Dynamics of built environment - An approach for modelling future material flows in the building industry

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MAREX-Conference
28. Juni 2016

DRESDEN concept

Leibniz Institute of Ecological Urban and Regional Development

Material-Flow perspective

Built environment

Raw material

Building material

C&D-Waste

Circular economy

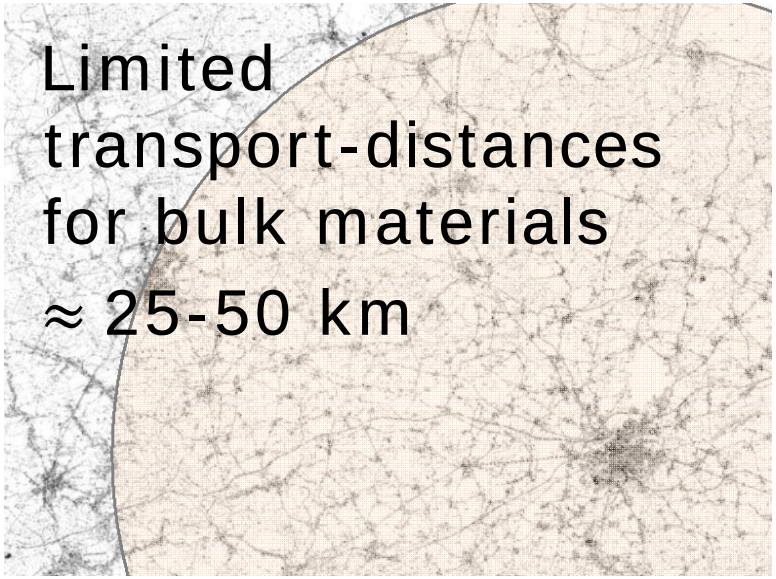
Mining → Raw material → Processing → Building material → Use → C&D Waste → Disposal/ Recycling → Waste

Secondary resources

Regional perspective

Raw material

Building material



C&D-Waste

Circular economy

Mining → Raw material → Processing → Building material → Use → C&D Waste → Disposal/ Recycling → Waste

Secondary resources

Planning areas touched by MFA

Settlement planning

Infrastructure planning

Green building

Capacity planning mining

Building material production

Waste management

Circular economy

Regional planning, Land use planning

Planning areas touched by MFA

Capacity planning
mining

Building material
production

Settlement planning

Infrastructure planning

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Waste management

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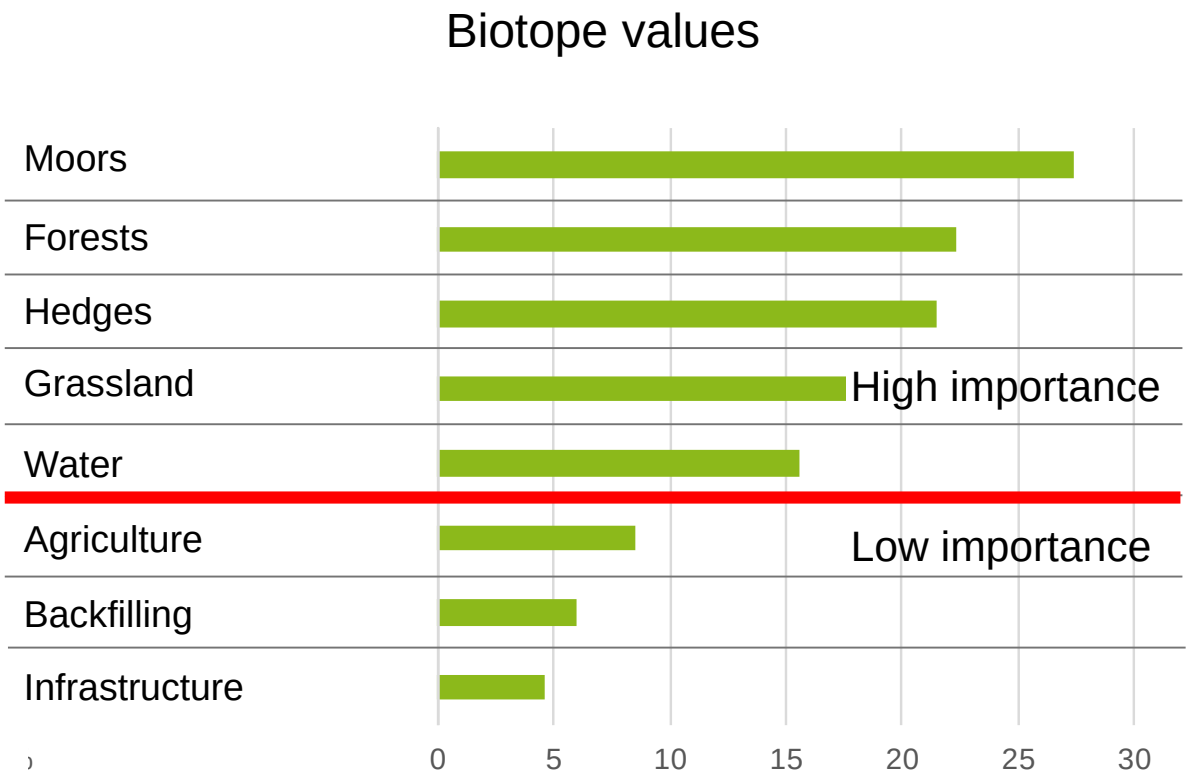
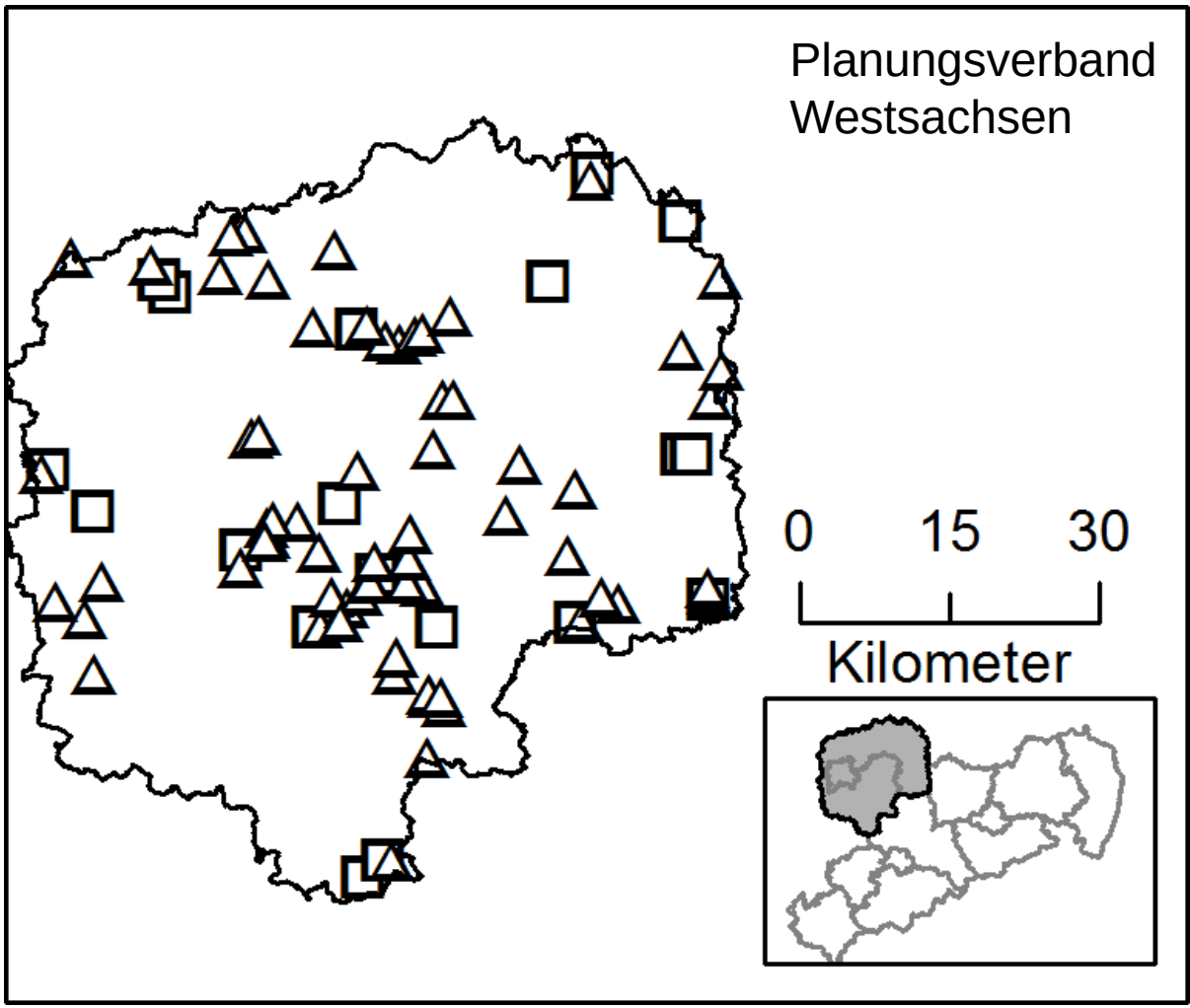
Assessment of land take due to material excavation

