Business-models of gravel, cement and concrete producers in Switzerland and their relevance for resource management and economic development on a regional scale

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High construction activity and limited resources call for circular economy!

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Research Questions (general)

“Co-Evolution of Business Strategies in Material and Construction Industries and Public Policies”

Research project funded by the Swiss National Science Foundations (2017-2021).

Guiding research questions:

- What are the central co-evolution mechanisms driving alternative business models and regulation in the Swiss construction industry?
- How can this co-evolution process be directed towards sustainability?

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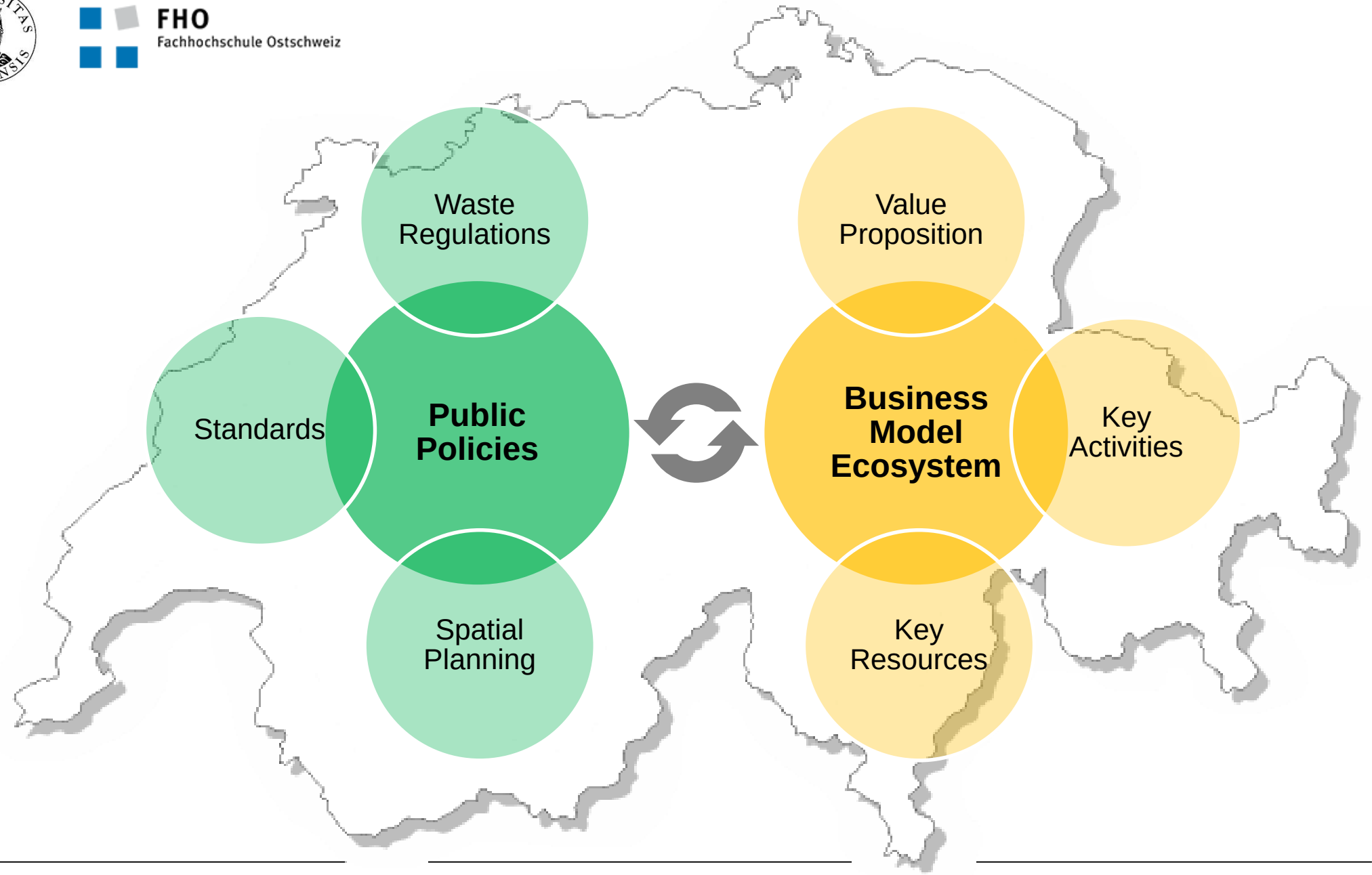
ETH zürich

FHO Fachhochschule Ostschweiz

“Co-Evolution of Business Strategies in Material and Construction Industries and Public Policies”



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Research Questions

- Can the success of alternative business models be explained by boundary conditions in the specific markets, in the regional supply of natural resources or incentives from public administration?
- If a business model is considered favorable in the transition towards a circular economy, can it be transferred from one region to another without losing its economic benefits?
- How does such a transition towards alternative business models affect regional resource consumption, emissions and value added on regional scale?

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How to assess an industry?

