

# Environmental systems perspective on ash utilisation and tools for decision support

- The needs and possibilities for applying a life cycle perspective

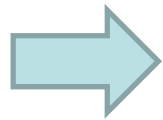
*Susanna Toller, Ecoloop/KTH*

How can we take decisions today that do not harm the possibilities for future generations?



# How can we take decisions today that do not harm the possibilities for future generations?

- Current legislation and environmental goals
- Available tools/methods for environmental assessment



Protection of different types of values  
(local, regional, global?)



# Environmental systems perspective on ash utilisation

- Different assessment answers different questions

*System level*

*Example*

*Environmental assessment includes*

Material:

MSWI bottom ash

Chemical and physical properties

Road environment:

MSWI bottom ash used in a road construction

Emissions from material

Narrow life cycle perspective:

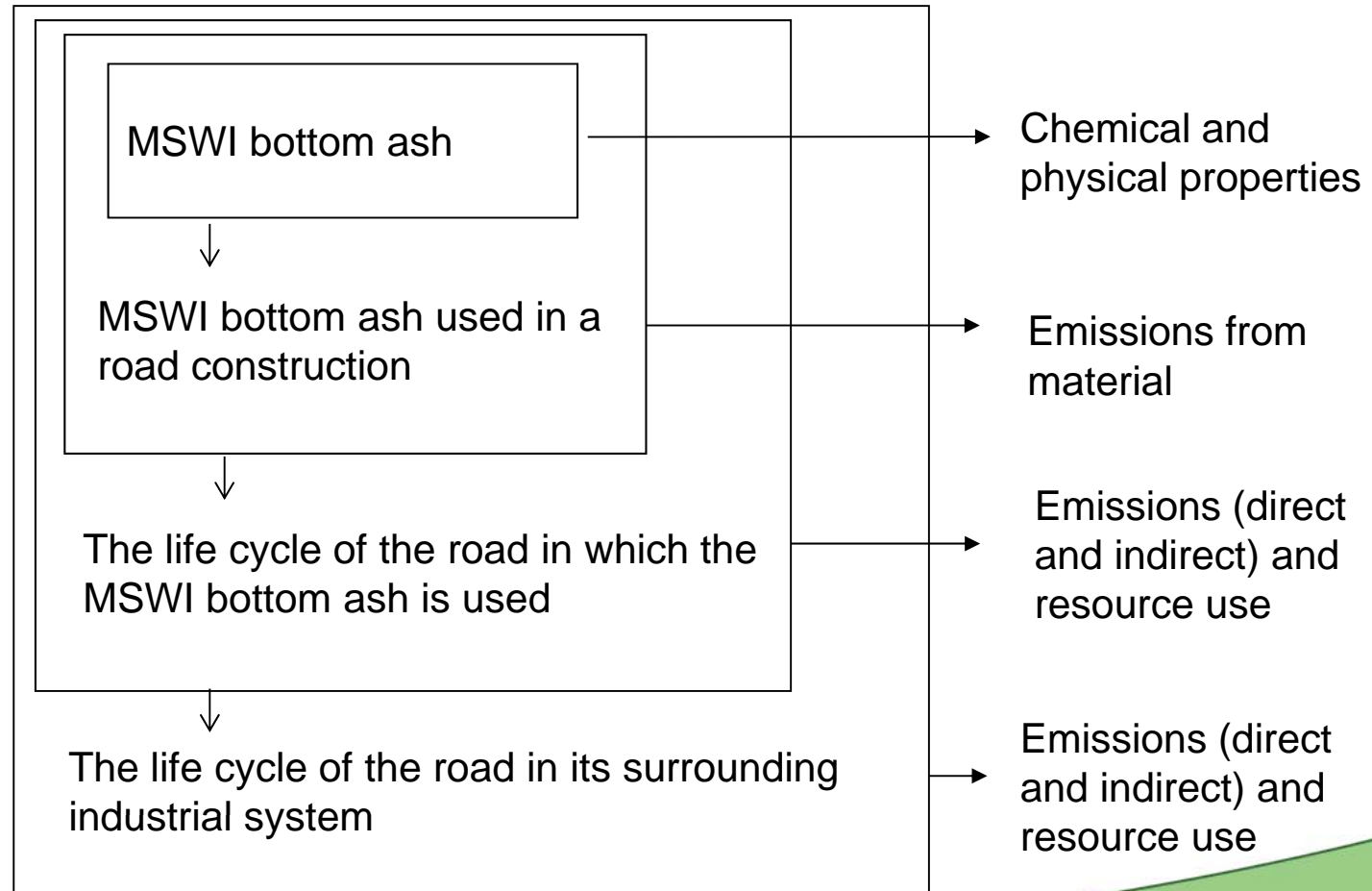
The life cycle of the road in which the MSWI bottom ash is used

