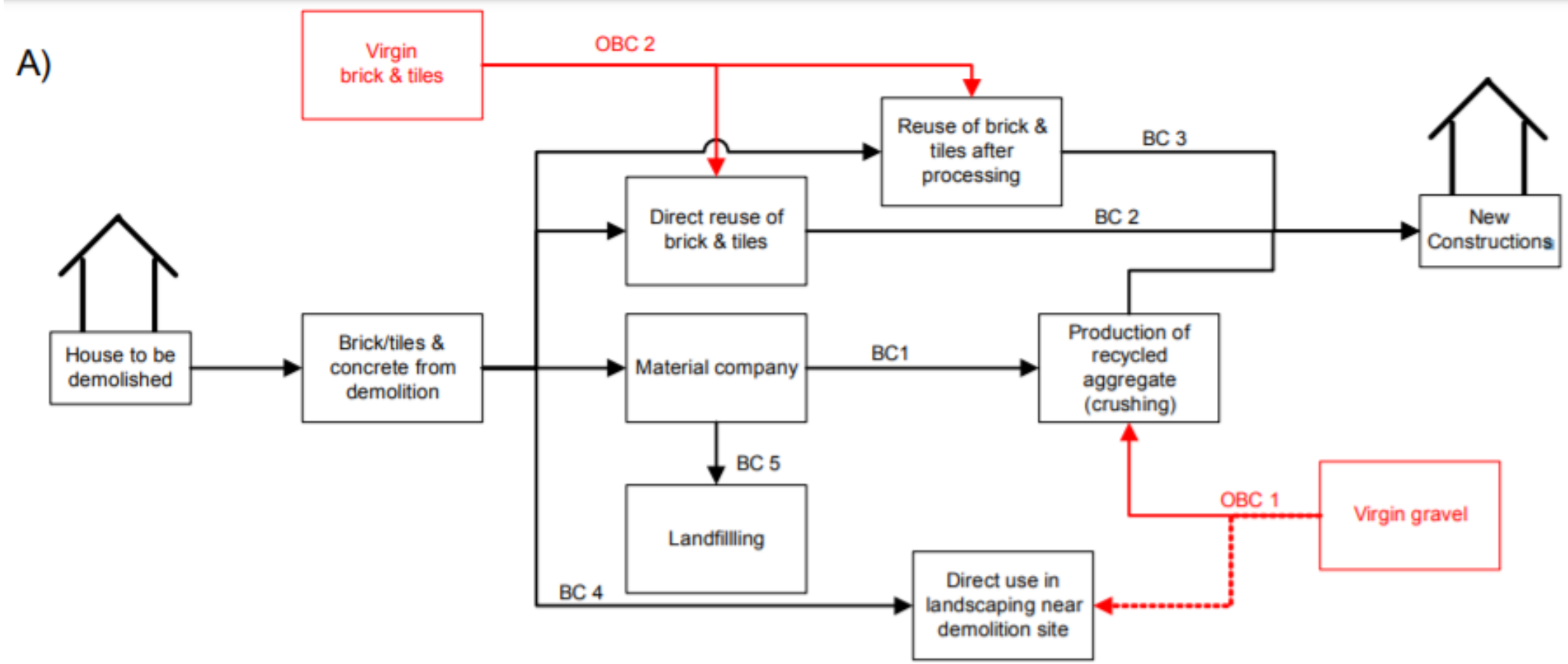
Construction City

Table 1 Levels of environmental impact from alternative waste handling schemes.

Fraction	**Level 0** **Traditional**	**Level 1** **Recycling/energy recovery**	**Level 2** **Reuse after treatment**	**Level 3** **Direct reuse**
Concrete	Landfill	Crushing	N.A.	Reuse of concrete elements.
Bricks	Landfill	Crushing	Reuse of brick and tiles after cleaning and reburning	Direct reuse
Wood	Landfill/ Incineration without energy recovery	Direct inceretion, Inceration of Chipwood	Reuse after, cleaning, sawing and/or grading.	Direct reuse

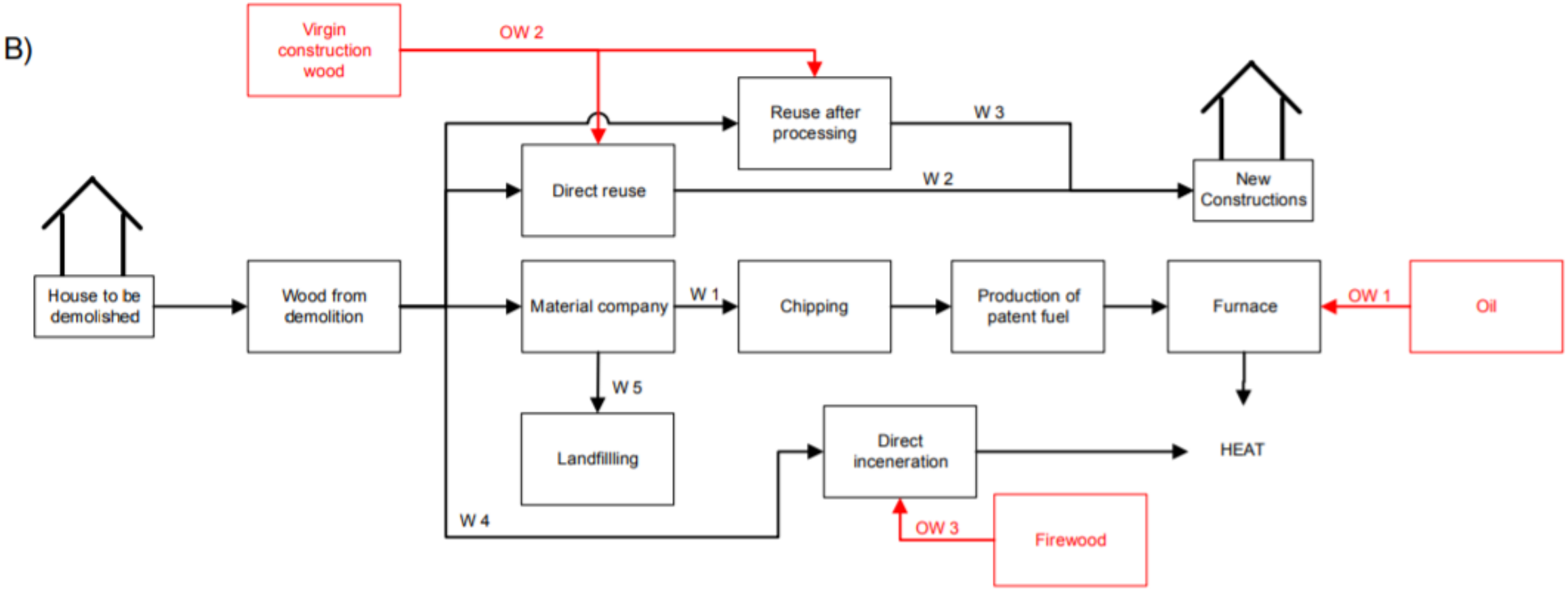
The higher the level of waste handling,
the less value is being lost