- e.g. considering nature conservation perspective

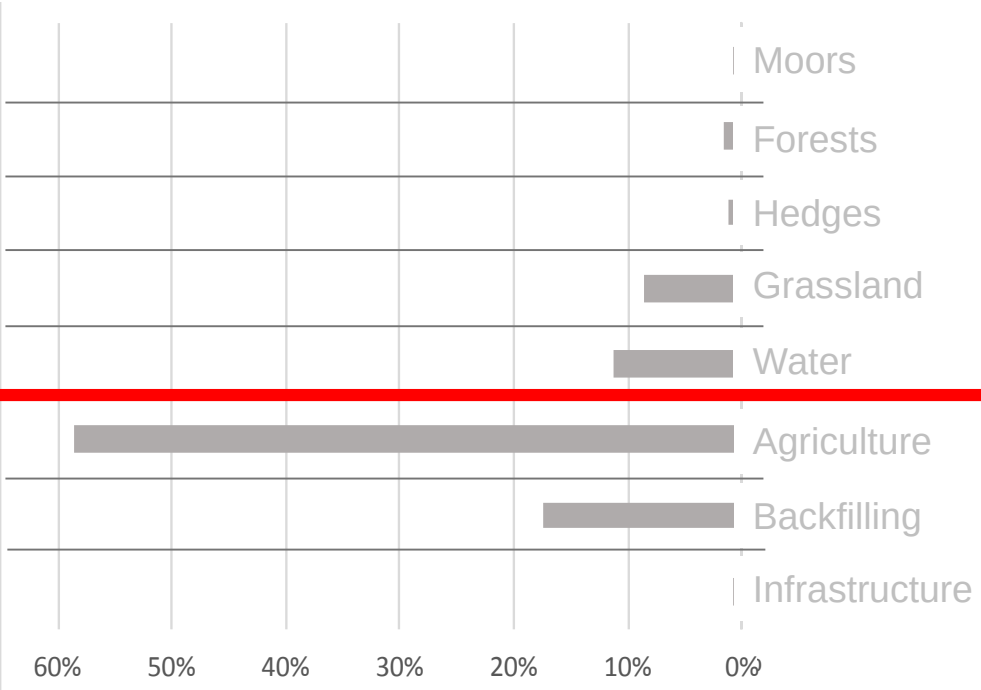


Land use planning for mining areas

- Priority area for mining
- Restricted areas for mining



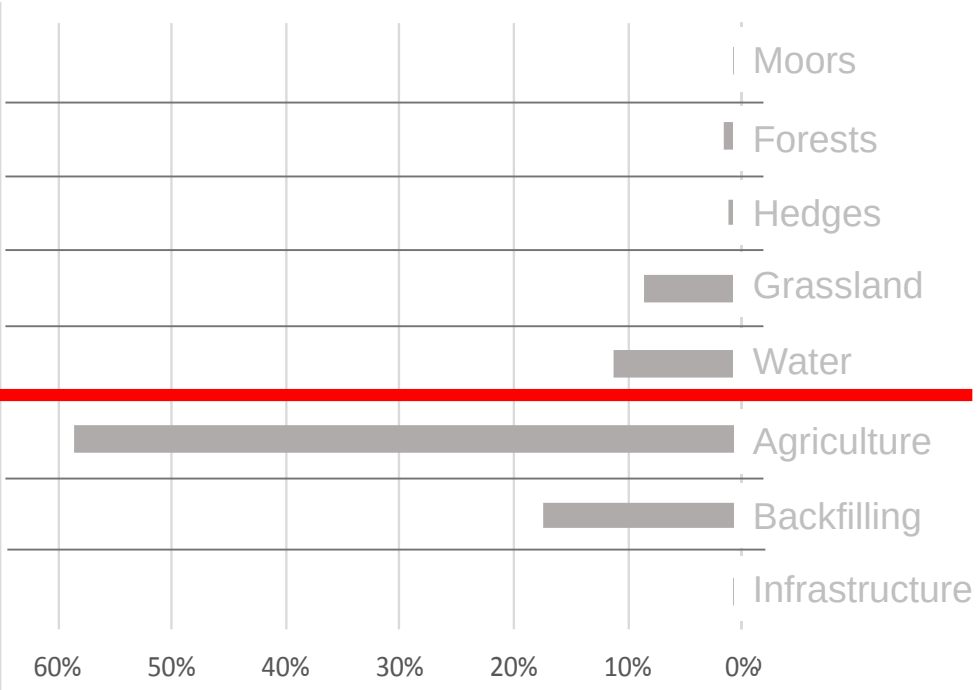
Distribution of potential excavation areas to areas with high and low „nature-conservation-importance“ (%)



High importance

Low importance

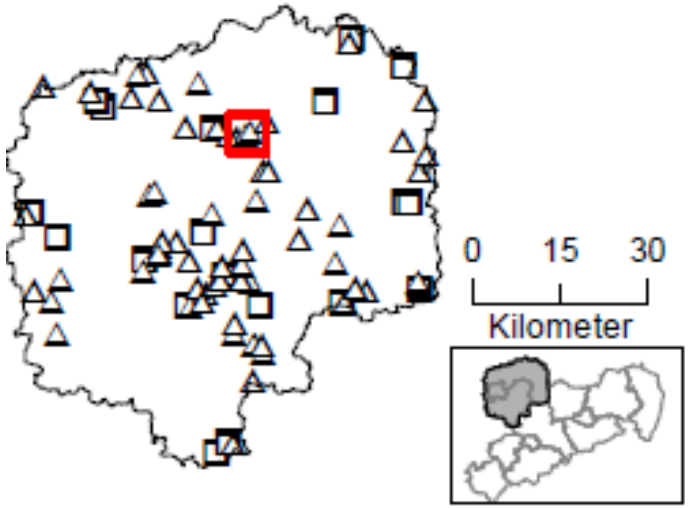
Distribution of potential excavation areas to areas with high and low „nature-conservation-importance“ (%)

