

## A SUSTAINABLE FUTURE FOR THE EUROPEAN CEMENT AND CONCRETE INDUSTRY

Technology assessment for full decarbonisation  
of the industry by 2050



# Decarbonisation of the European concrete and cement sector

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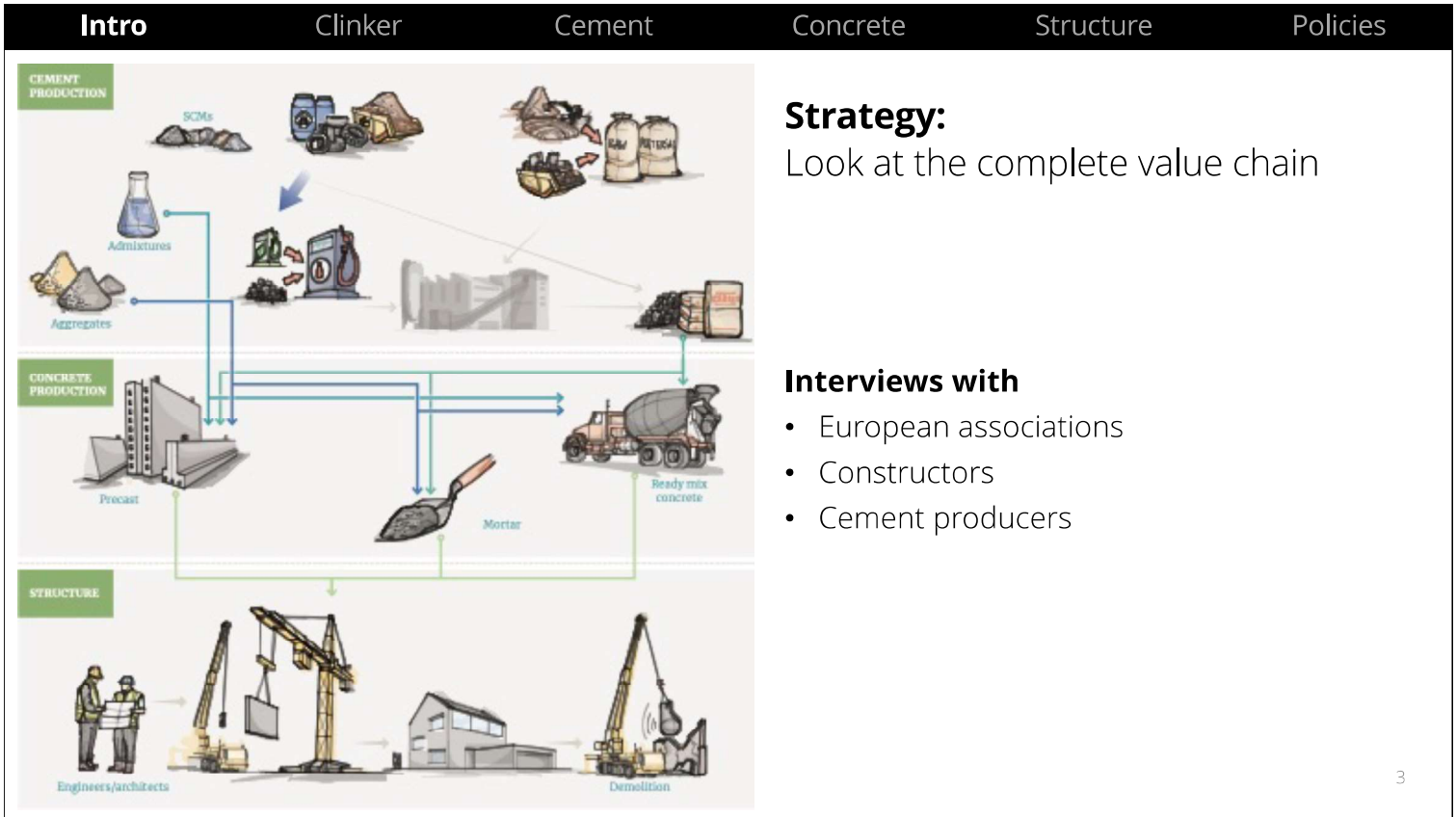
**Pantheon, Rome**

