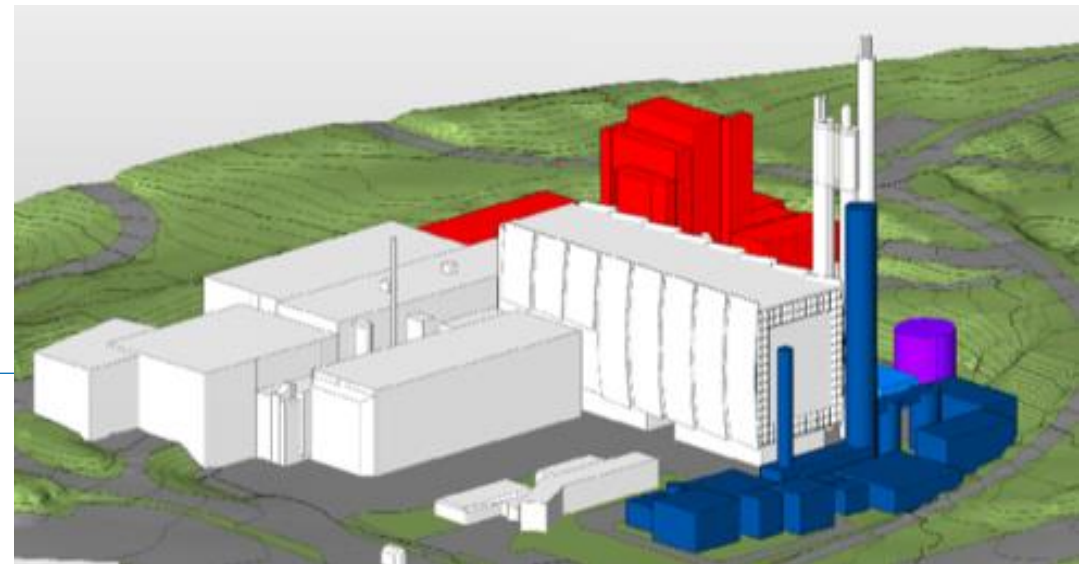


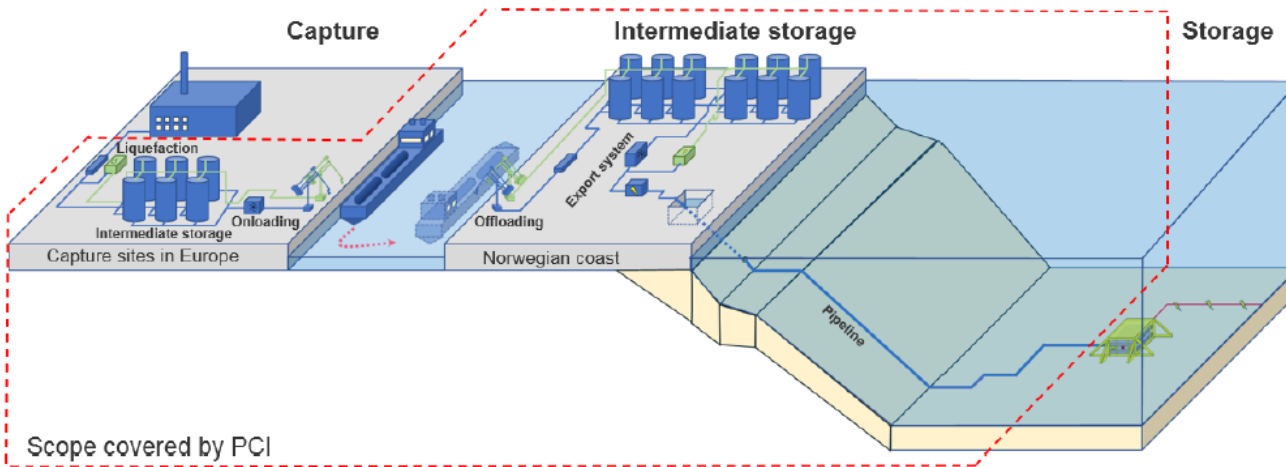
# Financing Carbon Capture from a Waste to Energy Plant: The Case of a Pioneering Initiative at Klemetsrud, Oslo A Feasibility Study

Elling Enger, Jon Lereim, Magne Lia & Atle Midttun , BI Norwegian Business School  
Arne Lind & Julien Meyer, IFE Institute for Energy Technology