Emissions (direct and indirect) and resource use

Industrial system:

The life cycle of the road in its surrounding industrial system

Emissions (direct and indirect) and resource use



# Environmental benefits from ash utilisation



Effective use of resources



Reduced material transports



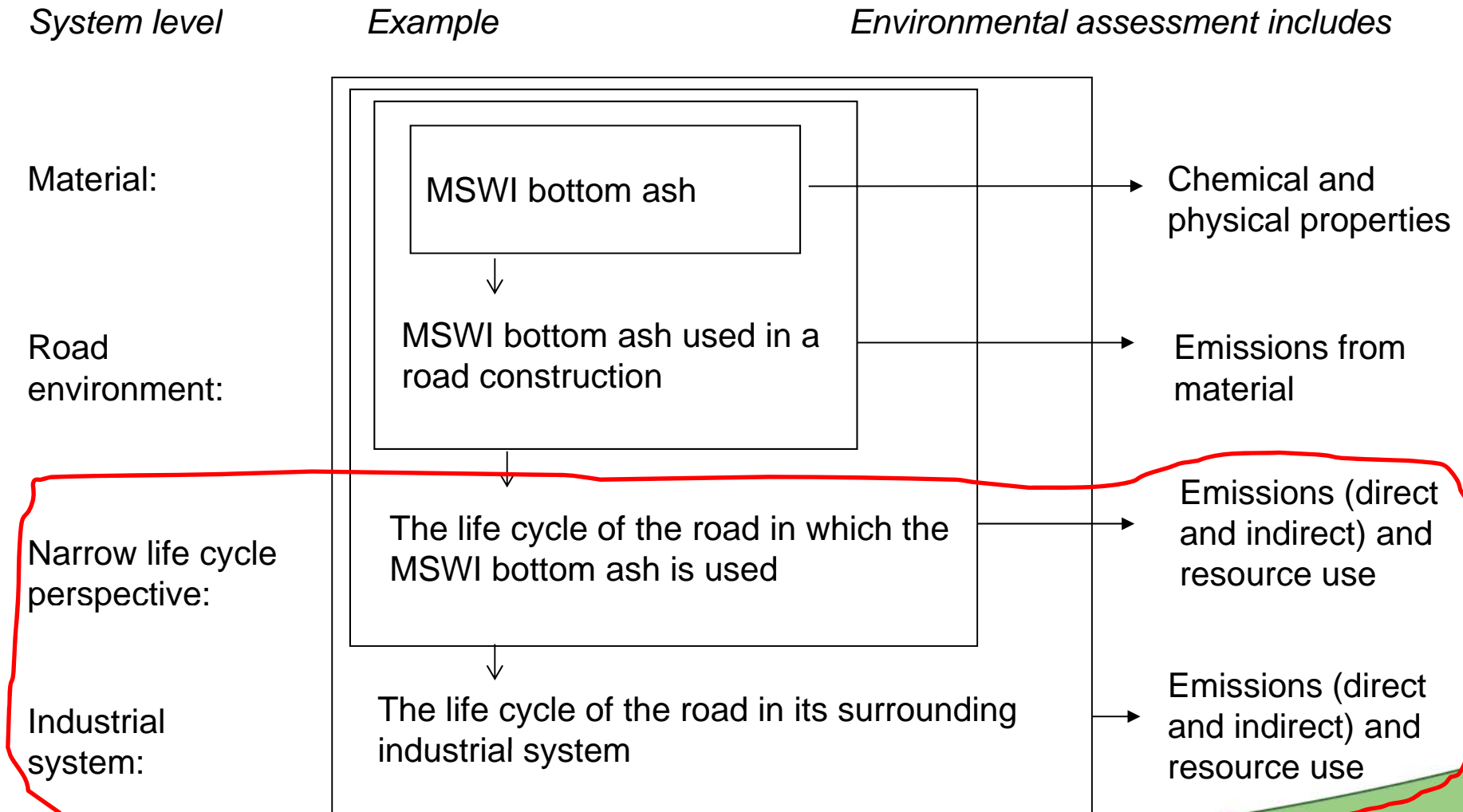
Less need for landfilling

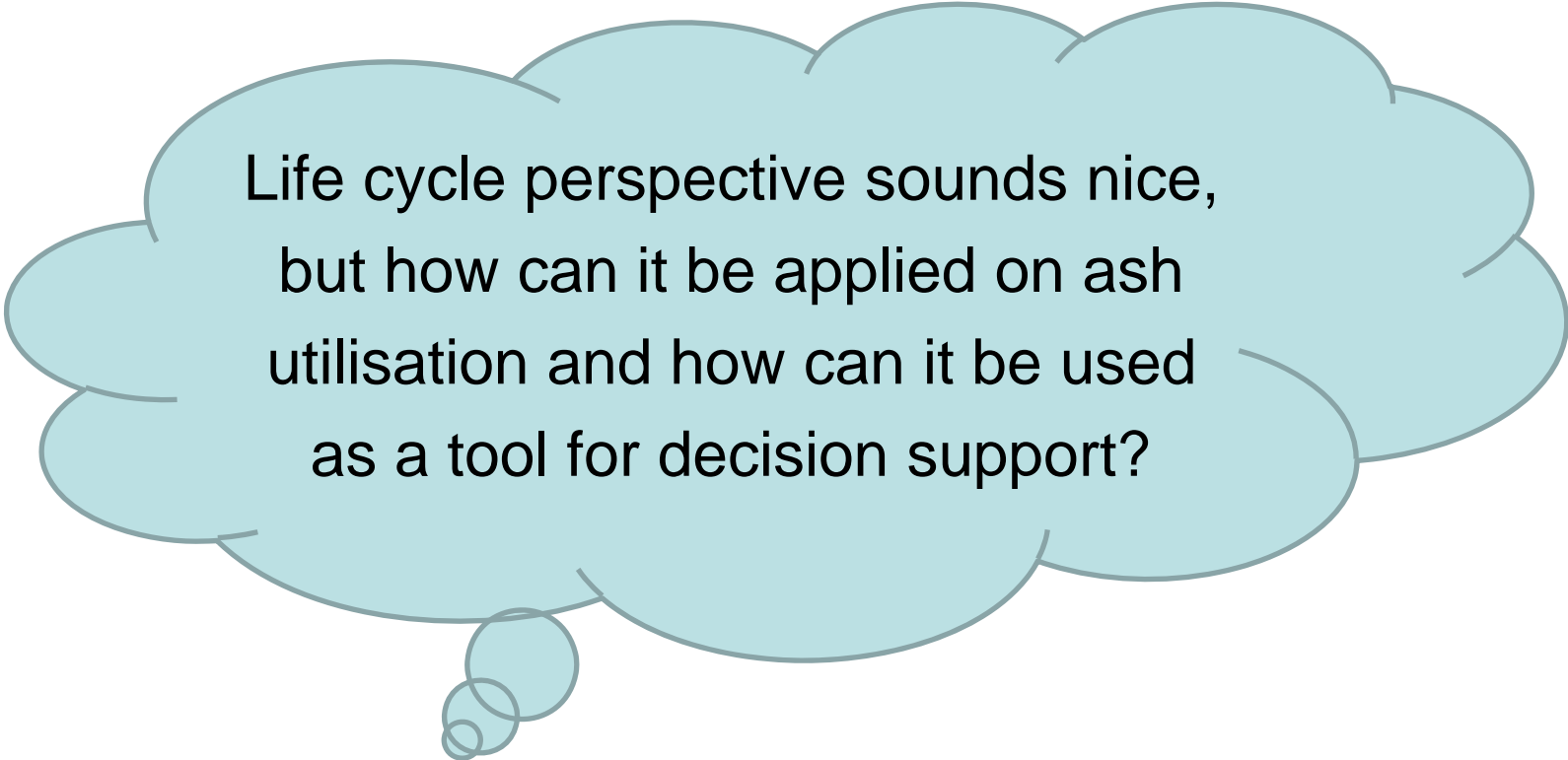