Former roman temple, 119-128 AD

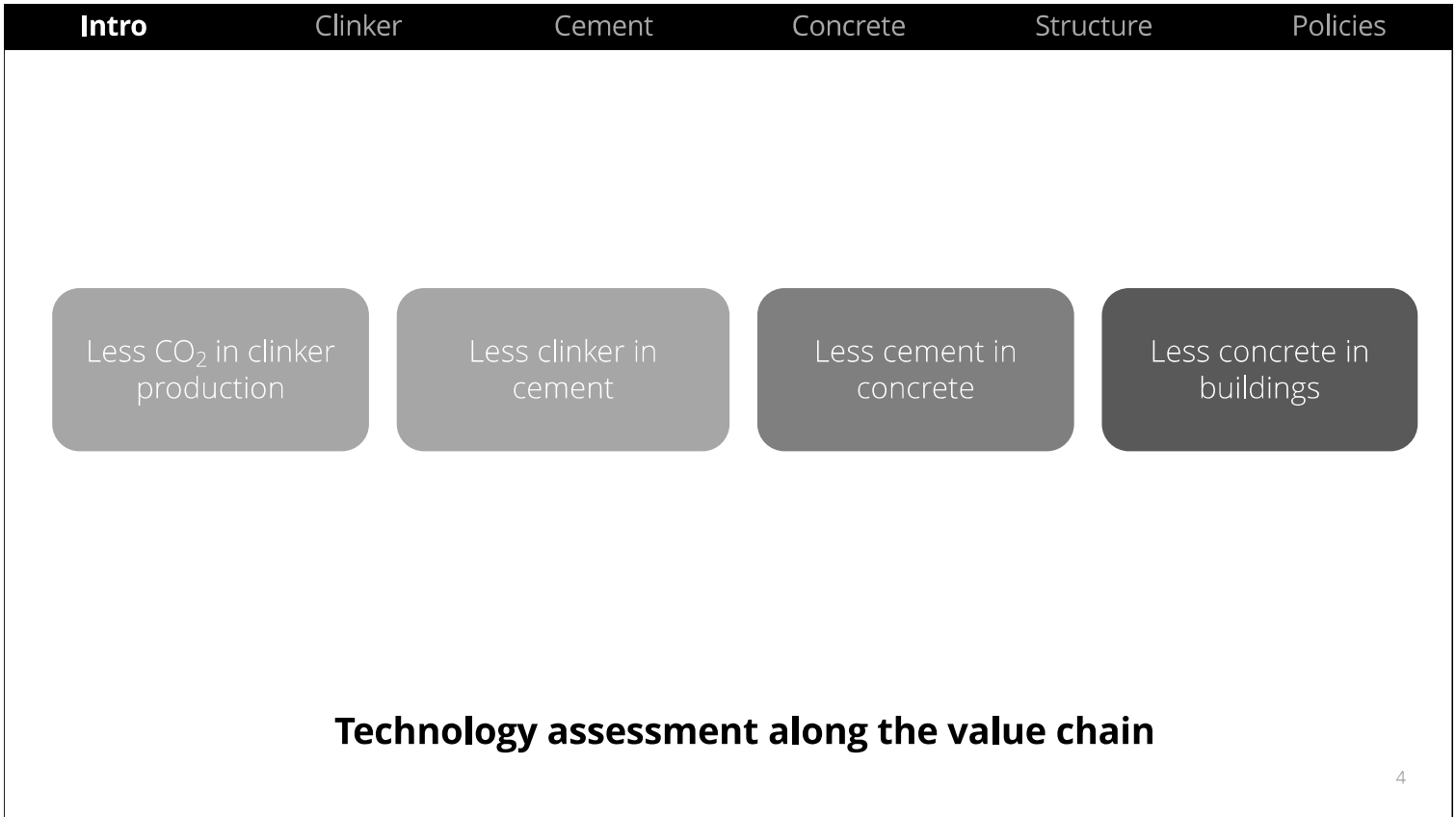


**Kingdome, Seattle**

Naramore, Skilling & Praeger, 1976-2000



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## Less carbon in clinker production

Clinker  $875 \text{ kgCO}_2\text{eq/t}_{\text{clinker}}$

- 30-40% from energy required to heat limestone and clay at  $1500^\circ\text{C}$
- 60-70% from chemical reaction of the decarbonisation of limestone