Material-Flow-Analysis (MFA)
(data from existing models; case studies)

Life-Cycle-Assessment (LCA)
for concrete (ecoinvent database)

Prices and costs
(case studies, statistical data)

Environmental Extended Input-Output-Tables
environmental impact: global warming potential GWP 100 years, kg CO_2 eq,
economic impact: value added VA in CHF/a

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Which Indicators?

Indicator	Unit
Amount of virgin gravel/sand extracted	ton per year
Amount of excavated material deposited	
Amount of recycling materials used for producing construction materials	
Value added	CHF per year
Global Warming Potential (GWP)	kg CO_2 eq. per year

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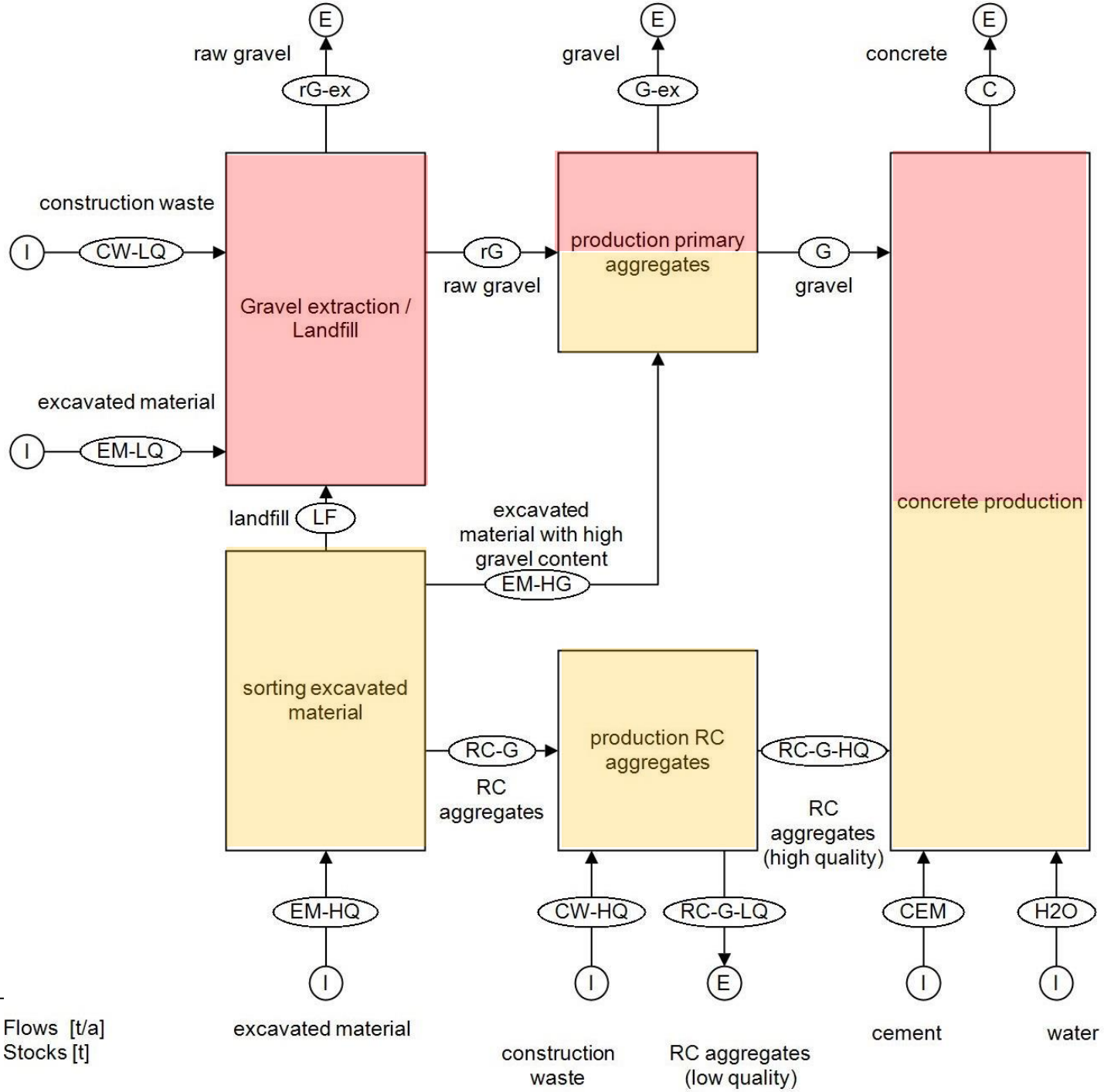
MFA of Companies

Company A "Extraction"

Company B "Recycling"



Flows [t/a]
Stocks [t]

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Results Companies

	Change in Value added per ton of concrete		Change in Value added per ton of primary aggregate		Change in Value added per ton of recycling aggregate		Change in GWP per ton of concrete	
[CHF]	company A	company B	company A	company B	company A	company B	[kg CO_2-Eq] company A	company B
landfill	3.38	-	5.67	-	-1.30	-	-	-
gravel extraction	7.34	4.83	11.50	6.54	-	-	-	-
production primary aggregates	1.58	7.10	2.47	12.19	-	-	3.13	2.82
production recycling aggregates	2.81	2.60	-	-	15.49	14.63	0.69	0.66
concrete production	19.50	21.60	-	-	-	-	99.22	99.22
	34.61	**36.13**	**19.64**	**18.73**	**14.18**	**14.63**	**103.04**	**102.71**