# Catering for a Complete Carbon Chain:

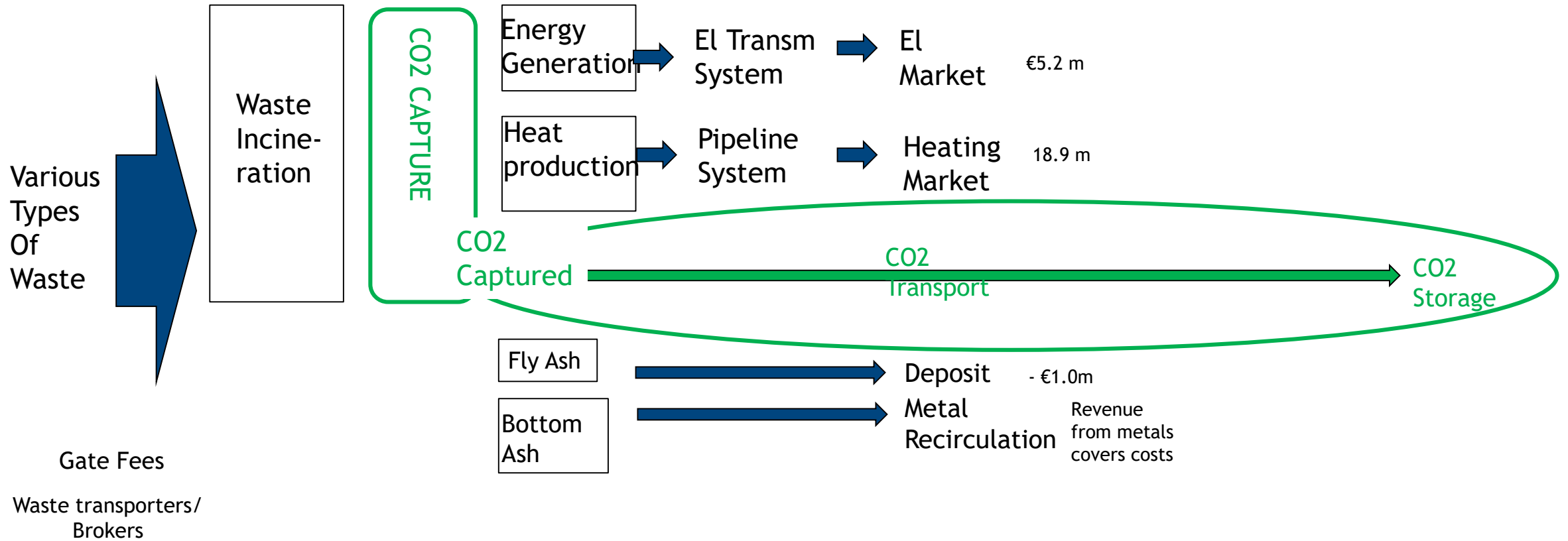
## Klemetsrud in the Larger North Sea Carbon-Industrial Ecology



Equinor, Shell and Total E&P Norge AS to carry out the concept and FEED studies for developing an open source service for transport and storage of European CO2