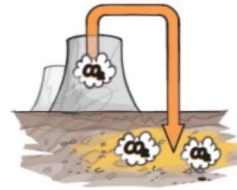
### Dry technologies



### Alternative fuels



### Carbon capture and storage



### Alternative binders



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## Less clinker in cement

Average clinker to cement ratio in Europe is 0.73

- Availability of supplementary cementitious materials (SCMs)
- Improving reactivity with efficient grinding

### SCM substitution



### Alternative raw materials including recycling fines



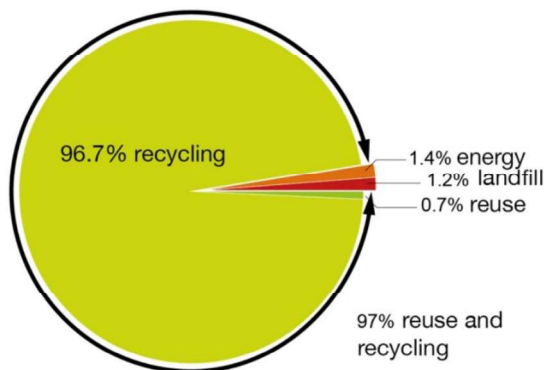
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Old International Olympic Committee (IOC), Lausanne



New IOC Headquarters, Lausanne



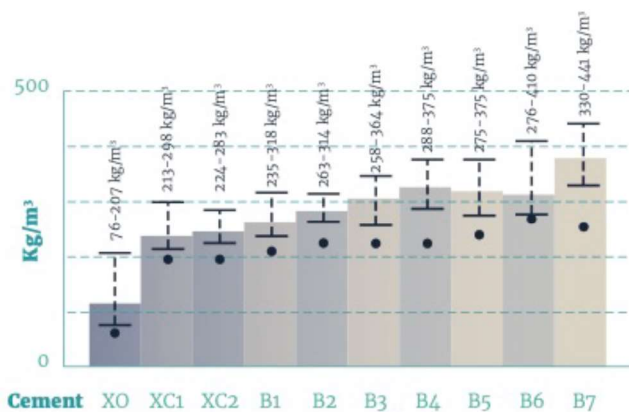
Treatment	Deconstruction	Demolition	Total (deconstruction+demolition)	
	Weight tonnes	Weight tonnes	Weight tonnes	% of total weight
Reuse	114.4	-	114.4	0.7%
Round gravel	67.7	-	-	-
Cement components	24.6	-	-	-
Others	22.1	-	-	-
Recycling	470.6	14,880.1	15,350.7	96.7%
Light iron	204.0	-	-	-
Glass	110.9	-	-	-
Metals and scrap iron	81.6	-	-	-
Others	74.1	-	-	-
Concrete	-	13,449.3	-	-
Iron/concrete columns	-	619.1	-	-
Inert	-	515.0	-	-
Others	-	296.6	-	-
Thermal Repurposing	150.9	64.1	215.0	1.4%
Foam glass	146.6	-	-	-
Others	4.3	-	-	-
Landfill	81.2	106.1	187.3	1.2%
<b>TOTAL</b>	<b>817.06</b>	<b>15,050.36</b>	<b>15,867.42</b>	<b>100%</b>



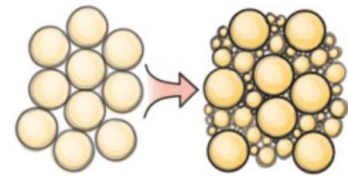
## Less cement in concrete

Overconsumption of cement 20% compared to standard

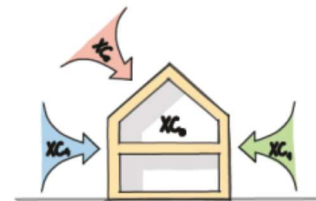
- Concrete producers want to reduce risk through error margin
- Most conservative exposure classes are chosen