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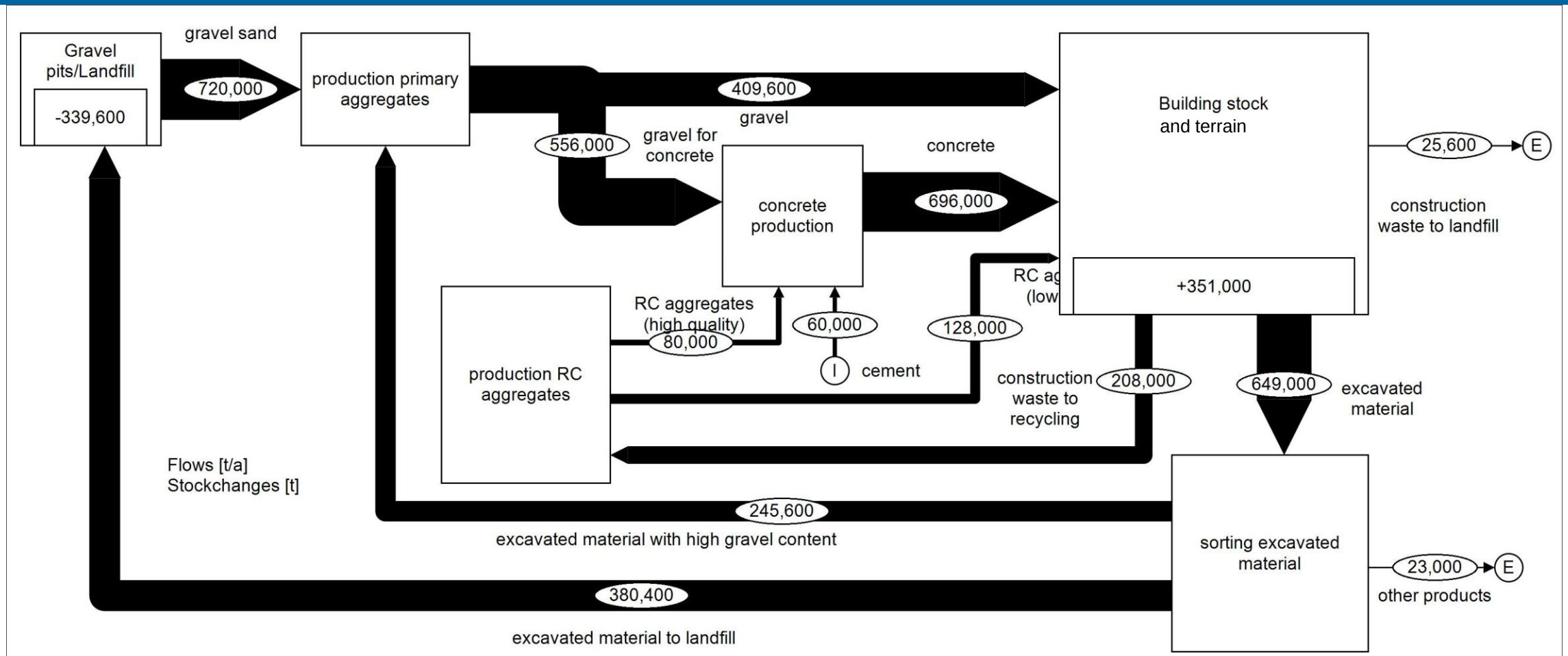
MFA of Model Region «AlpVal»



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Results Regions

Scenario A: All concrete and gravel produced in ALPVAL is produced by company A “Extraction”
Scenario B: All concrete and gravel produced in ALPVAL is produced by company B “Recycling”

	status quo	Scenario A	Scenario B
Amount of virgin gravel/sand extracted (tons per year)	720’000.00	656’432.00	402’944.00
Amount of excavated material deposited (tons per year)	380’400.00	485’264.00	0
Amount of recycling materials used for producing construction materials (tons per year)	208’000.00	253’280.00	253’280.00
Value added (CHF per year)		33’948’144.00	34’690’928.00
Global Warming potential (kg CO2 eq per year)		71’715’840.00	71’486’160.00

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Conclusion

- success of both BM depends on the regional availability of raw materials and the possibility to process/landfill excavated material, but both BMs are economically beneficial ►depends on settlement development / spatial planning
- higher material turnover leads to a higher revenue ► BM so far do not fully decouple this logic but expand their value proposition with additional services such as waste management and logistics.
- effects on resource consumption (virgin material and amount of excavated material deposited) can be significant
- **it is essential to identify alternative business models and understand their impact on the production and consumption of primary and secondary resources**

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THANK YOU FOR YOUR ATTENTION

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