Waste recycling



Pathway	Level 0 Traditional	Level 1 Recycling/energy recovery	Level 2 Reuse after treatment	Level 3 Direct reuse
Brick/tiles and concrete	BC4 and BC5	BC1	BC3	BC2

Waste recycling 2



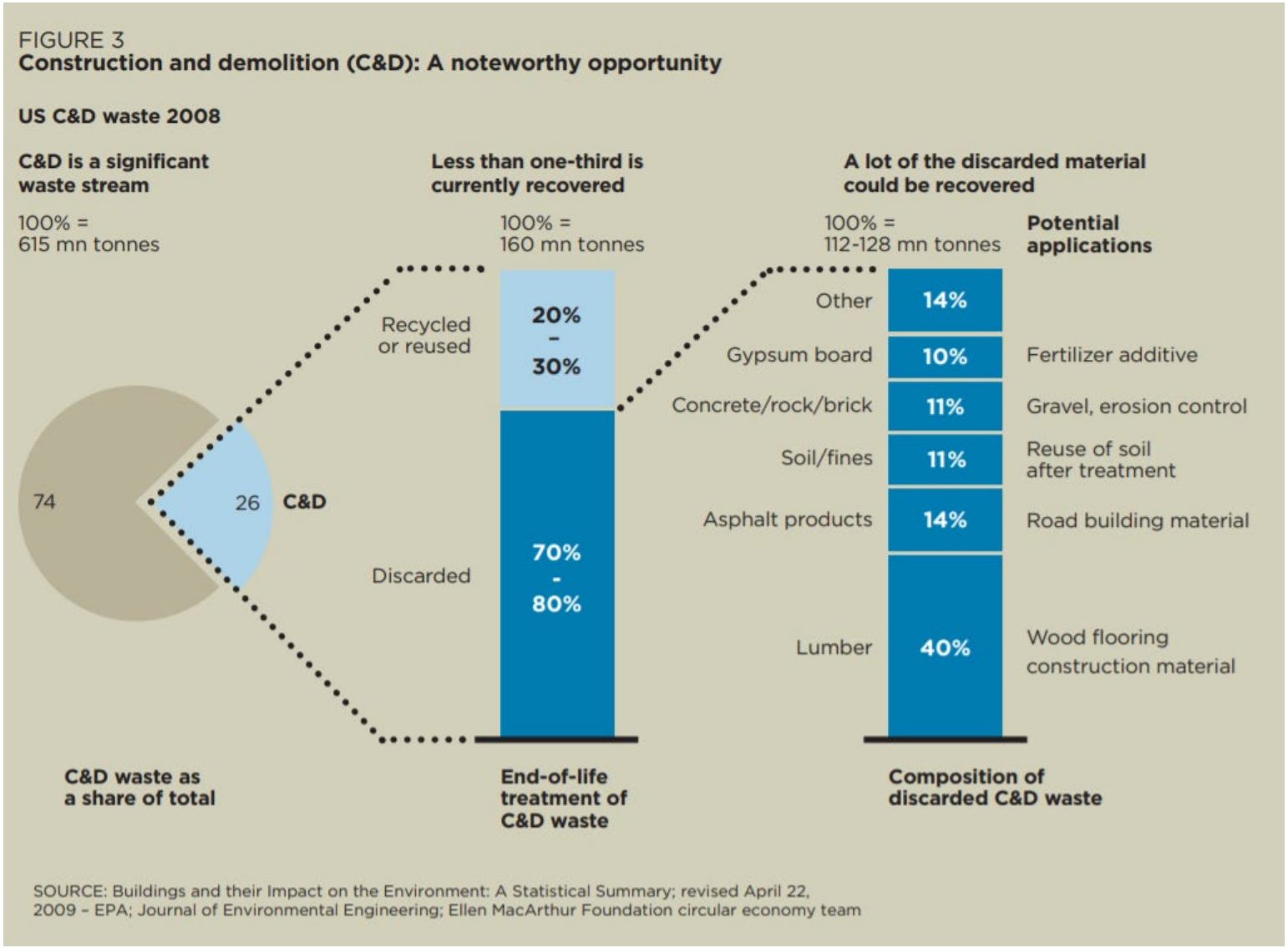
Pathway	Level 0 Traditional	Level 1 Recycling/energy recovery	Level 2 Reuse after treatment	Level 3 Direct reuse
Wood	W4 and W5	W1	W3	W2