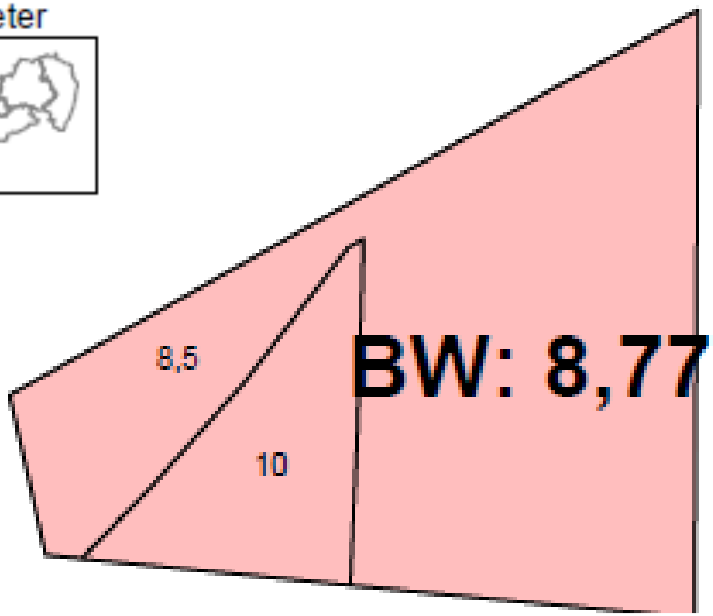


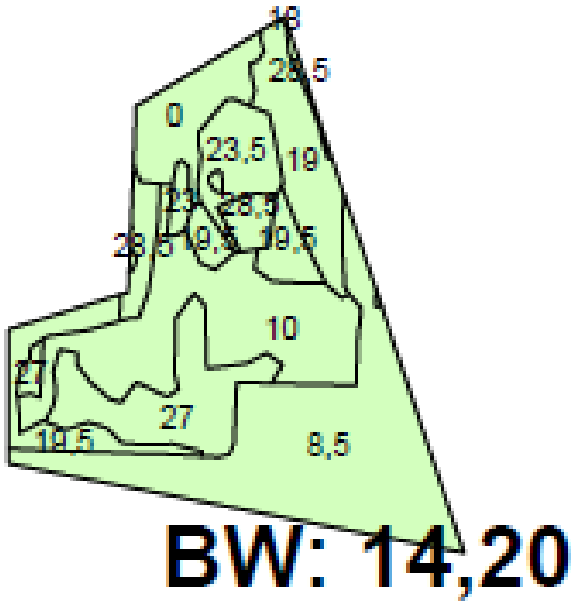
MFA:
Basis to estimate demand

Basis to identify potentials for reductions

Link to land use planning







Priority mining

Priority nature conservation

Planning areas touched by MFA

Capacity planning
mining

Building material
production

Settlement planning

Infrastructure planning

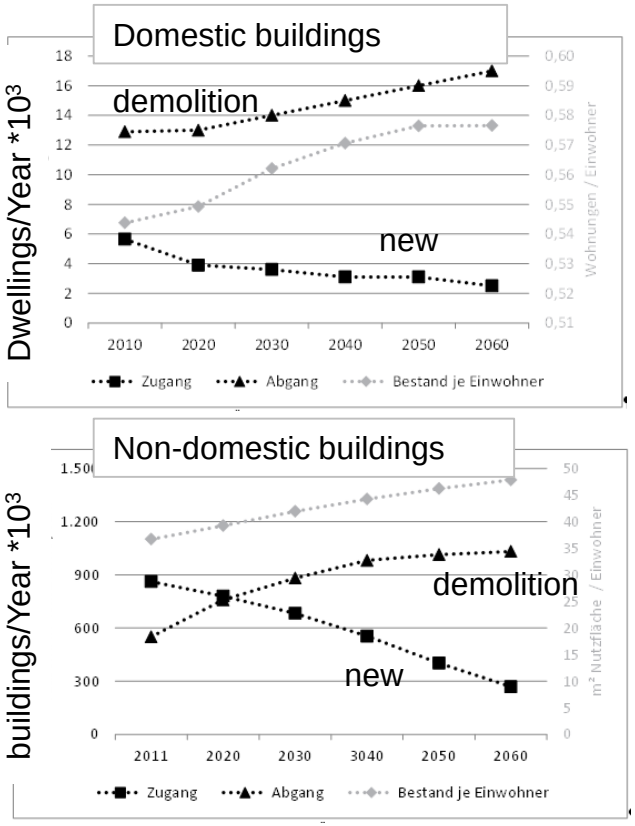
Green building

Waste management

Circular economy

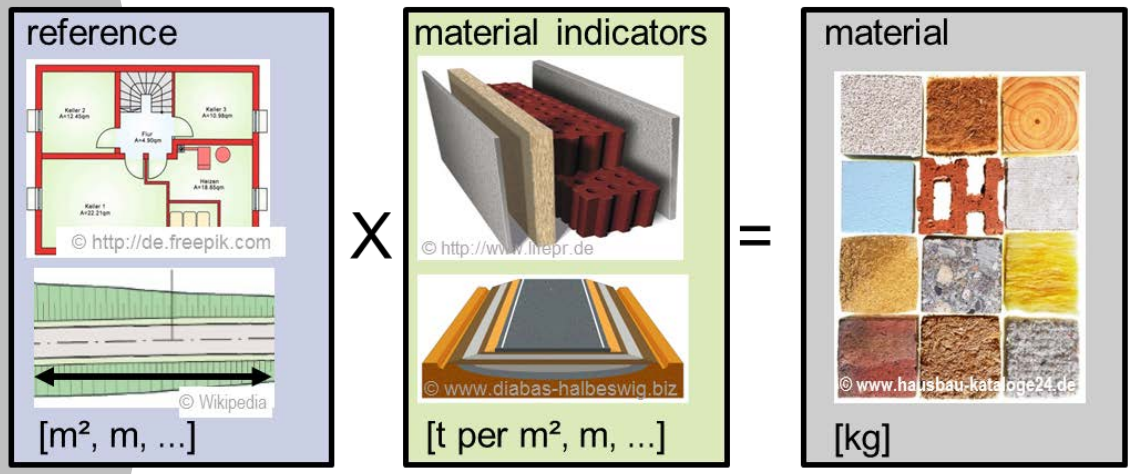
Regional planning, Land use planning

Translation of demolition activities e.g. to C&D-waste-flows



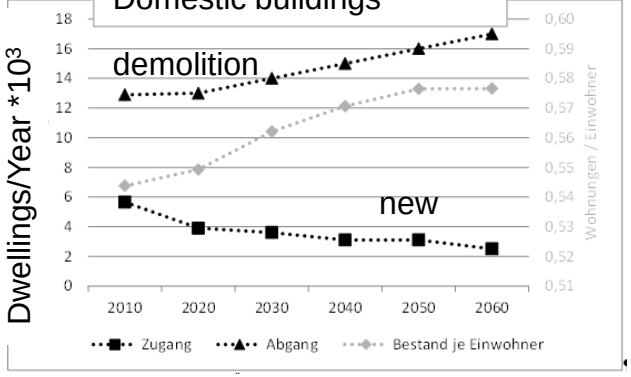
Road construction

- „Landesverkehrswegeplan“
- Assumptions

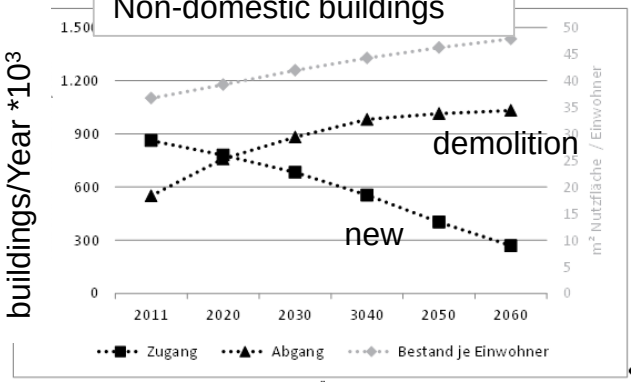


Translation of demolition activities e.g. to C&D-waste-flows

Domestic buildings

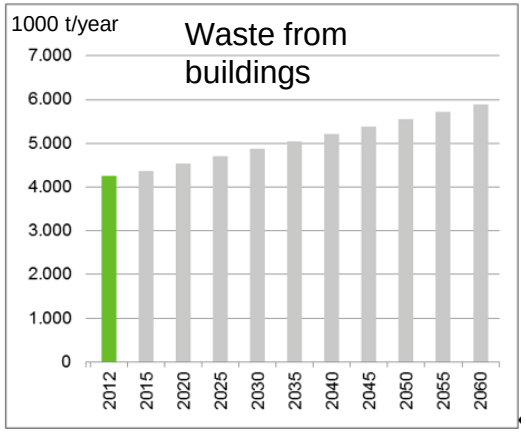


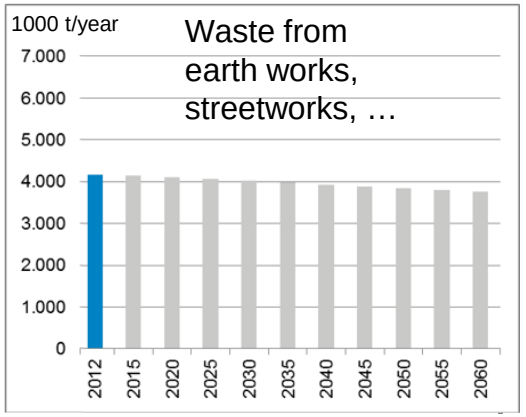
Non-domestic buildings



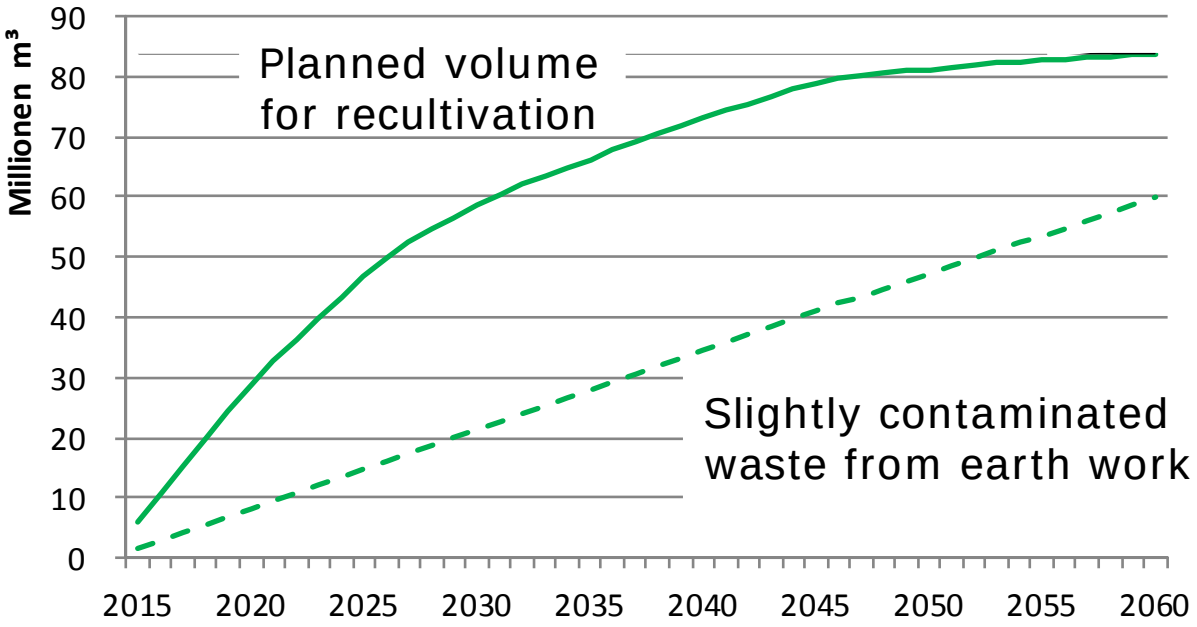
Road construction

- „Landesverkehrswegeplan“
- assumptions

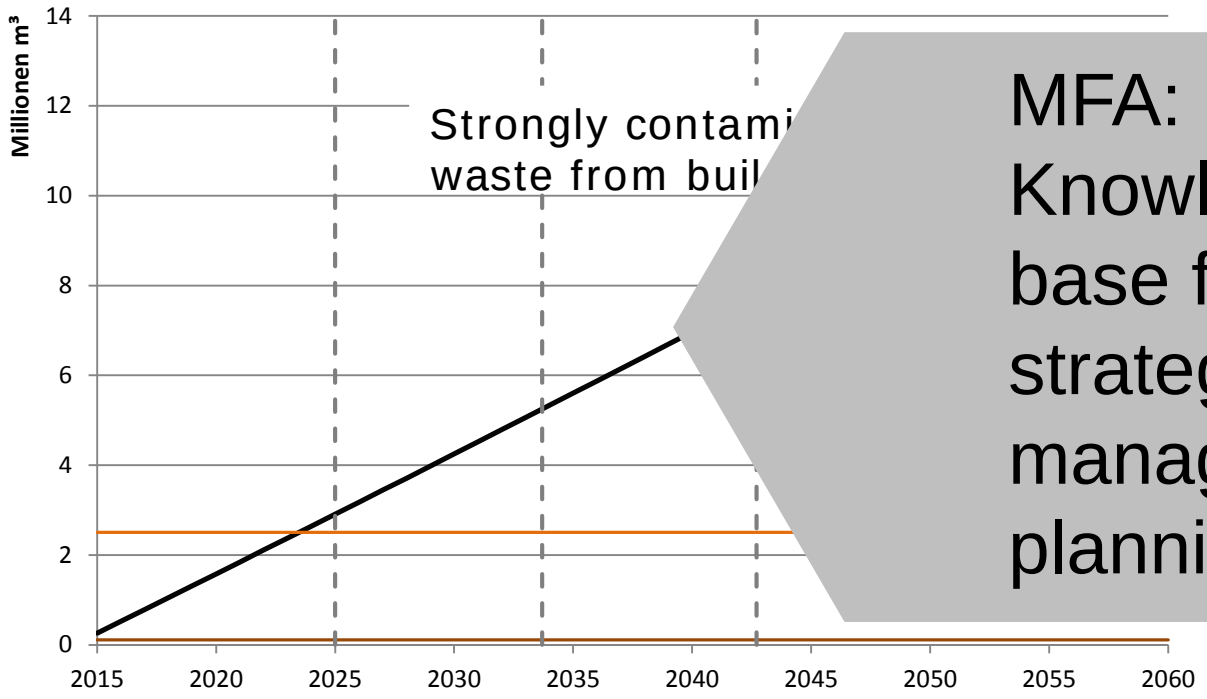




Potential for waste recovery



Landfill planning