Improved technical performance

# Environmental systems perspective on ash utilisation

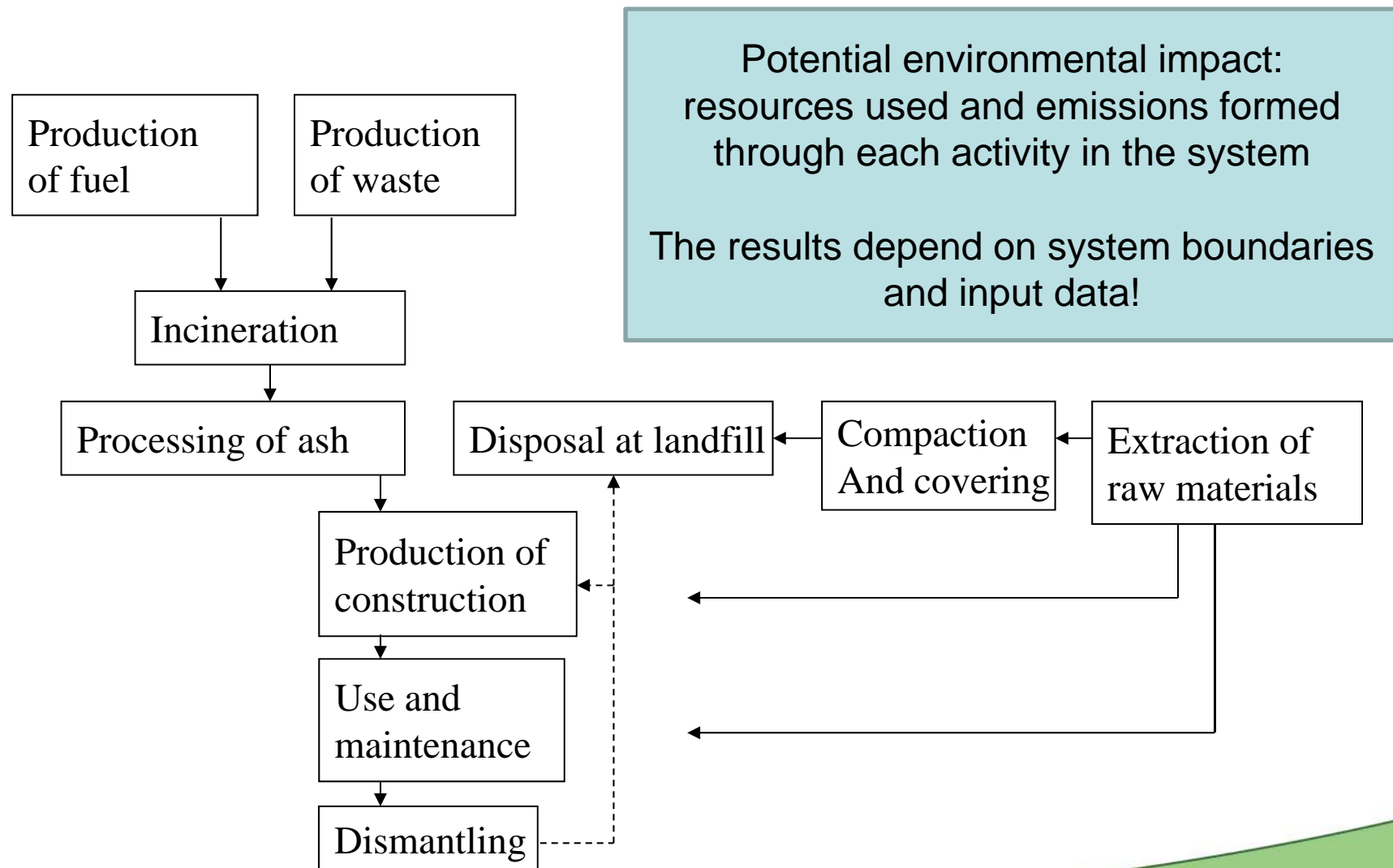
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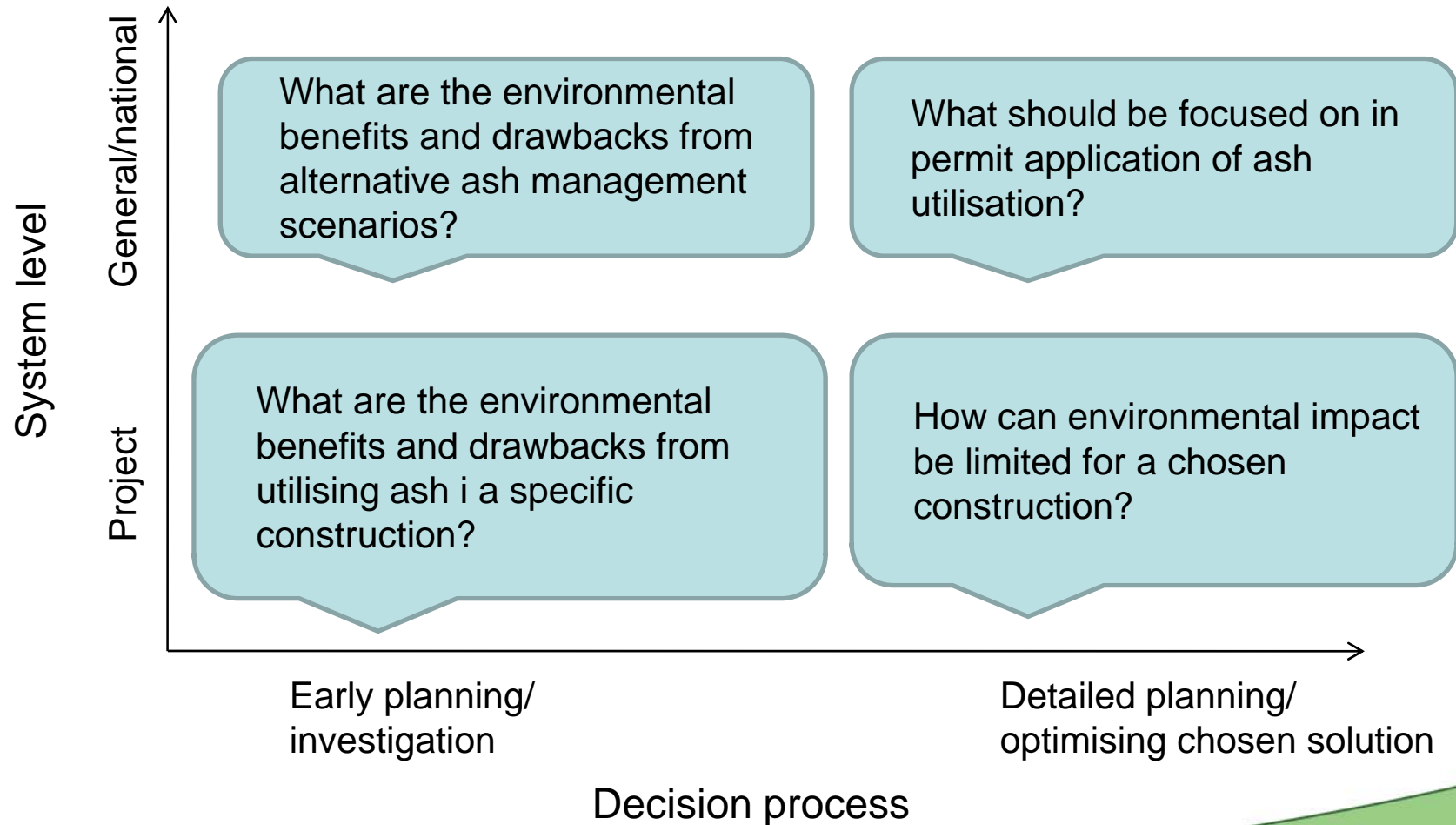