Main barriers for circular economy

Ranking	Barrier
1	Architects and design engineers do not consider recycled materials and products during project design and specification
2	Lack of positive perception from clients who drive project process
3	Uncertainty on whole life durability of recycled materials and products
4	Materials selection and specification are influenced by cost rather than environmental benefits
5	Recycled Materials and products are more expensive than expected due to perceived environmental friendliness
6	Building control hindering the use of recycled materials
7	Suppliers' websites lack substantial product information
8	Recycled materials product information is difficult to find
9	Difficult to find suppliers of Recycled materials
10	There is inadequate education about recycled materials and products in schools
11	Samples of Recycled materials are difficult to obtain
12	Industry professionals are not versed enough on recycled materials and products
13	Recycled materials does not always meet projects needs and quality requirements
14	Supply of recycled materials is not always of the same quality
15	Market supply of recycled materials is not always reliable
16	There is a perceived culture among construction professionals that Recycled materials and products are inferior
17	Level of recycled contents in products is not always clear and easy to find
18	Legislation prevents the use of Recycled Products and Materials
19	Lack of tax breaks for contractors

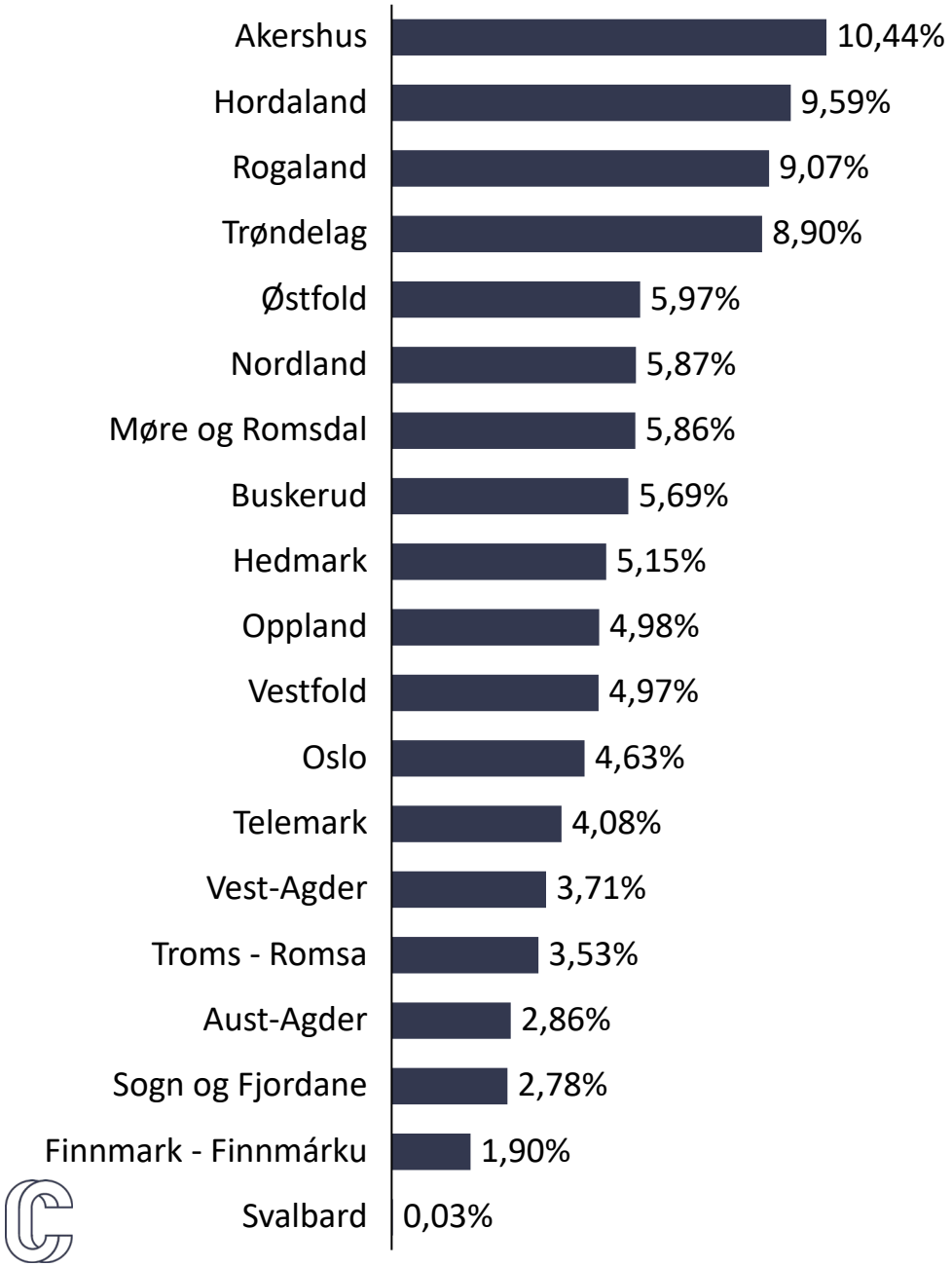
Treatment of waste

FIGURE 3
Construction and demolition (C&D): A noteworthy opportunity



SOURCE: Buildings and their Impact on the Environment: A Statistical Summary; revised April 22, 2009 – EPA; Journal of Environmental Engineering; Ellen MacArthur Foundation circular economy team