MFA: Knowledge base for strategic waste management planning

Planning areas touched by MFA

Settlement planning

Infrastructure planning

Green building

Capacity planning mining

Building material production

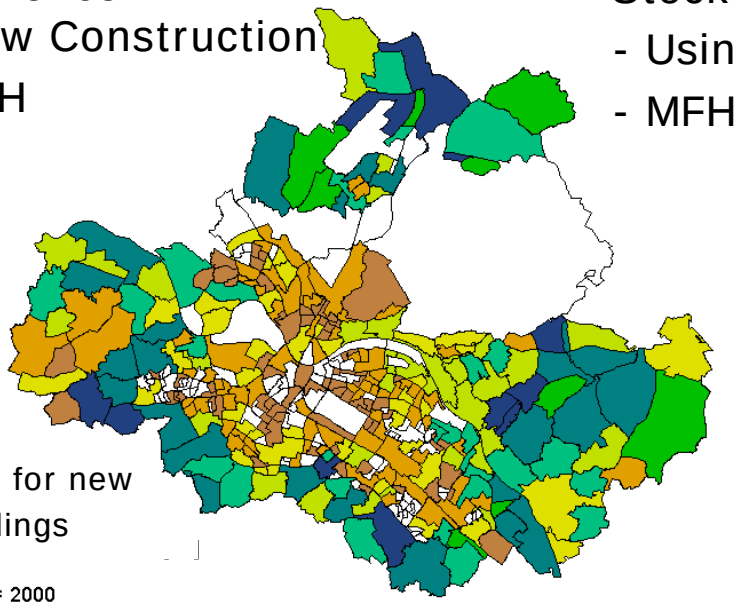
Waste management

Circular economy

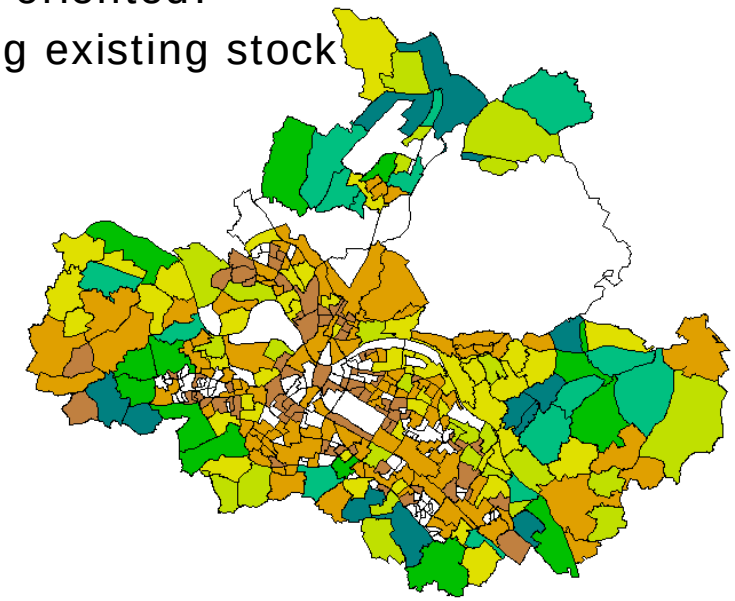
Regional planning, Land use planning

Alternative settlement development paths – Identical demand for dwellings

Reference:
- New Construction
- SFH



Stock-oriented:
- Using existing stock
- MFH

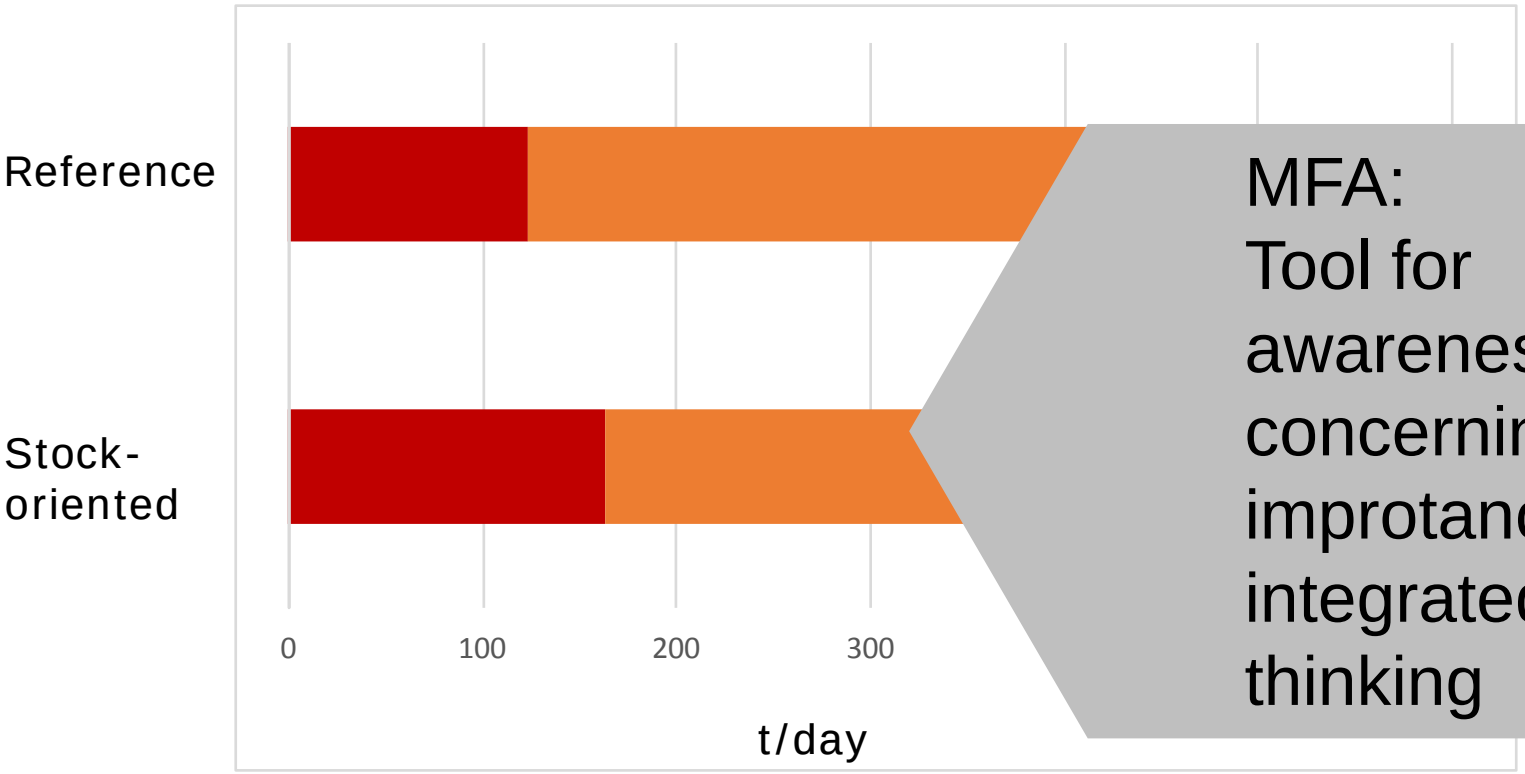


Area for new buildings

- <= 2000
- > 2000 und <= 7000
- > 7000 und <= 12000
- > 12000 und <= 20000
- > 20000 und <= 35000
- > 35000 und <= 50000
- > 50000 und <= 100000
- > 100000

0 6 12 km

Demand for building material



MFA:
Tool for awareness-rising concerning the improtance of integrated thinking

MAREX-MFA-Model APPROACH

Built environment

Raw material

Building material

C&D-Waste

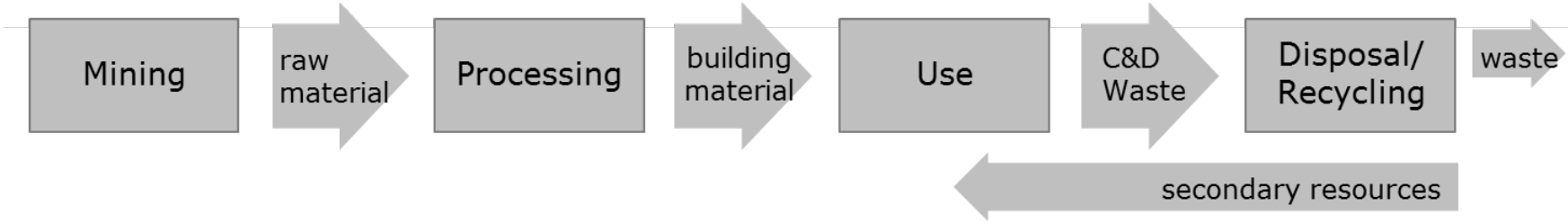
Circular economy

Mining → Raw material → Processing → Building material → Use → C&D Waste → Disposal/ Recycling → Waste