Improved granular packing & use of admixtures

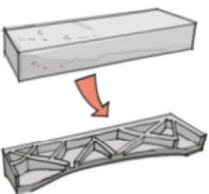


Appropriate exposure classes

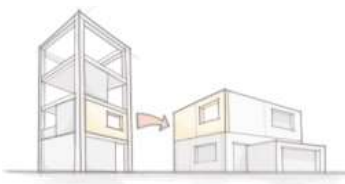


## Less concrete in buildings

Optimization

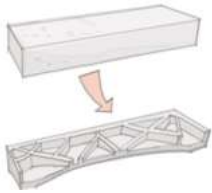


Reuse

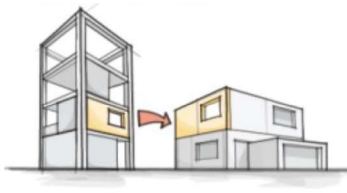


## Less concrete in buildings

### Optimization



### Reuse

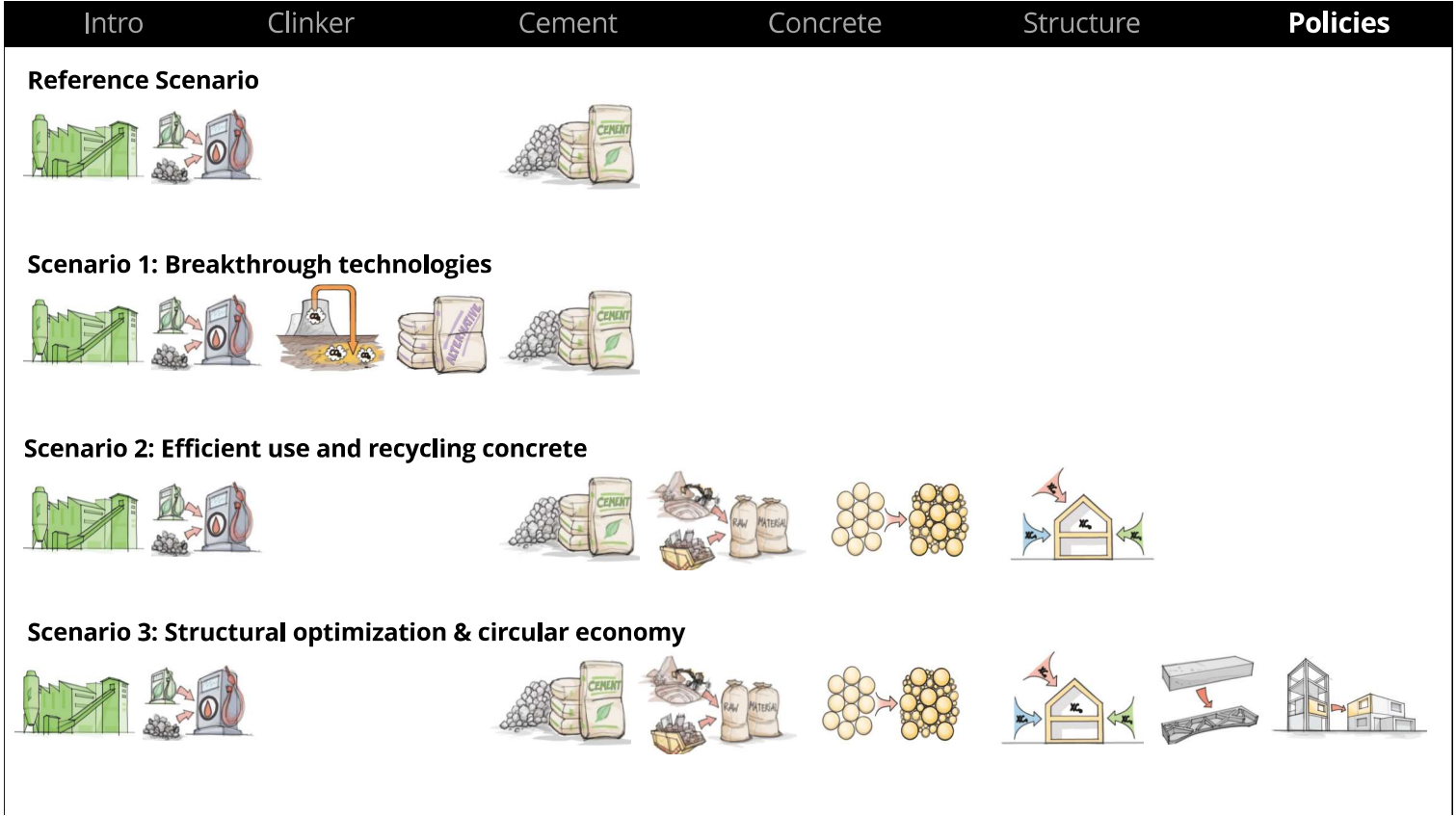
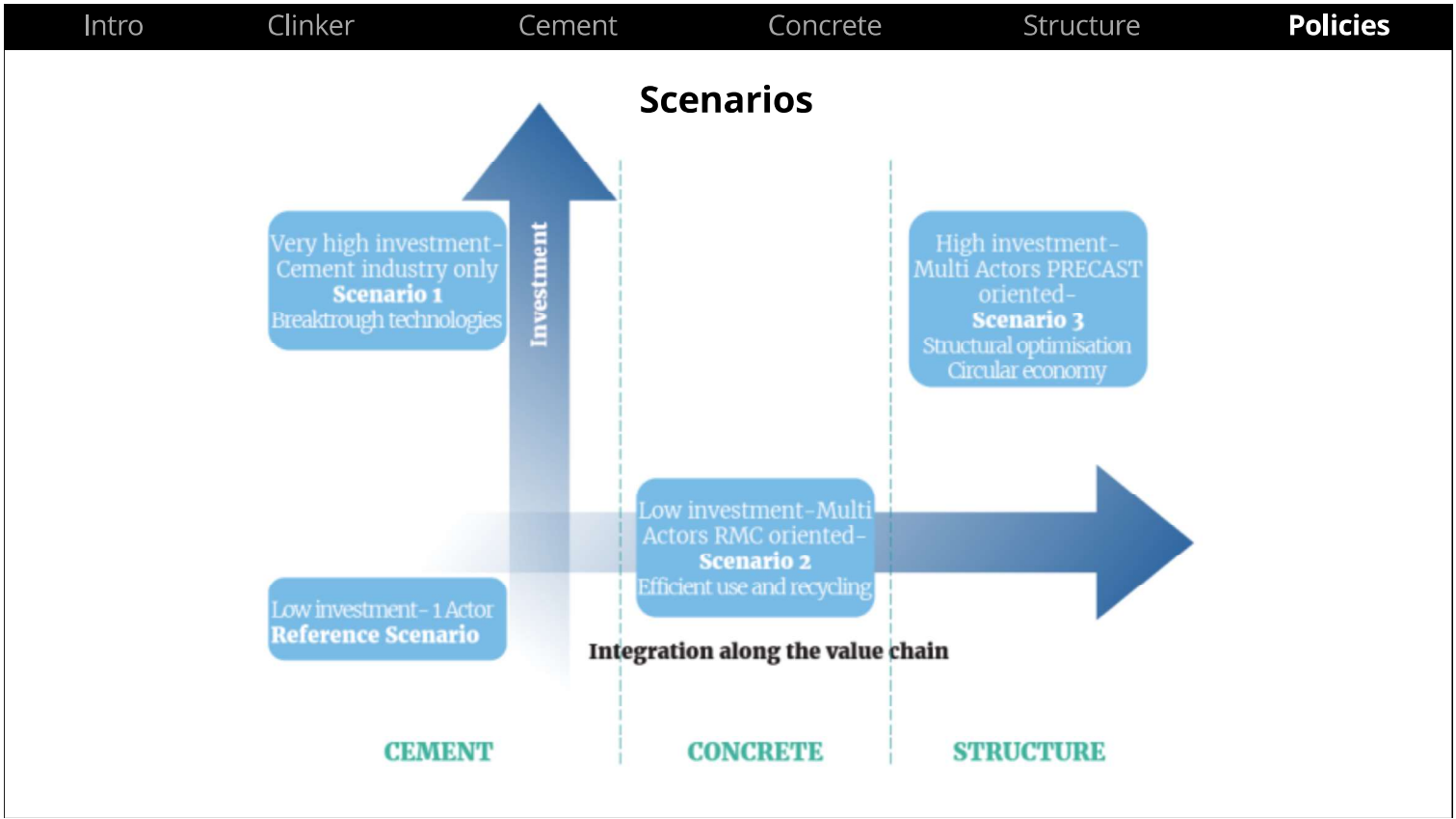