Alternative approach to scaling



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Roadmap to scaling the business model

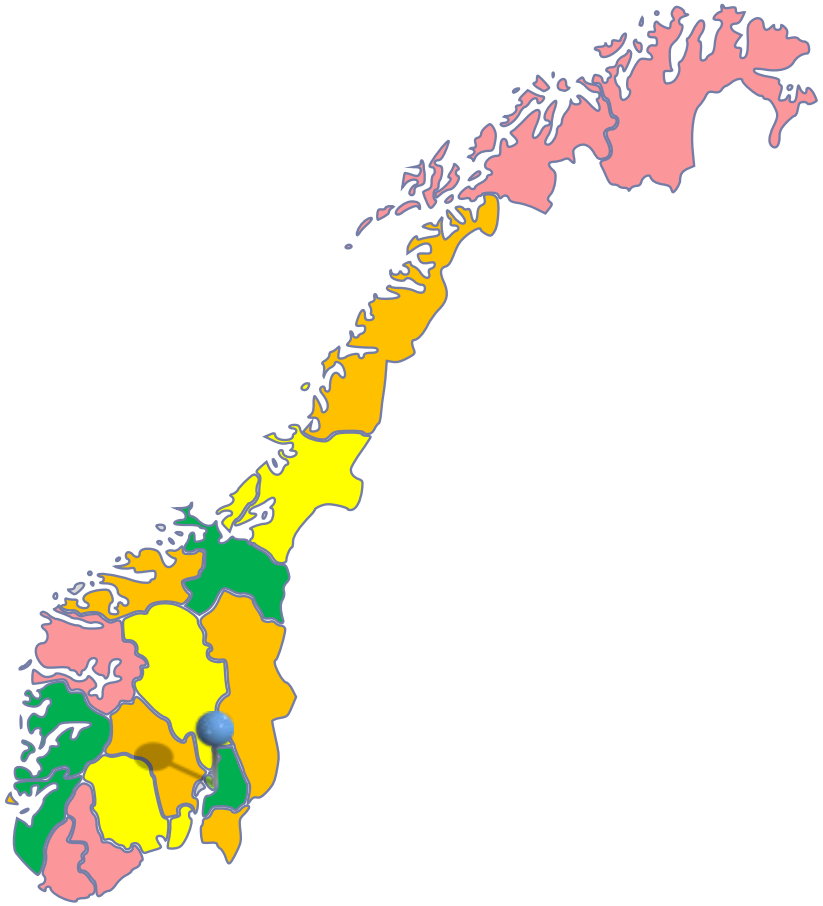
Phase 0: The plant is fully operational in **Oslo**

Phase 1: Placing plants to **counties with above 8% building density.**

Phase 2: Placing plants to **counties with above 5% building density.**

Phase 3: Placing plants to **counties with above 4% building density.**

Phase 4: Placing plants to **the remaining counties.**



Multiconsult and Startup Lab will be in lead of the certification process

Construction City

Responsible

Current members of the Cluster

Multiconsult

STARTUP LAB

Benefits

Tangible

Companies will directly engage with Multiconsult and StartupLab at inspections

Selling other related services

Intangible

Increased goodwill

Multiconsult will be associated with outstanding consulting and assurance

Startup Lab will further develop its network of cutting-edge companies

Certification Process

Construction City

Phase 1

Evaluate **technological readiness**

- ✓ The plant **is capable to assess reusability** of every material
- ✓ Every piece of **equipment is installed** and ready to be used
- ✓ The **plant has proper quality control mechanisms** in place, 6 sigma preferred

Phase 2

Staff evaluation based on use of technology

- ✓ **Management is debriefed** on workshops, and assessed
- ✓ **Workers are evaluated**, key bottlenecks and plans for improvement are shared
- ✓ Screening through **a probation period**, final evaluation

Phase 3

Quality monitoring of goods by **random sampling**

- ✓ **Random sampling** of reusable materials
- ✓ **Consultation** every 6 months at the HQ in Oslo
- ✓ **Screening feedbacks** from buyers of materials at the Marketplace

The business model of Construction City

Construction City

KEY PARTNERS

Cluster members
Government
Educational institutions

KEY ACTIVITIES

Inspect building materials
Facilitate change

KEY RESOURCES

Network across the value chain
Industry experts

VALUE PROPOSITION

Become a pioneer in the Norwegian Circular Economy by utilizing the knowledge sharing of the platform

CUSTOMER RELATIONSHIPS

Co-working office
Workshops and conferences

CHANNELS

Reselling platform
Blog
Website

CUSTOMER SEGMENTS

Demolition companies
Collector and recycling facilities
Construction companies

COST STRUCTURE

Building the recycling plant
Platform establishment and maintenance
Administrative costs