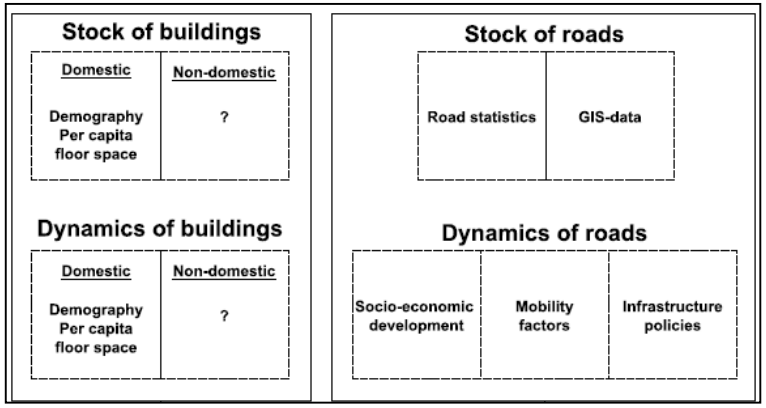
Secondary resources

MAREX-MFA-Model APPROACH

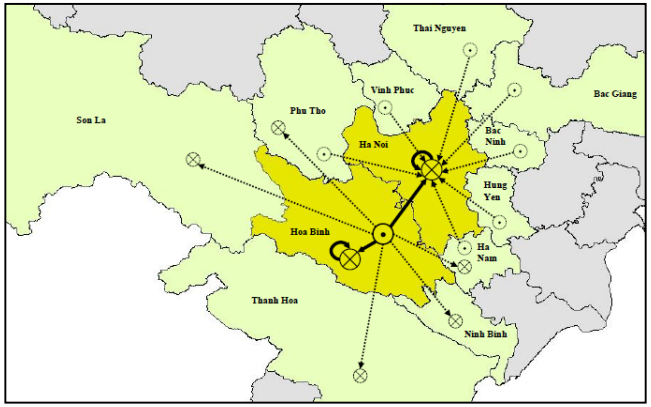
Process chain



Built environment

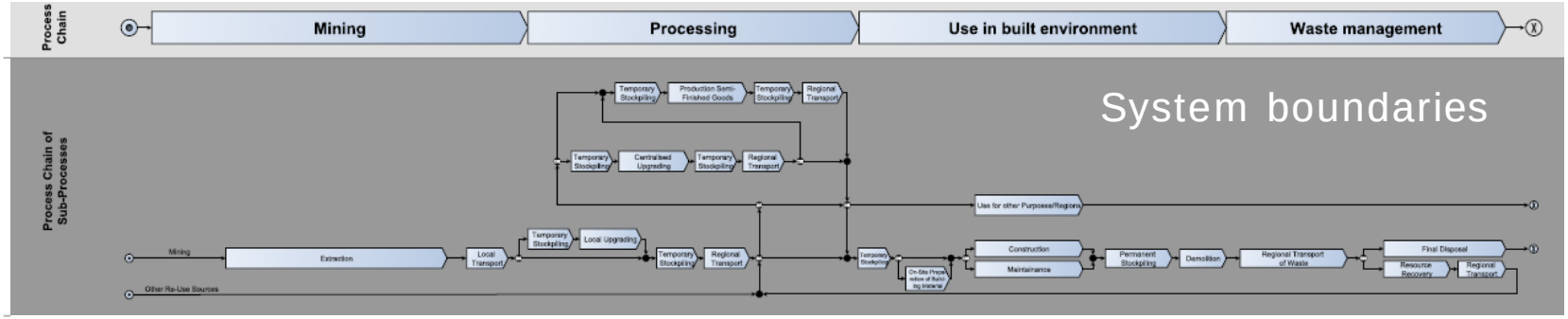


Spatial reference



Process chain

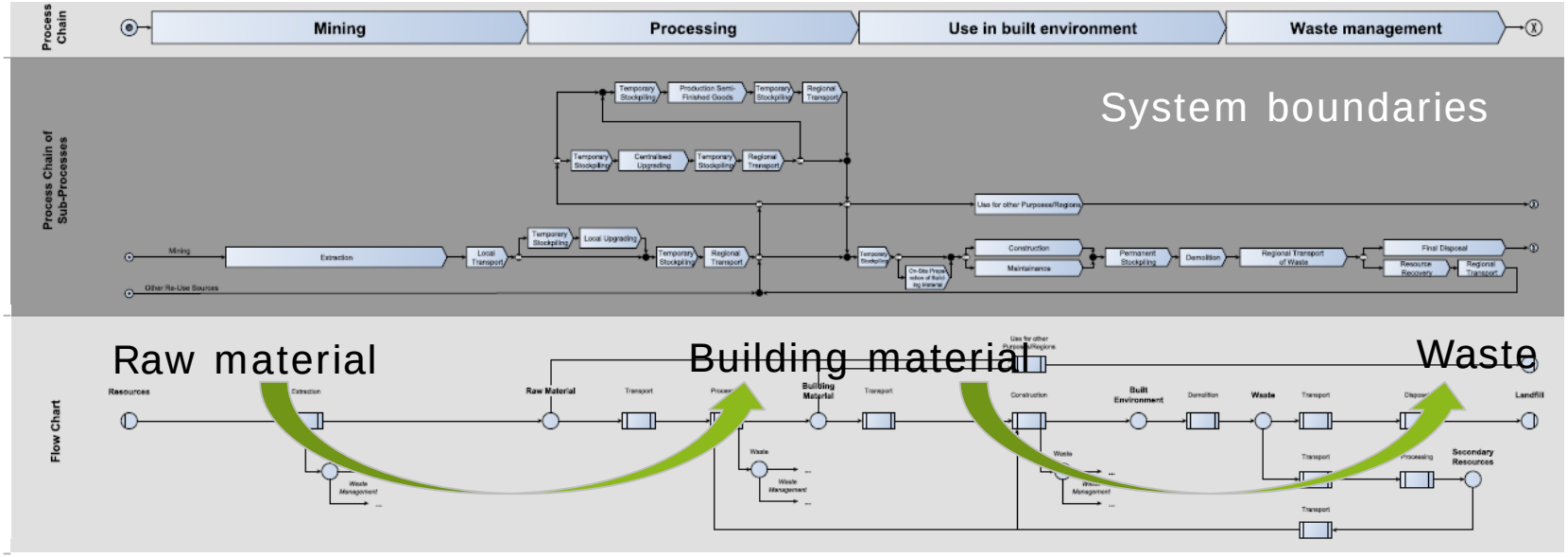
processes



Process chain

processes

stocks and flows

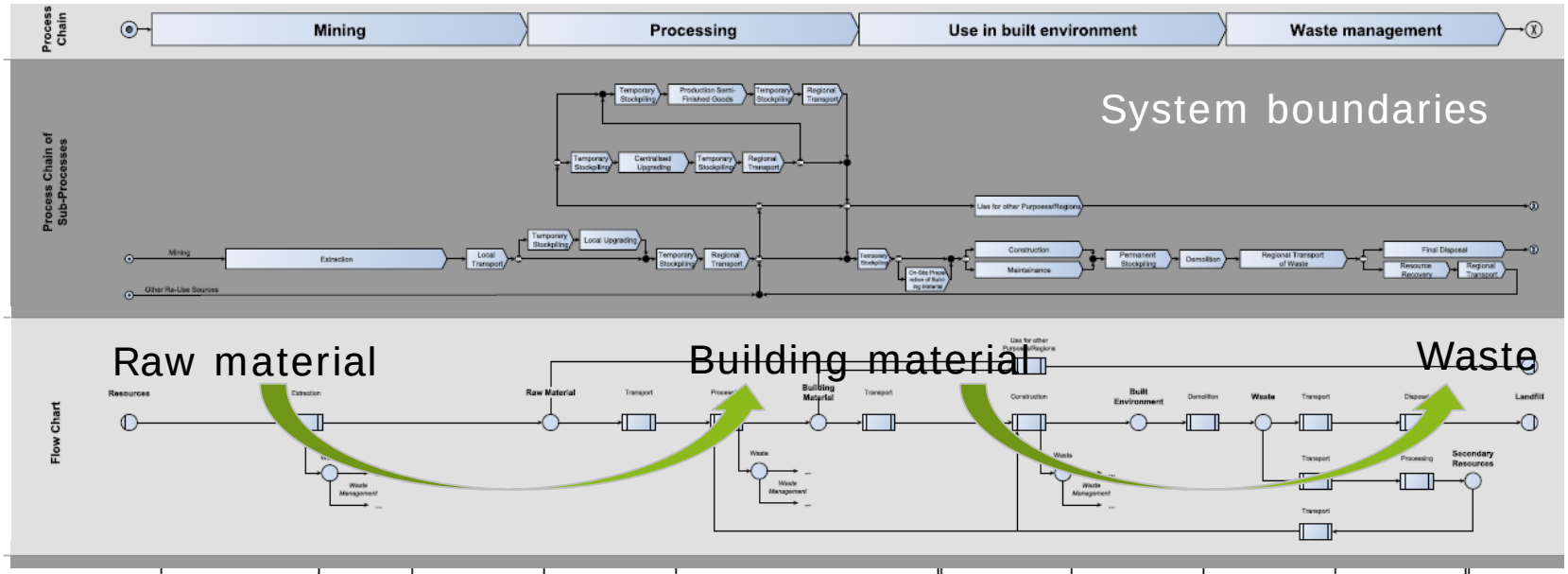


Process chain

Processes

Stocks and flows

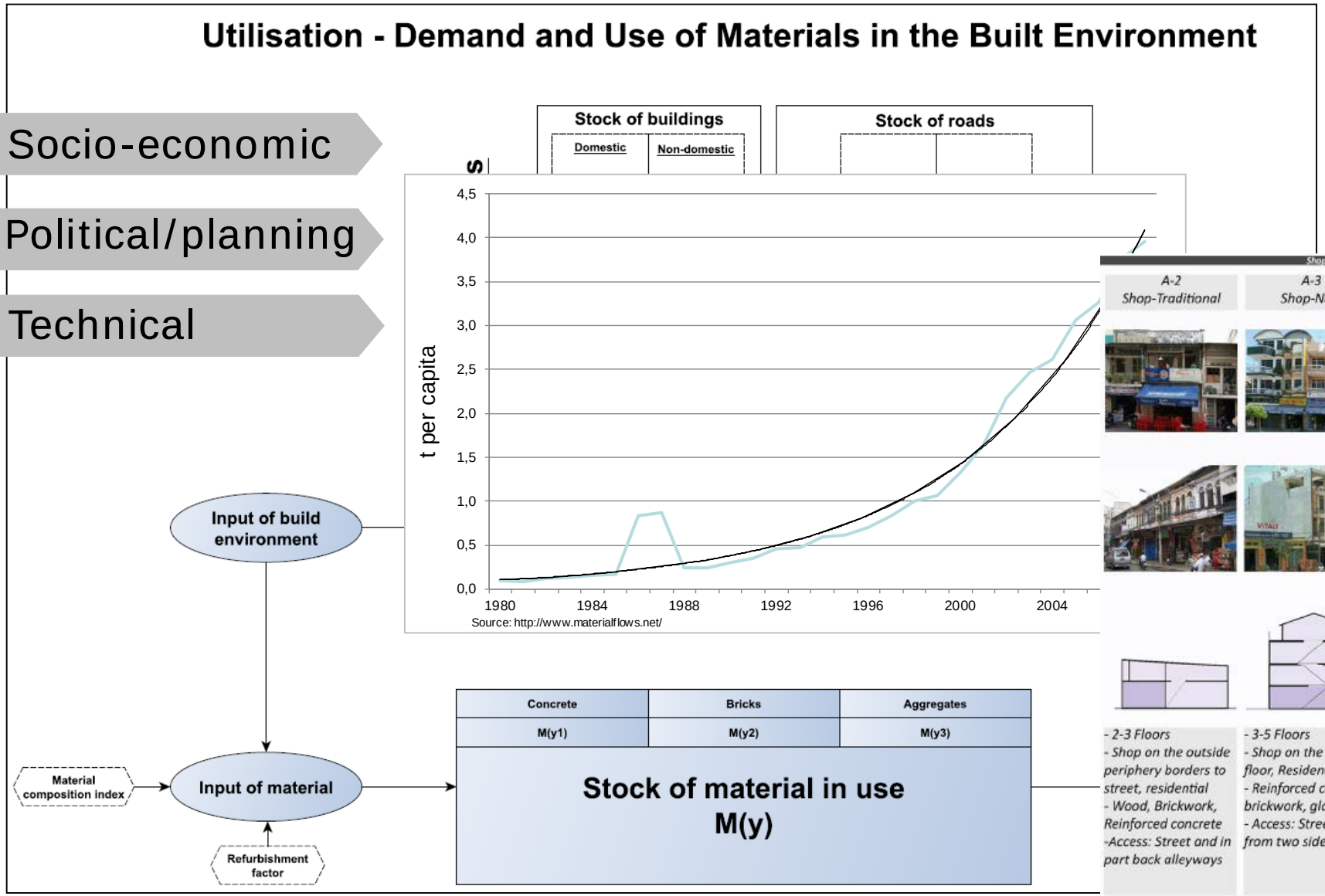
Case studies



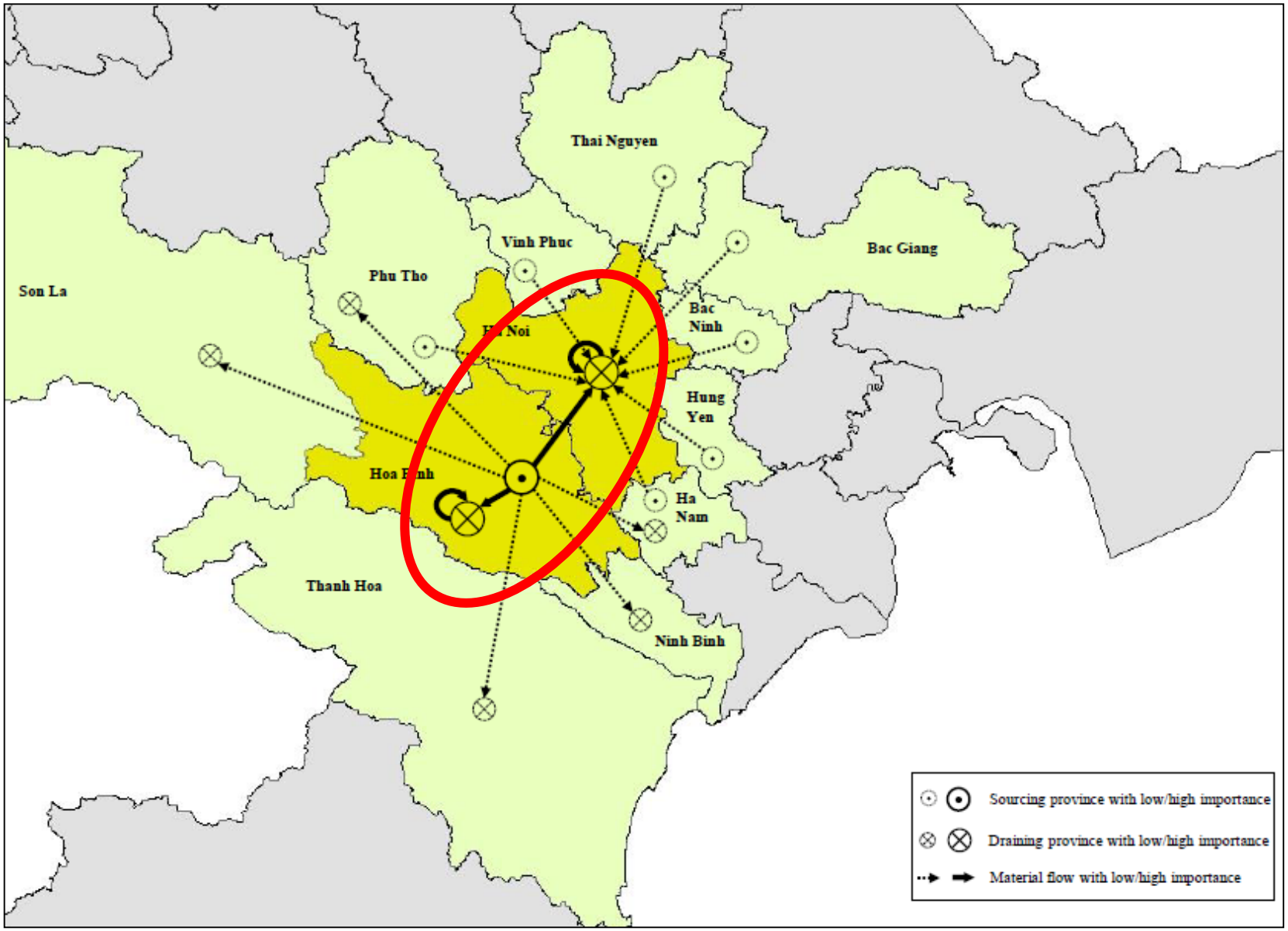
Company / Công Ty	Number of Mining Sites / Số mỏ đang khai thác	Type of Resources / Loại tài nguyên	Mass of Reserves for each Resource Type (2015)	Mass of Reserves for each Resource Type (according to EIA report)	Type of Products / Loại Sản Phẩm: Resource / Sản Phẩm	Type of Products: Size / Kích Thước	Mined Mass per Year in m³ (2013) (khối lượng khai thác trong năm 2013 (khối lượng đá thành phần)	Mined Mass per Year in m³ (2014) Khối lượng