Source: Equinor 2019

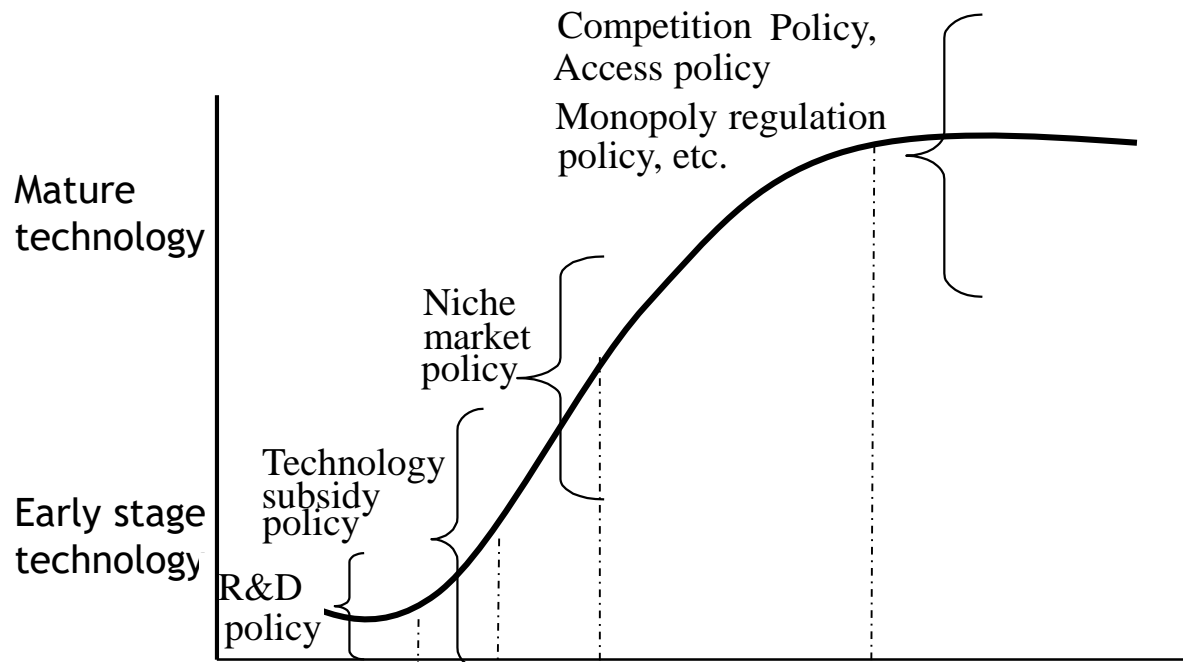
# Klemetsrud plant with CO2 Sequestration



Household Waste 273,000 tonnes @ €70 per tonne	Imported Waste 91,200 tonnes @ €46 per tonne	Infectious Waste (hospitals, etc) 15,200 tonnes @ €308 per tonne
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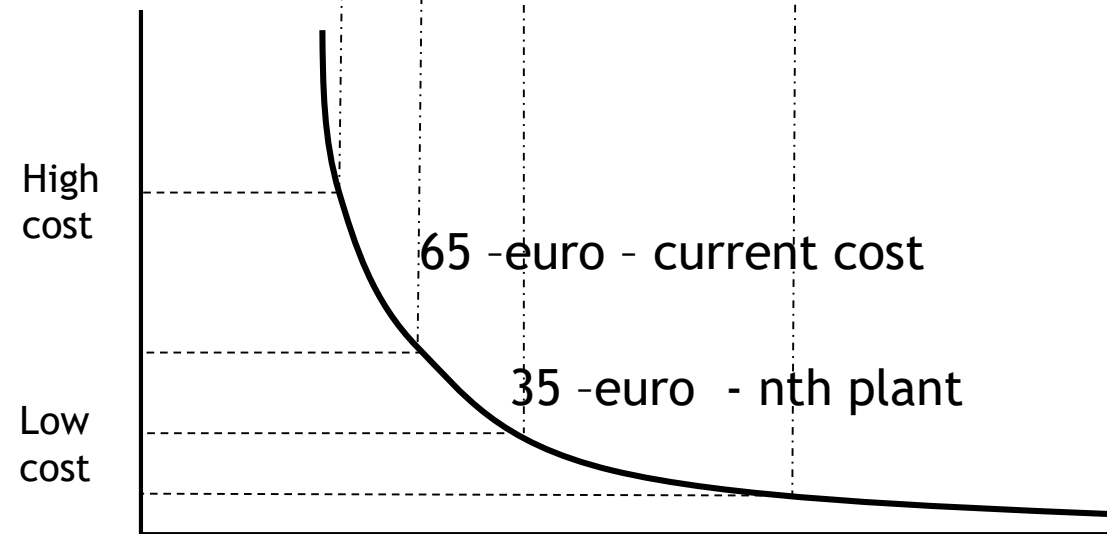