REVENUE STREAMS

Inspection and certification fees
Commission from the platform

Modular construction systems backup

Construction City

Modular construction systems

Premanufactured volumentric units

Assembled on site to create buildings

Same type of elements can be used in several designs

Standardized building parts

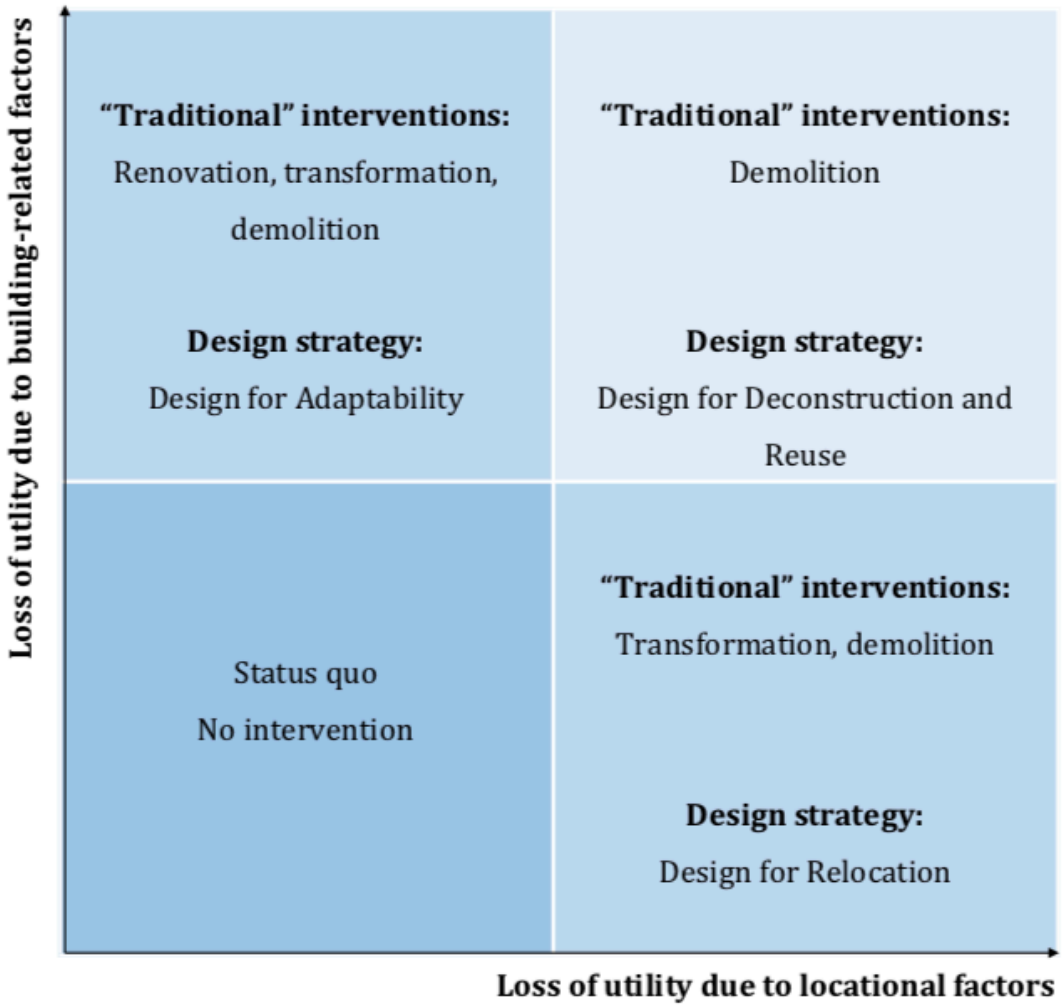
Mass production is more sustainable

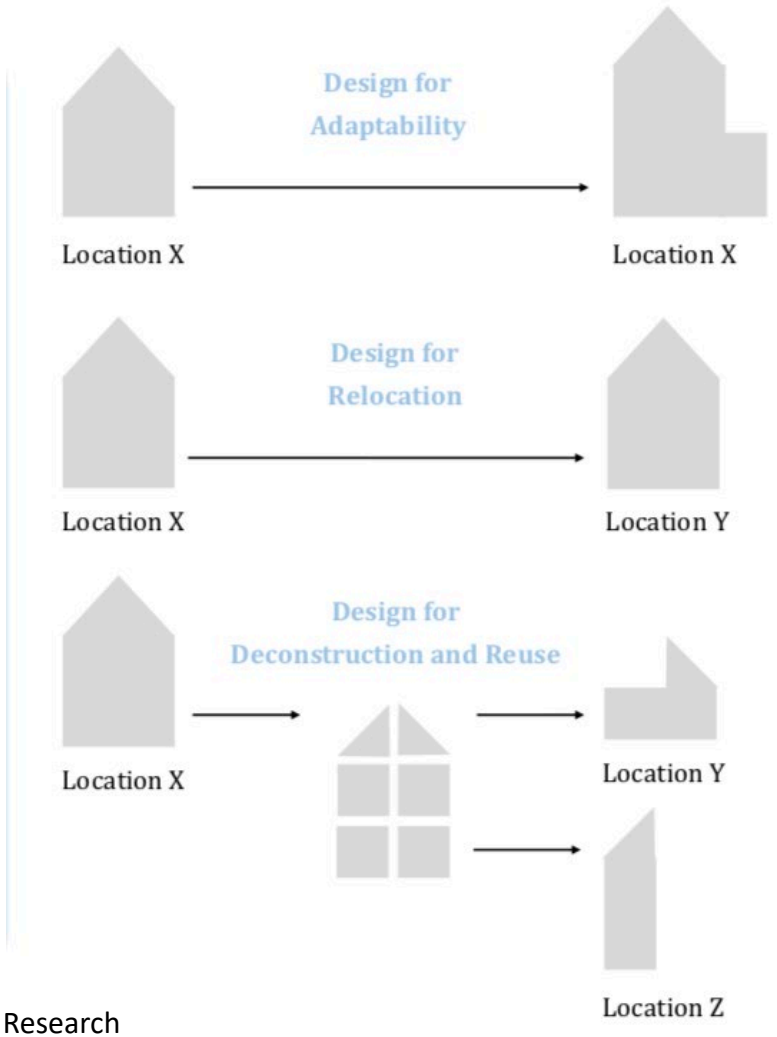