khai thác 2014 (khối lượng đá thành phần)	Mined Mass per Year in m³ (2015) Khối lượng khai thác 2015	Mined Mass per Year in m³ (Planned 2015) Khối lượng khai mỏ theo kế hoạch	Mass K: Hoa Binh	Mass K: Ha Noi
Mỏ đá Basalt Công ty CP Sông đà 11.7	1	Basalt	6.660.400	9.186.500	Basalt	0-5mm						
					Basalt	5-10mm						
					Basalt	10-19mm						
					Basalt	>20mm						
					Stone (đá sub base)							
Quang Long	1	Basalt	5.210.156	5.210.156	Basalt	10-50 cm						
					Basalt	4-6 cm						
					Basalt	2x4 cm						
					Basalt	1x2 cm						
					Basalt	0,75 cm						

- Understand processes
- Justify assumptptions
- Stakeholder involvement

Built environment



Spatial reference



Rough estimations for material flows in Hanoi region

Built environment

Raw material

Building material

C&D-Waste

Circular economy

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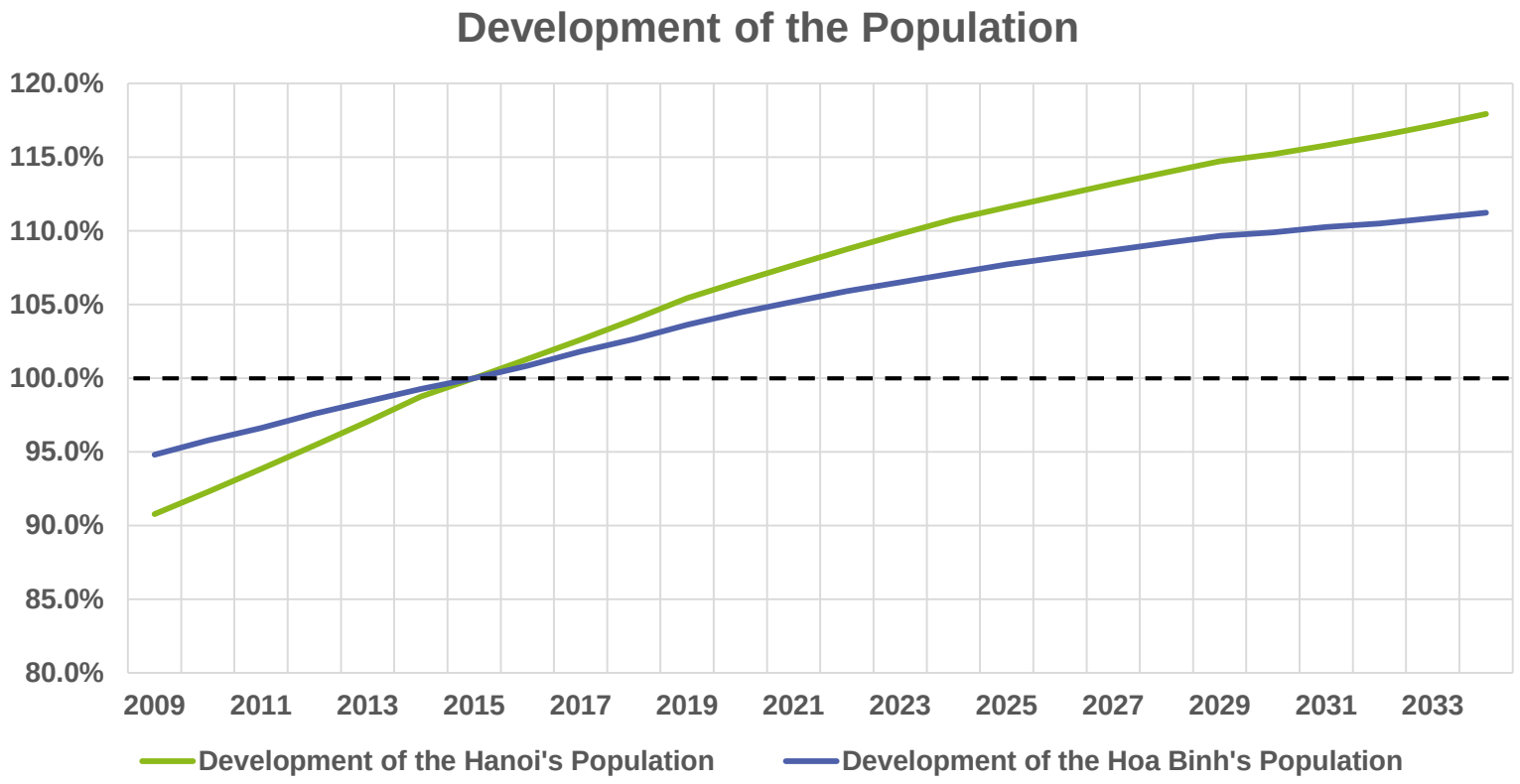
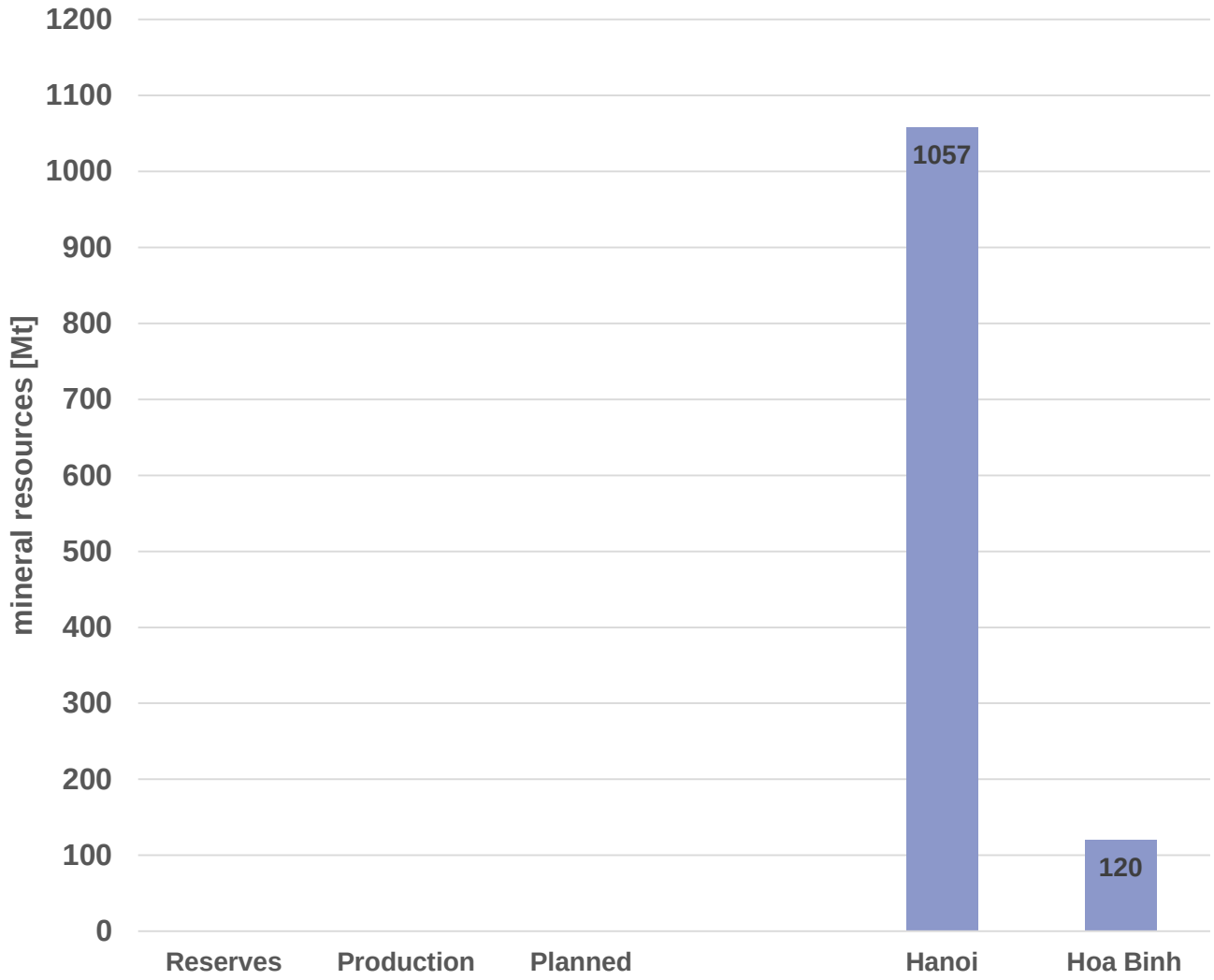
Secondary resources