Life cycle perspective sounds nice,  
but how can it be applied on ash  
utilisation and how can it be used  
as a tool for decision support?

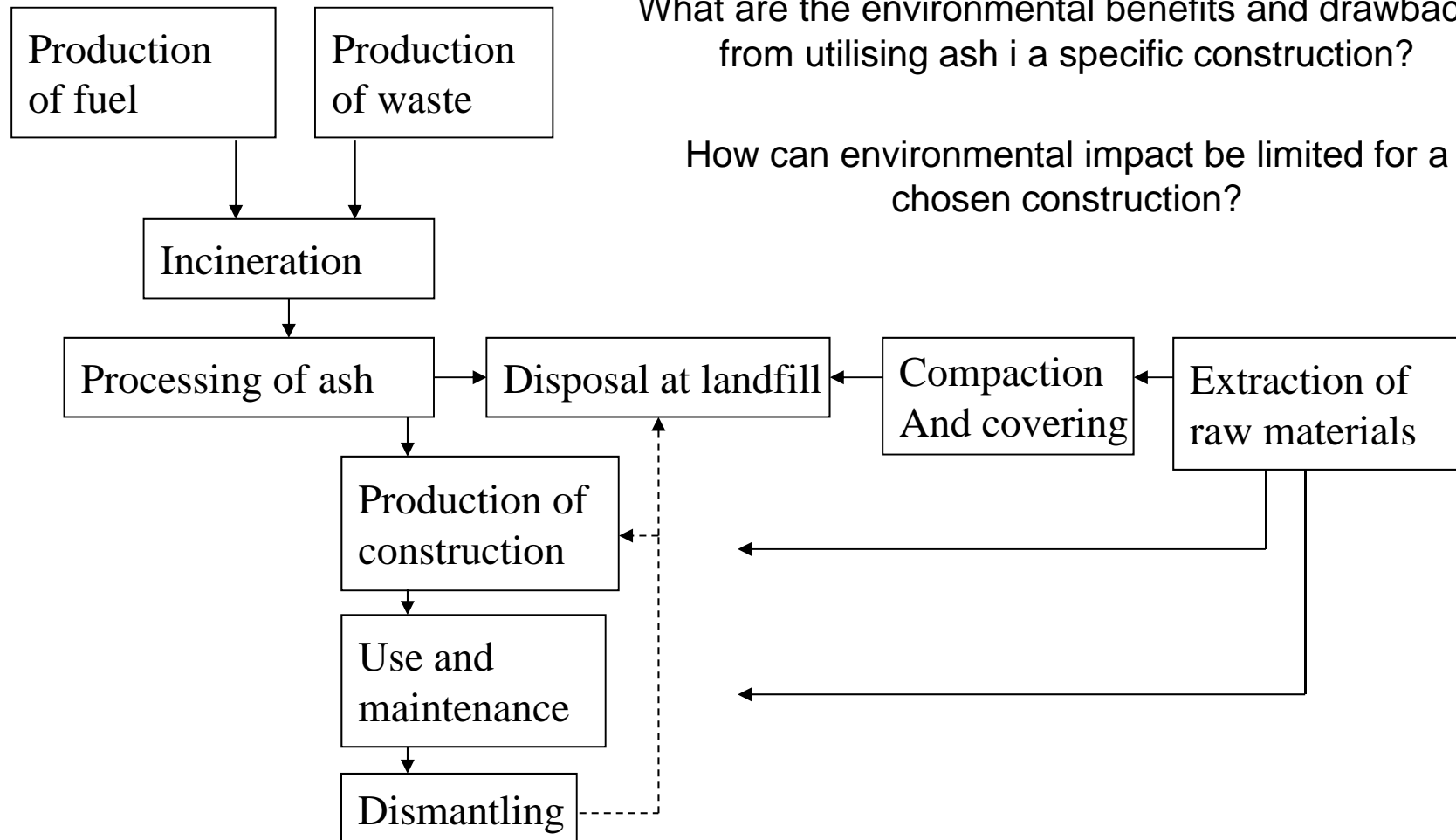
## Utilisation of ashes in a life cycle perspective