Economies of scale

Maintenance is easier

Material base tracking

Utility in construction





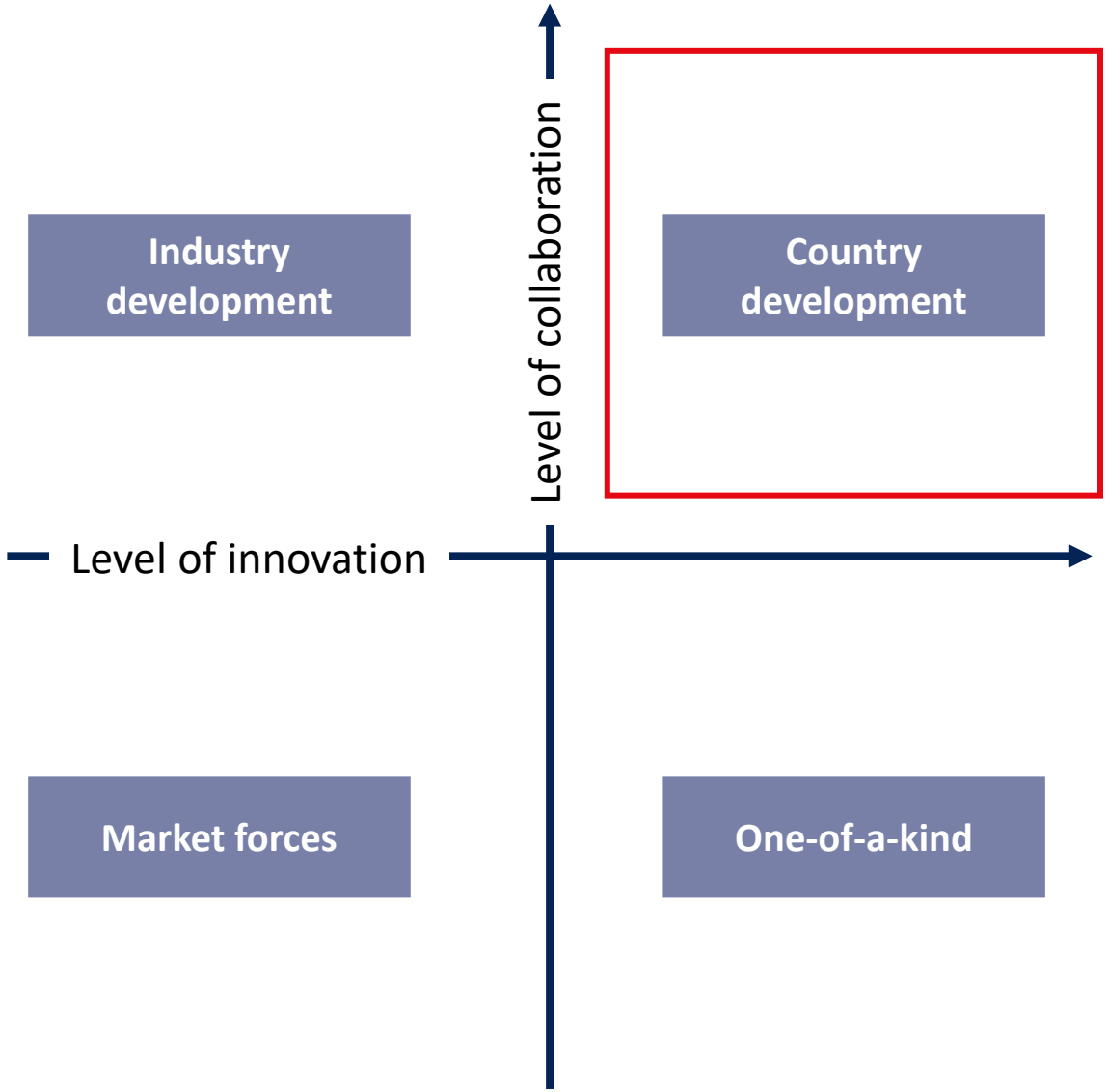
source: Astrid Potemans Graduation Research

Construction City

Different approaches

Current buildings	Future buildings
 Track materials	 Track materials
 Minimize transportation eco-impact	 Up-to-date building passport
 Maximize resources kept	 Modular buildings are more reusable