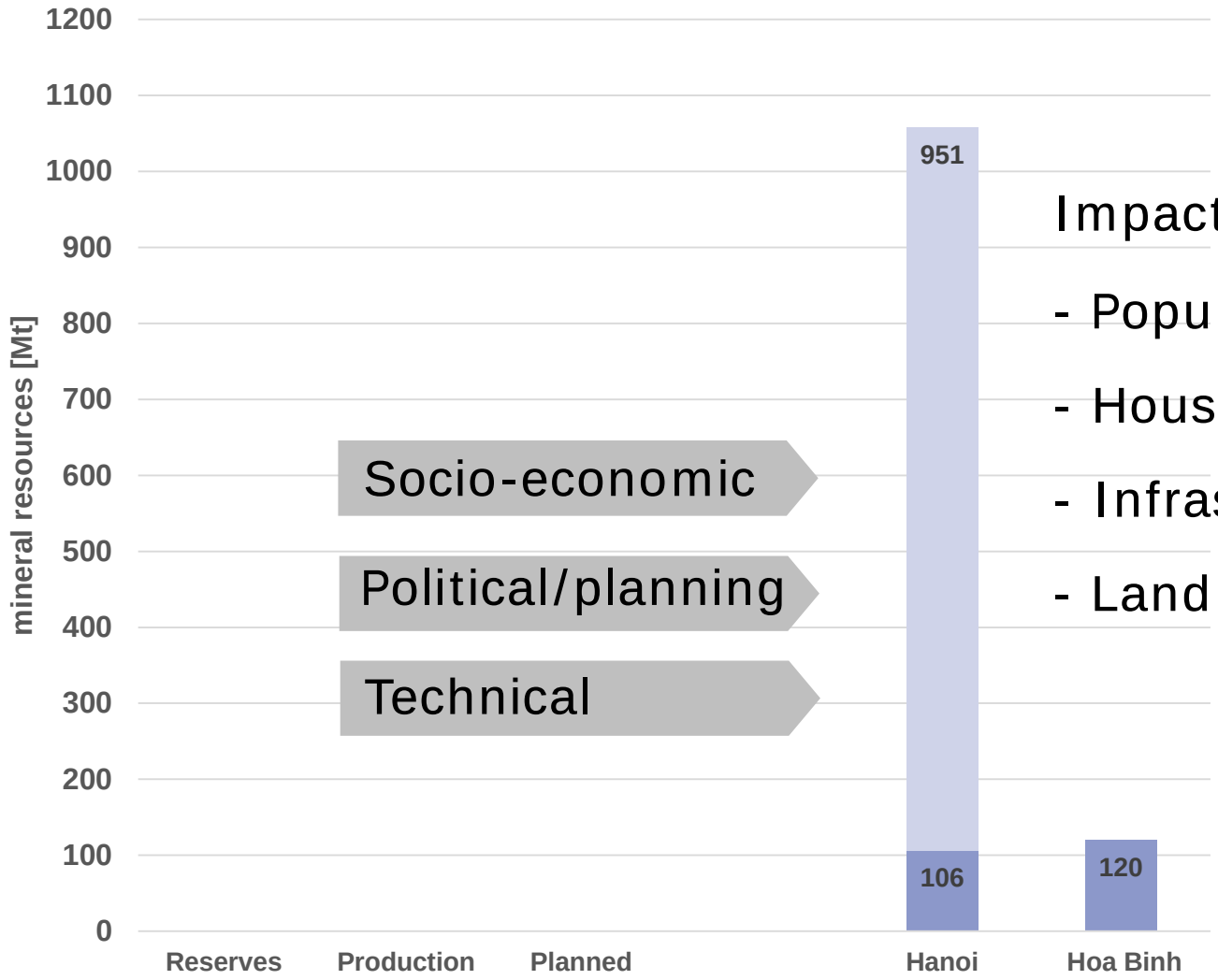
Hanoi / Hoa Binh – Population dynamic



Demand and supply of mineral resources (2015-2030)



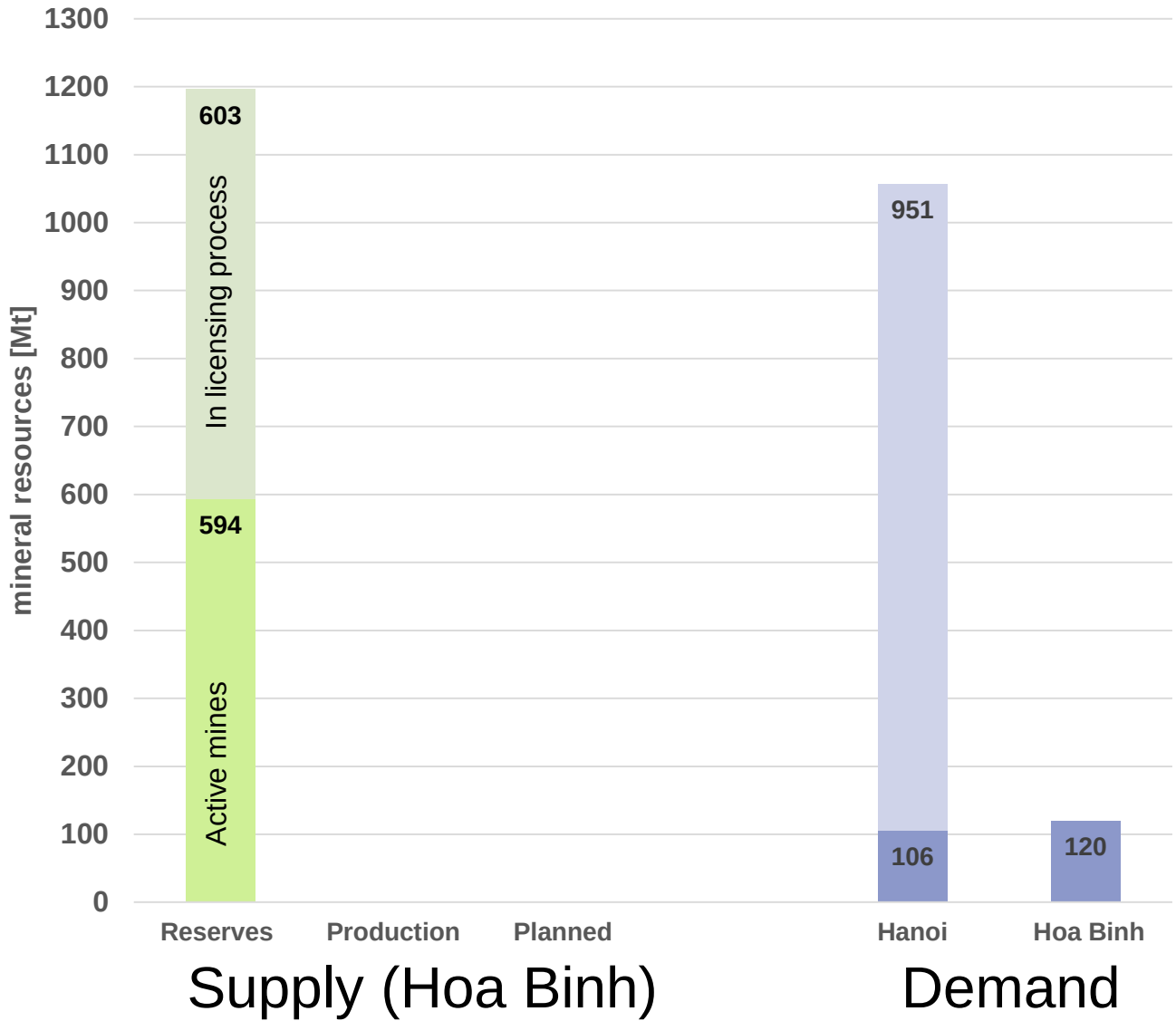
Demand and supply of mineral resources (2015-2030)