*The S Curve  
Technological  
Maturity*



*Regulatory  
Approaches  
To Drive  
Technological  
Progress*

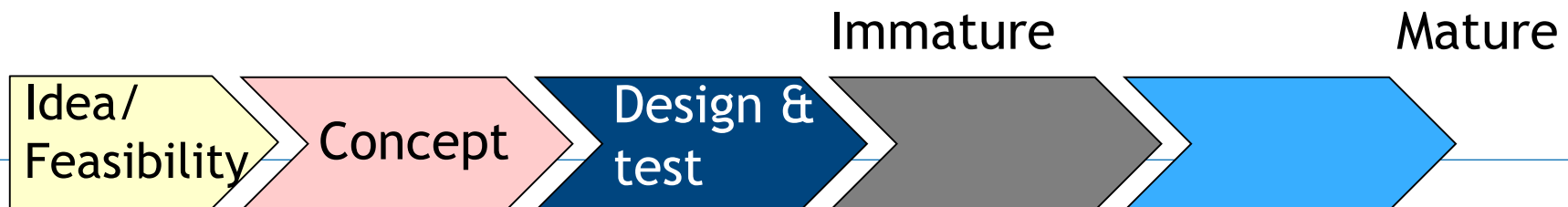
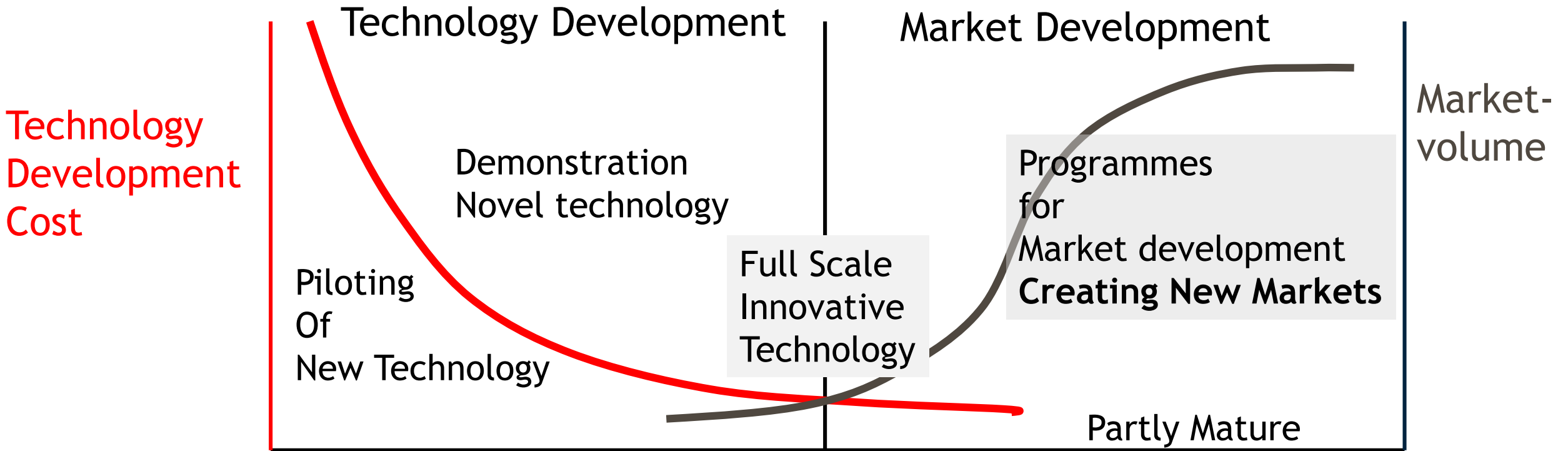
*The Learning Curve  
Cost Efficiency  
Performance*



From Midttun & Gautesen (2007)