Viable future scenarios in the construction industry



Country development is the most beneficial future scenario for Construction City

Import substitution

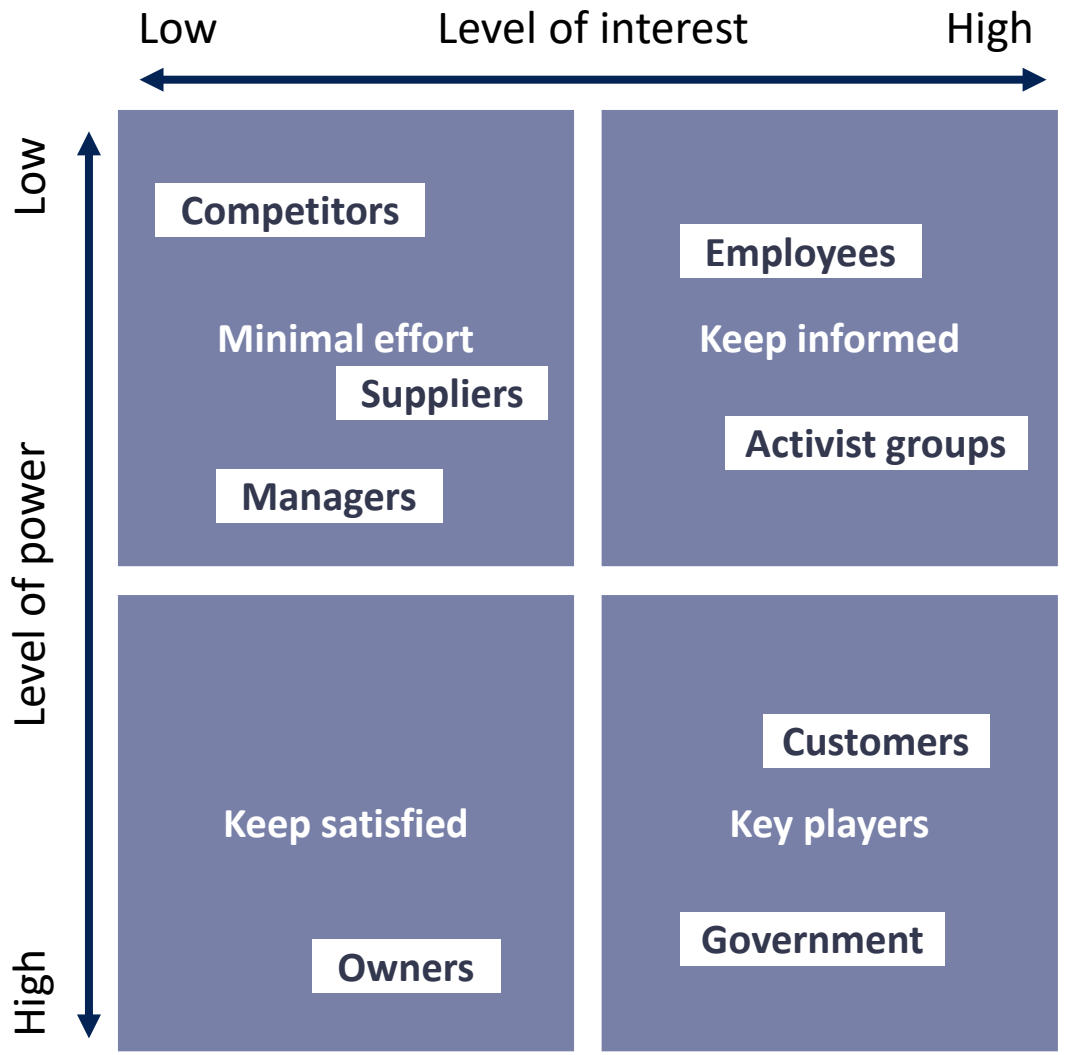
Industry and academia generate innovation

High level of government support

R&D preference

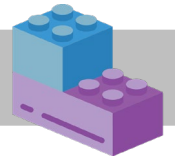
Significant legislation improvement

Stakeholder mapping: the power / interest matrix



Circular future

Construction City

BRIEFING	DESIGN	MANUFACTURE	LOGISTICS	CONSTRUCTION	USE	DEMOLITION	LANDFILL
Residual value is rarely considered	Waste is designed into the building	Virgin materials, performance only at sale	No material tracking, difficult return	On-site cut and assembly, no future care	Lack of information, underutilization	Components cannot be disassembled	No selective collection, downcycling
							
Clients	**Architects**	**Manufacturers**	**Suppliers**	**Contractors**	**Owners/ Investors**	**Deconstruction contractor**	**Recycling facilities**
Residual value is appreciated	Ensure design allows for disassembly	Recover materials and resell	Retain ownership of assets	Prefabrication models, coordination	Allow for the upgrade of systems	Become material reuse providers	Selection, repurposing, recycling

Benefits

Better interest rates	**Knowledge transfer**	**New source of income**	**Protection from scarcity**	**Reduced health and safety risks**	**Maximum efficiency and comfort**	**New business model: Dissassembly expers**	**Realize full value, revenue growth**

KPI timeline assumptions

Construction City

Recovery rate

Assumption	Metric	Value	Calculation
Total waste generated	Tonnes		1896557
Cluster controlled waste	%	0.37	701726.09
Total landfill	Tonnes		689541
Cluster controlled landfill	%	0.37	255130.17
Result landfill	Tonnes		434410.83
New Ratio to total	%		0.229052346

Assumption	Metric	Value	Calculation	
Total landfill midterm	Tonnes		434410.83	
Fourth year ratio	%	0.38	165076.1154	
Fifth year ratio	%	0.38	165076.1154	
Sixth year ratio	%	0.18	78193.9494	Ratio to total
Fourth year landfill	Tonnes		269334.7146	0.142012454
Fifth year landfill	Tonnes		104258.5992	0.054972563
Sixth year landfill	Tonnes		26064.6498	0.013743141

Recycling + reuse rate

Assumption	Metric	Value	Calculation	
Total waste generated	Tonnes		1896557	
Sent to recycling	Tonnes		647471	
Recycling ratio	%		0.34139285	Ratio to total
Year 3 end	Tonnes		902601.17	0.475915657
Year 4 end	Tonnes		1067677.285	0.562955548
year 5 end	Tonnes		1232753.401	0.64999544
Year 6 end	Tonnes		1310947.35	0.691224862

Assumption	Metric	Value	Calculation	
Total buildings	Building		1,555,734	
Yearly built	Building		35,000	Ratio to total
Year 10 end	Building		350,000	0.224974192
Year 20 end	Building		700,000	0.449948384
Year 30 end	Building		1,050,000	0.674922577
year 40 end	Building		1,400,000	0.899896769

Stakeholder costs and benefit

Construction City

Construction city

Assumption	Metric	Value	Calculation
Targeted actors sum			32
Certification price			10000
Certification revenue			320000