# Life cycle perspective in decision support, examples



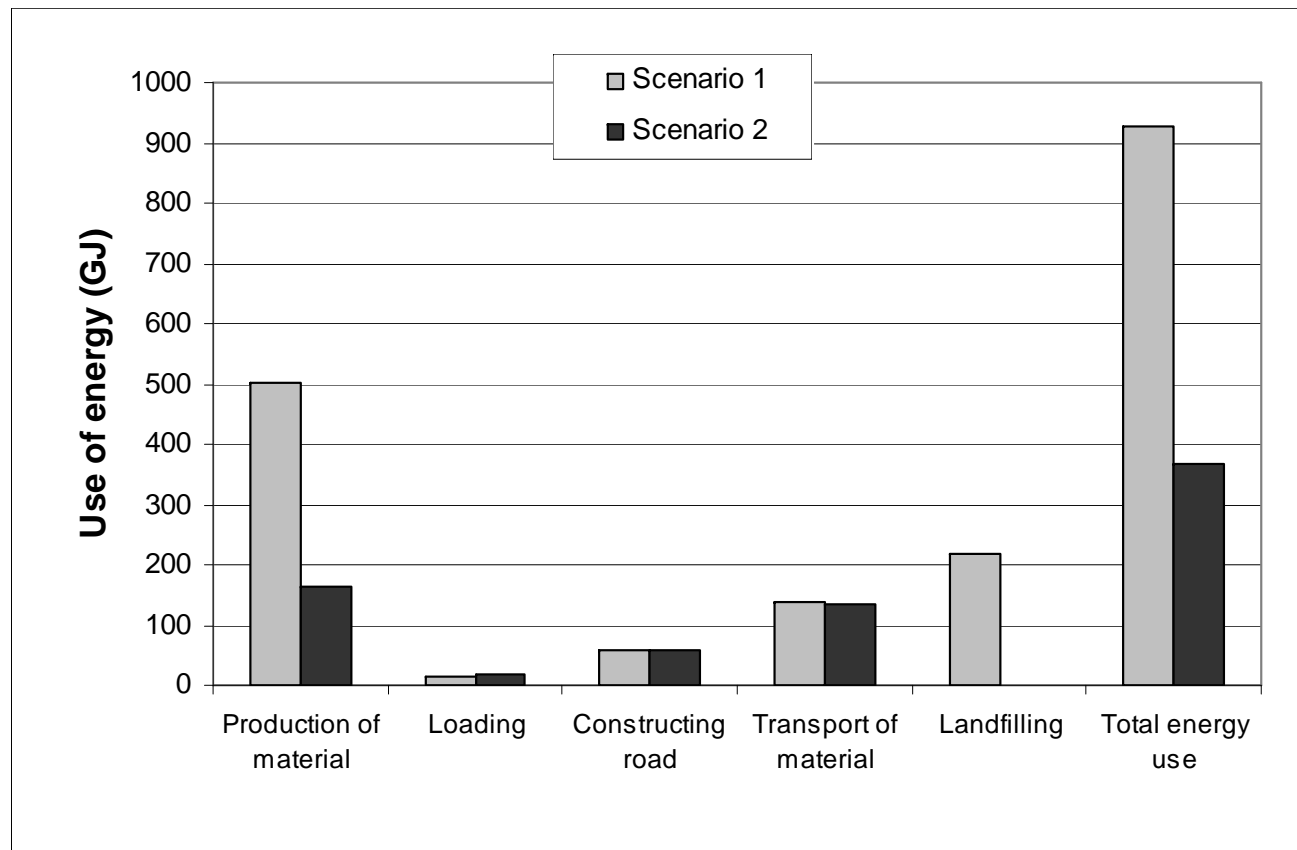
## Project level



What are the environmental benefits and drawbacks from utilising ash in a specific construction?