Circular Retrofit Lab  
TRANSFORM (VUB), Van Der Meeren (1973), Brussels

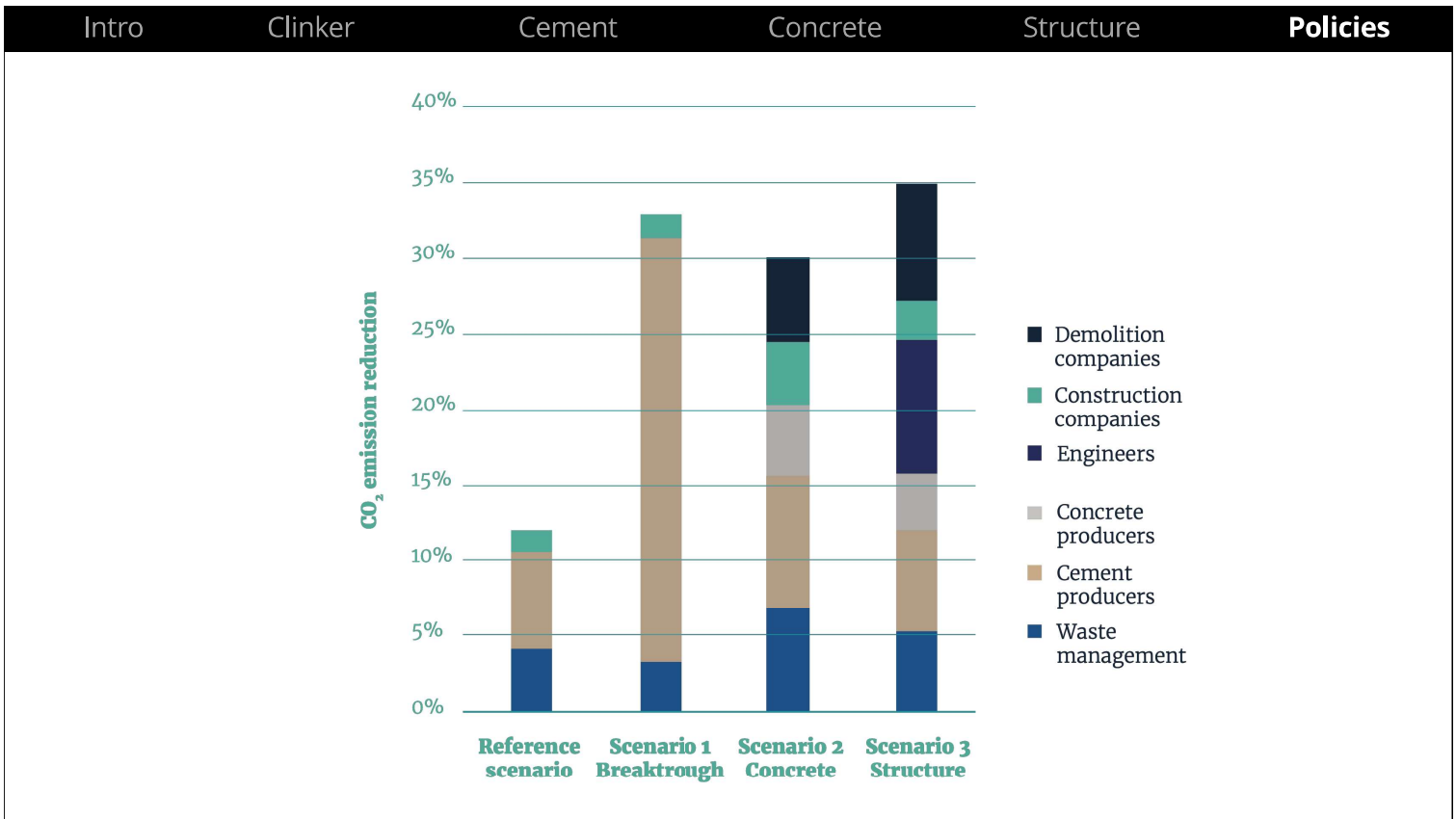


Reuse of concrete elements, St-Aubin, Switzerland









Intro	Clinker	Cement	Concrete	Structure	Policies
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## Policies

- Close old plants
- Regulate landfill
- Provide public-private financial support for CCS
- Incentivise local partnerships between cement and waste producers
- Compensate for loss of productivity SCMs
- Invest in clay calciners
- Require quarries to provide more than one granular class
- Include more time for design as a criterion for awarding contracts
- Enforce respect of standard
- Tax complete demolition and promote deconstruction