Assumption	Metric	Value	Calculation
1 tonnes brick price			285
Recycled brick price			310
Comission		0.03	9.3
Subsidy			35
Year 3 end sold			279,806,363
Year 3 end comission			8,394,191
Year 3 subsidy			31,591,041
Year 4 end sold			330,979,958
Year 4 end comission			9,929,399
Year 4 subsidy			37,368,705
Year 5 end sold			382,153,554
Year 5 end comission			11,464,607
Year 5 subsidy			43,146,369
Year 6 end sold			406,393,679
Year 6 end comission			12,191,810
Year 6 subsidy			45,883,157

Manufacturing facility

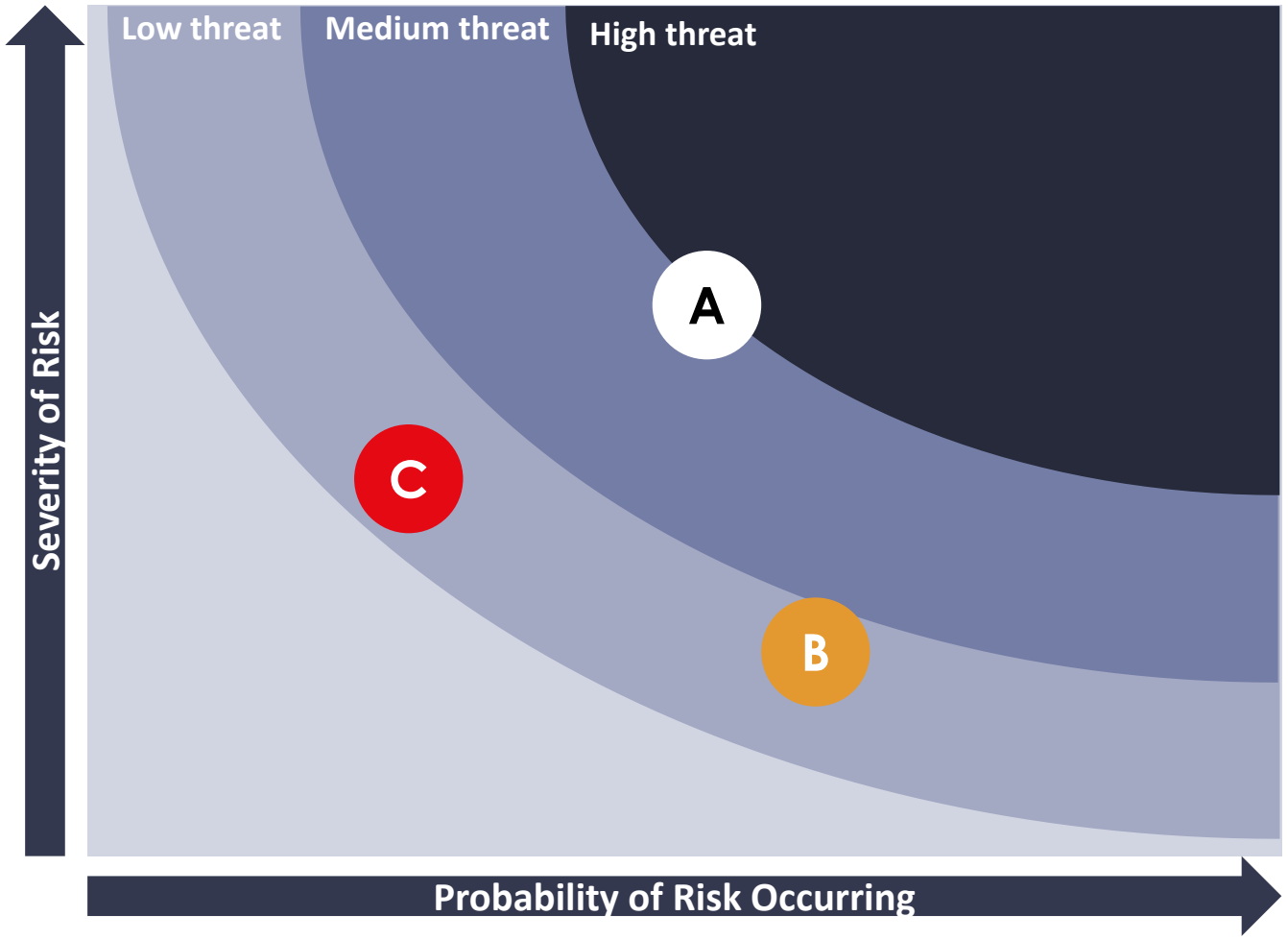
Assumption	Metric	Value	Calculation
Cost due to no production	NOK		582,930
Technology benchmark	NOK		1,530,000
Certification price	NOK		10,000
One year capacity	Tonnes		63,333
Profit per tonnes	NOK		19
Profit	NOK		1,222,333
Payback	Years		2.24

Construction City

Construction city

Assumption	Metric	Value	Calculation
Certification cost	NOK		224,000
Manufacturing plant cost	NOK		20,000,000
HR/admin expenses	NOK		2,520,000
Capital expenses	NOK		571,200
Development cost	NOK		1,700,000
Maintenance cost	NOK		839,419
Revenue	NOK		8,394,191
Margin	NOK		4,810,772
Breakeven	Years		4.157337089

Building trust and awareness persuades final customers to adopt CE



Risks and Mitigation Strategies

Strategic | **Implementational** | **Financial**

A **Final consumers are hesitant to reuse materials**

Building trust and awareness in collaboration with educational institutions and activist groups

B **Manual workers are reluctant towards new tasks**

Developing employee expertise on new technology, providing assistance in the mindset change

C **Companies will bypass the material resell platform**

The performance of platform users is monitored automatically, supported by manual checks