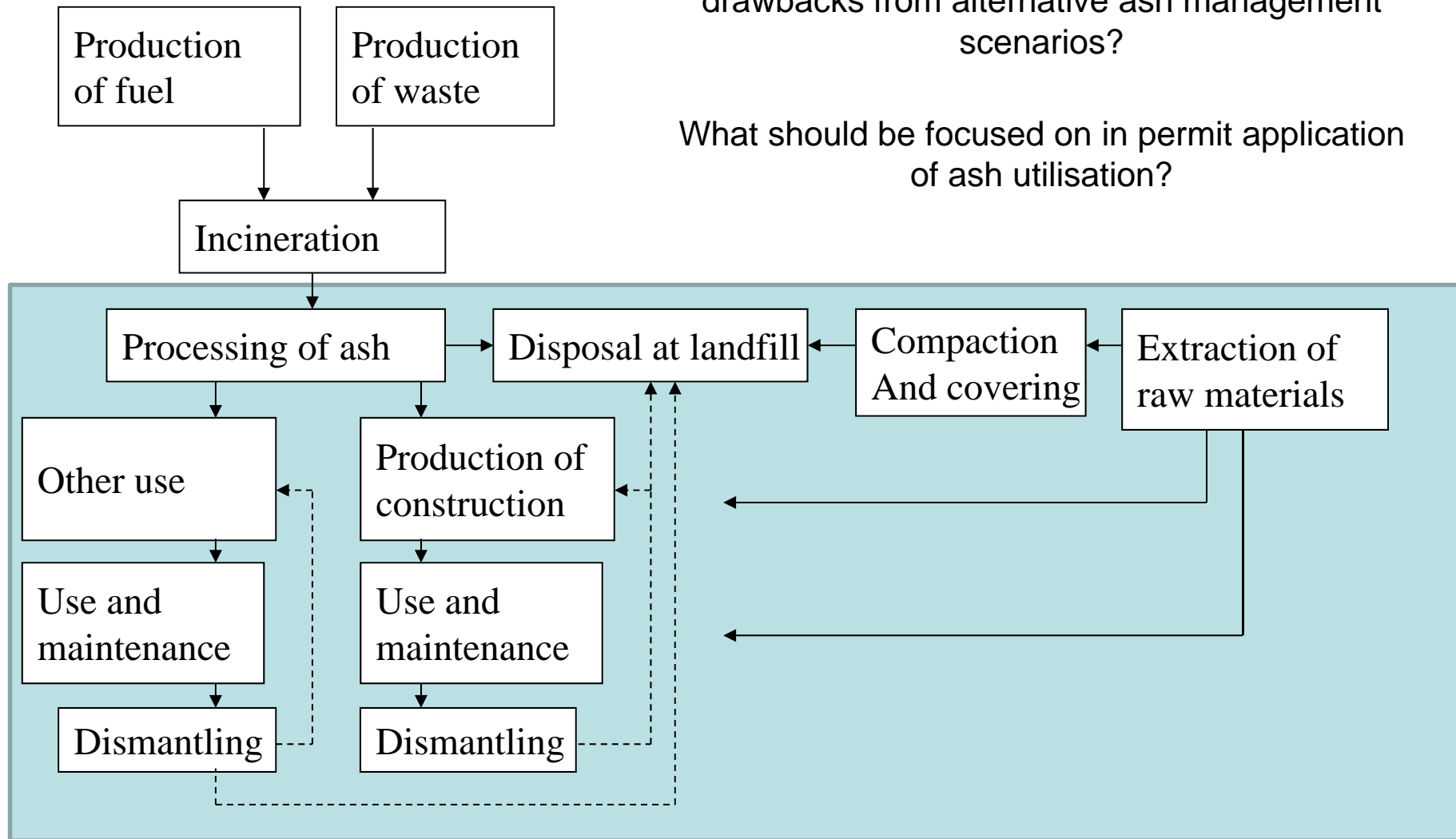
How can environmental impact be limited for a chosen construction?

## Example of results, comparison of two alternative road construction scenarios



What are the environmental benefits and drawbacks from alternative ash management scenarios?

What should be focused on in permit application of ash utilisation?