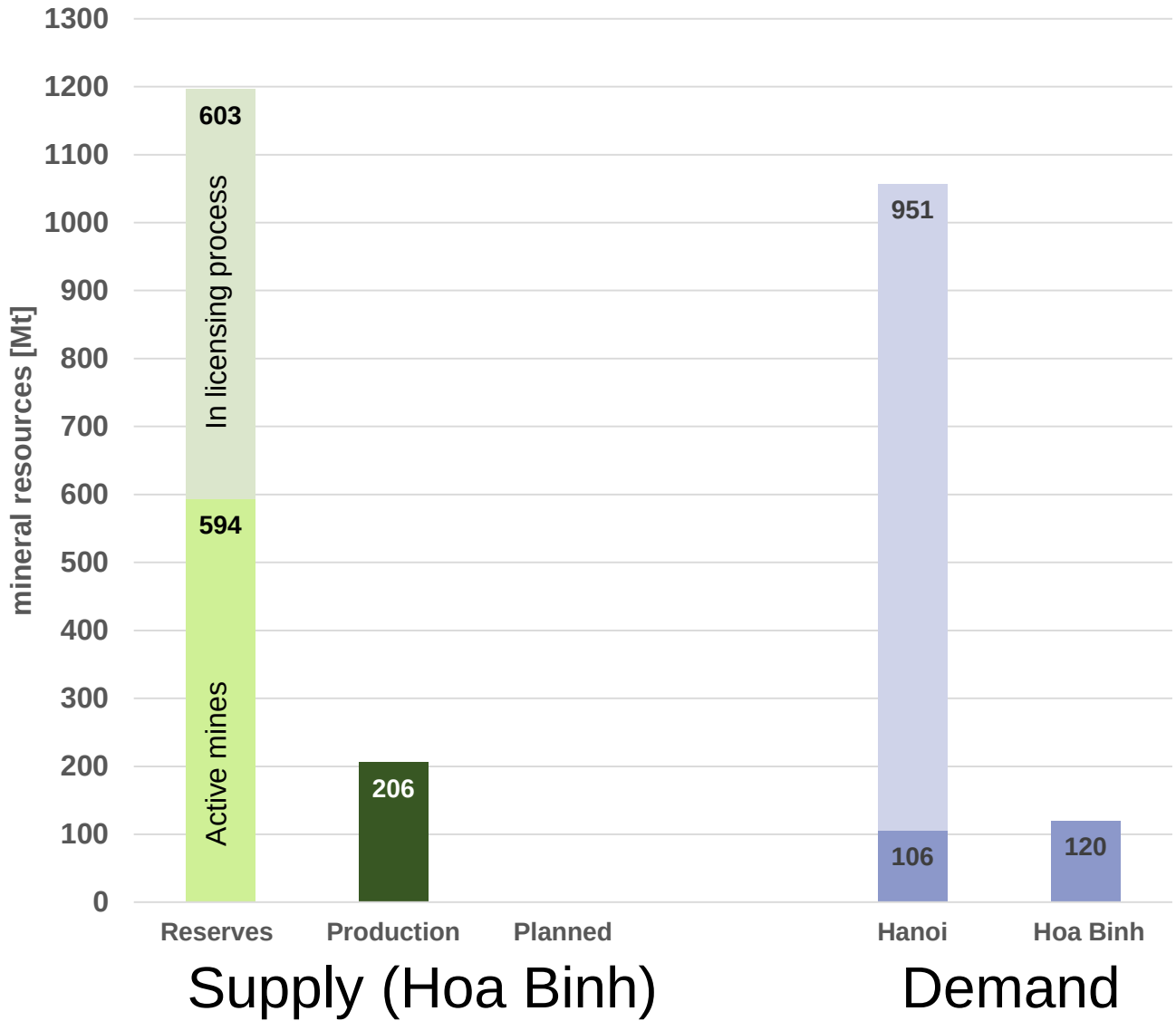
Impact...

- Population?
- Housing policy?
- Infrastructure policy?
- Land use policy?

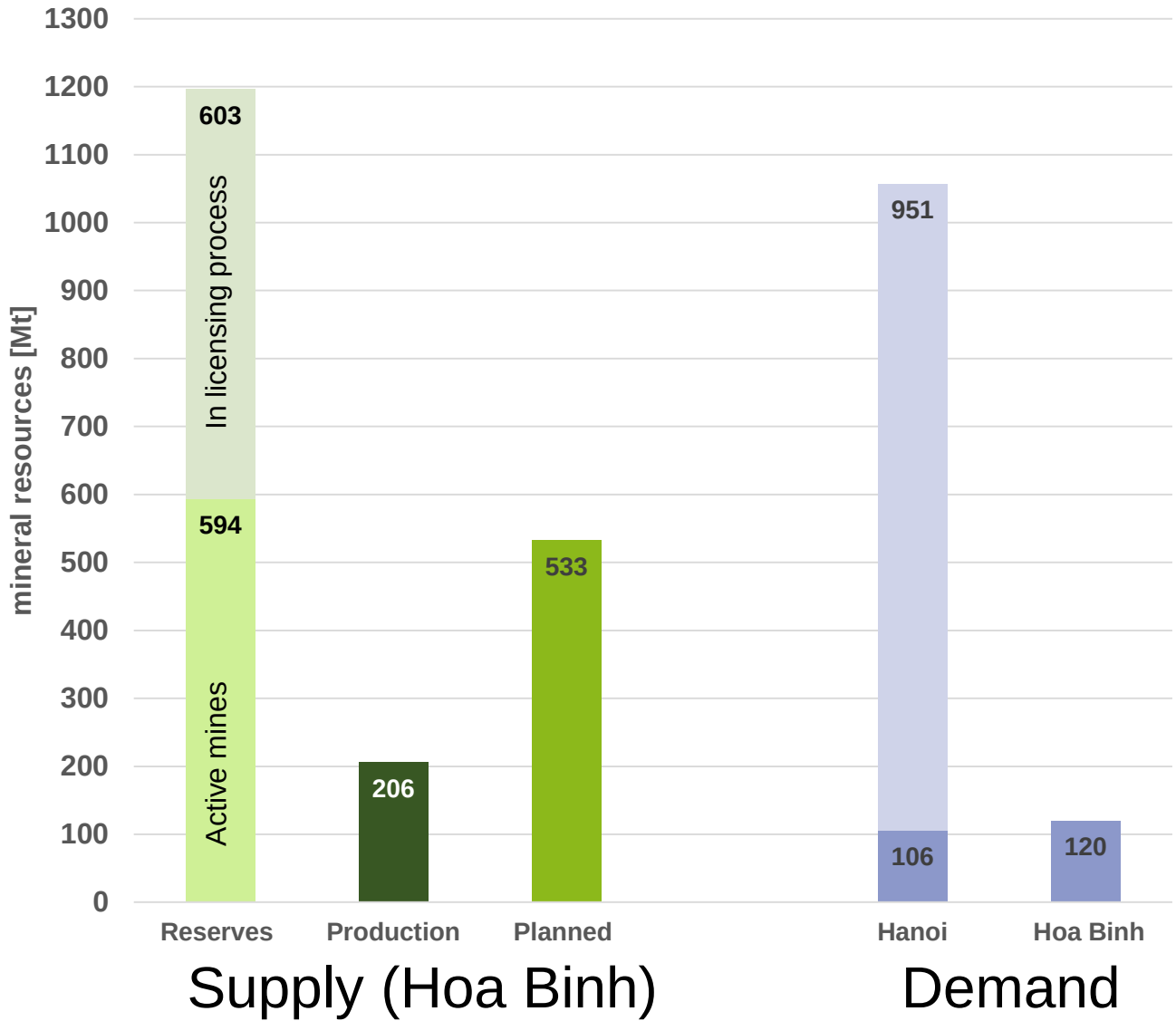
Demand and supply of mineral resources (2015-2030)



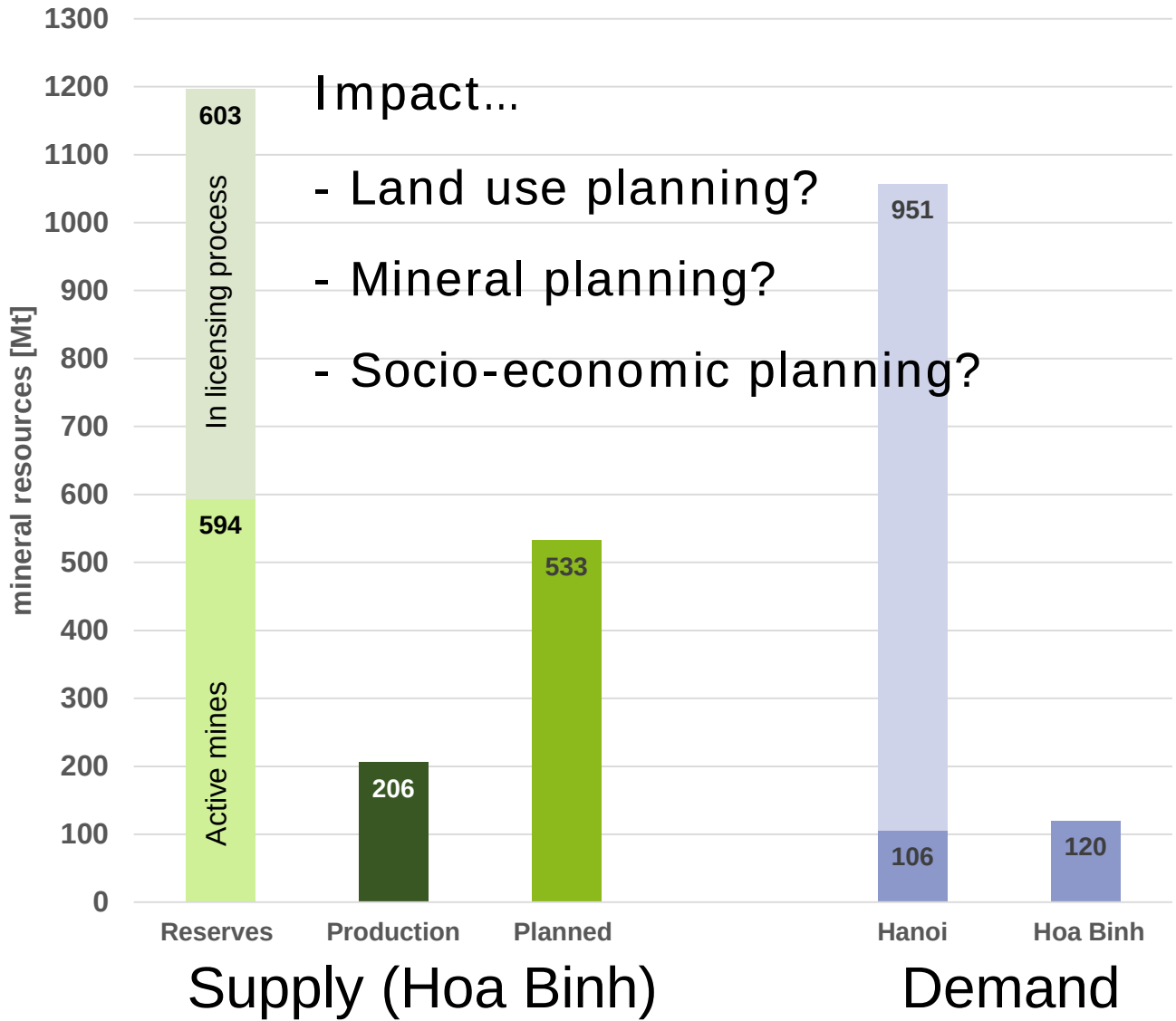
Demand and supply of mineral resources (2015-2030)



Demand and supply of mineral resources (2015-2030)



Demand and supply of mineral resources (2015-2030)



Impact…

- Land use planning?
- Mineral planning?
- Socio-economic planning?

Conclusion

Sustainable management of mineral resources needs

- Regional approaches
- Integrated approaches

→ Requirements for the MFA-approach