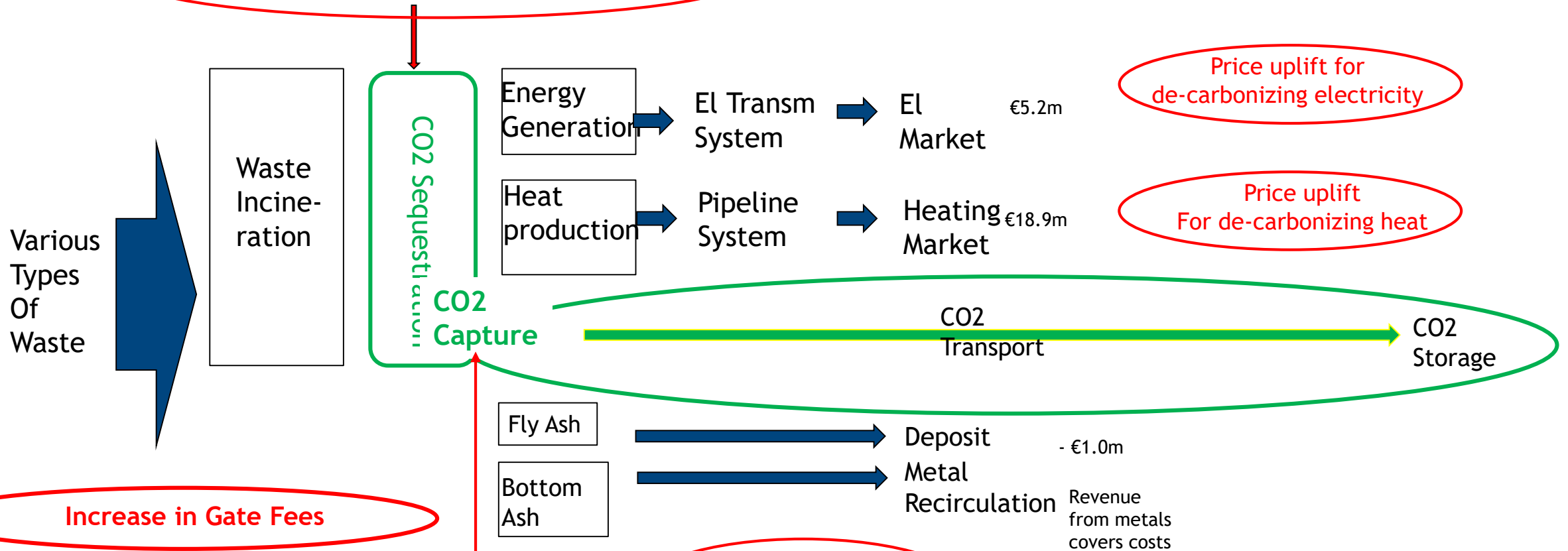


# Technology & Market Development



# Financing Klemetsrud plant with CO2 Sequestration

Transfer from State/Municipal Budgets



Increase in Gate Fees

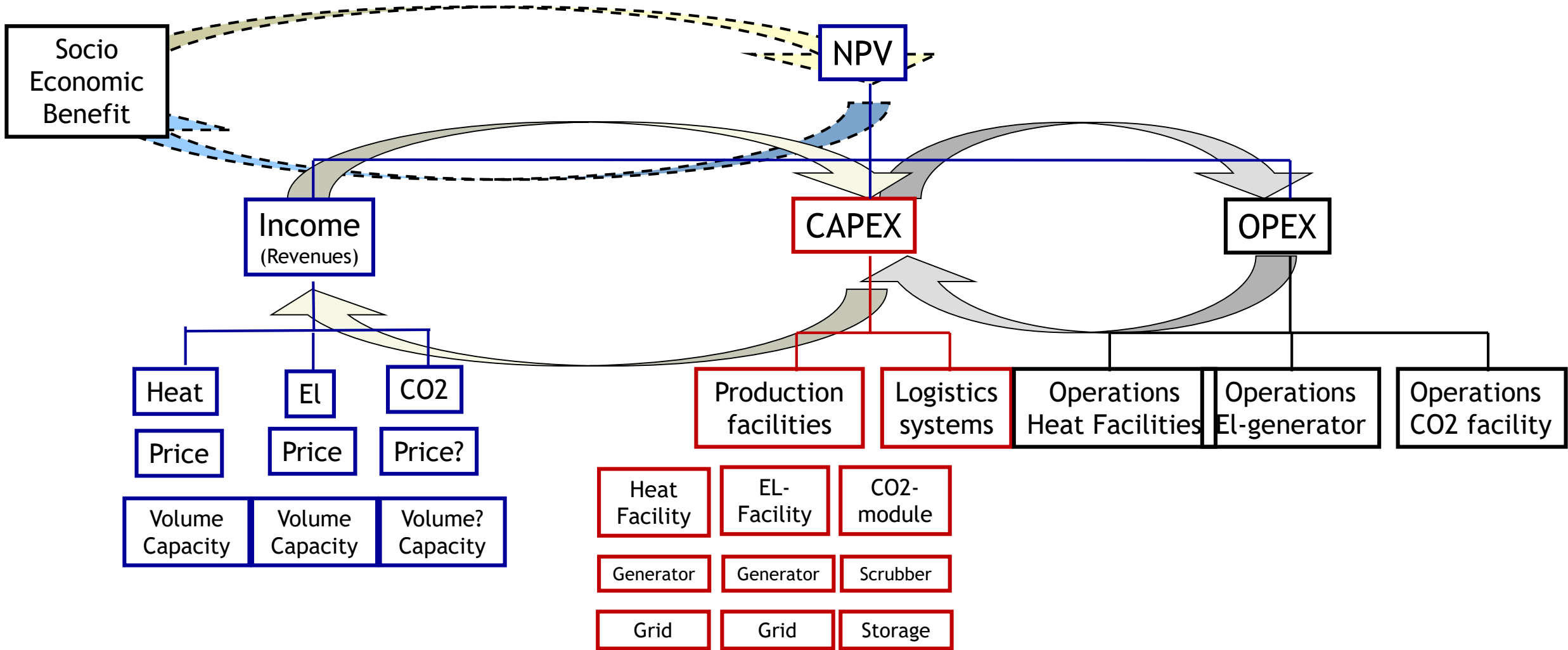
Waste transporters/  
Brokers

Household Waste 273,000 tonnes @ €70 per tonne	Imported Waste 91,200 tonnes @ €46 per tonne	Infectious Waste (hospitals, etc) 15,200 tonnes @ €308 per tonne
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Financing in  
EU - ETS market

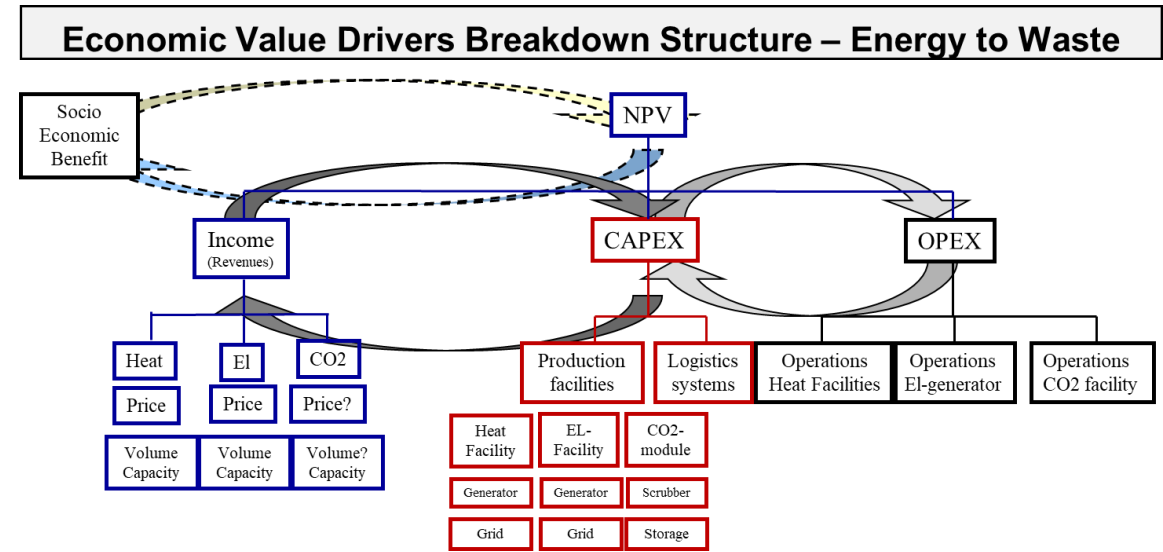


# Economic Value Drivers Breakdown Structure - Energy to Waste

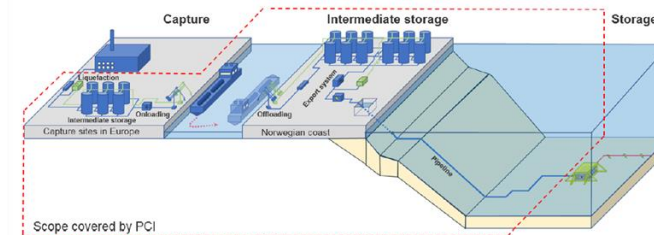


# Closing remarks

- A NPV/IRR model is established for the Carbon Capture-cases
- Various Scenarios are run for a range of variables
- The NPV/IRR Klemetsrud case provides us with a business driven framework for Carbon Capture
- The NPV/IRR model should be used as a primary dialogue tool with the authorities regarding public funding and incentives for technology breakthroughs and acceleration of the implementation for Next Generation Carbon Capture facilities



## Catering for a Complete Carbon Capture Chain



Equinor, Shell and Total E&P Norge AS to carry out the concept and FEED studies for developing an open source service for transport and storage of European CO2

Source: Equinor 2019