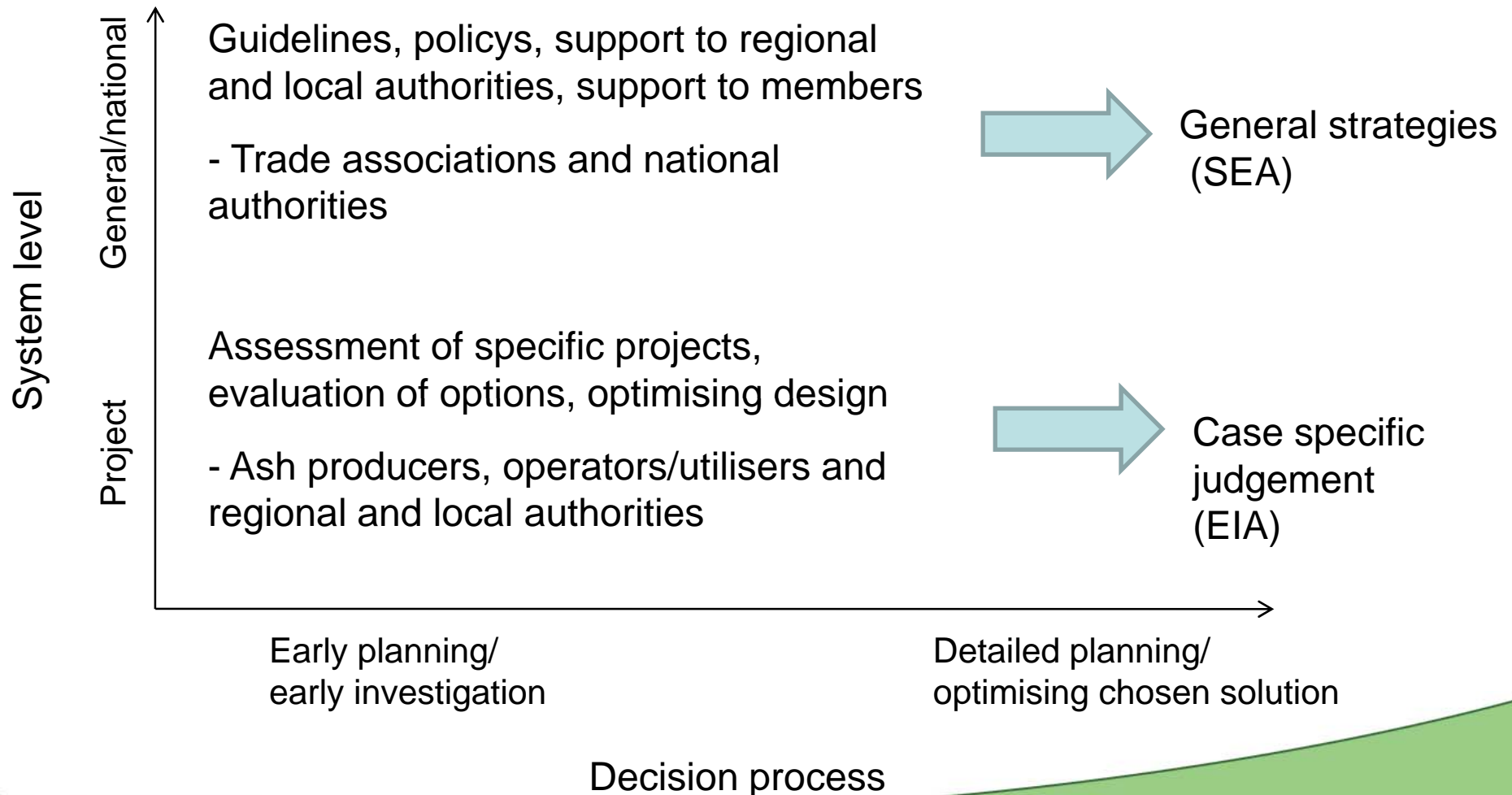


Example of results, comparison of alterantives for managing 1 ton of MSWI bottom ash in Uppsala

Resources and emissions (during 100 years)	Drainage-material at landfill covering	Sub base layer in road	Disposal at landfill
Energy [MJ]	269	79	139
Crushed rock[ton]	1,2	0,3	1,2
CO <sub>2</sub> [g]	11590	4570	6030
NO <sub>x</sub> [g]	91	36	48
Cu [g]	43	2	0,2

As [g]	0,1	0,4	0,4
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# Life cycle perspective in decision support



## Important stakeholders on a project level

### Ash producer

- Ash utilisation is an important question
- Interested in economical management
- High level of knowledge

### Operator/utiliser of ash

- Ash utilisation is a minor question, but implies a long term responsibility
- Interested in supply of cheap and suitable material
- Some knowledge of ashes

### Joint goals and strategies?

### Local environmental authority

- Ash utilisation is a rare question
- Interpret environmental legislation
- Limited knowledge on ashes

## Conclusion

- The approach for performing an environmental assessment should be based on the question to be answered and the decision situation in which the information is to be used
- Life cycle thinking contributes to decisions that aim for long term sustainable development and is necessary to capture environmental benefits from ash utilisation
- Life cycle thinking on ash utilisation may be applied on different system levels and in different stages of the planning process.

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ecoloop

Thanks!