



# Next-generation biofuel production integrated with Swedish forest industry – Technology and location choices

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**International Wood Biorefining Week**  
**May 26, 2016**



Forskningsrådet  
Formas  
Project  
213-2014-184

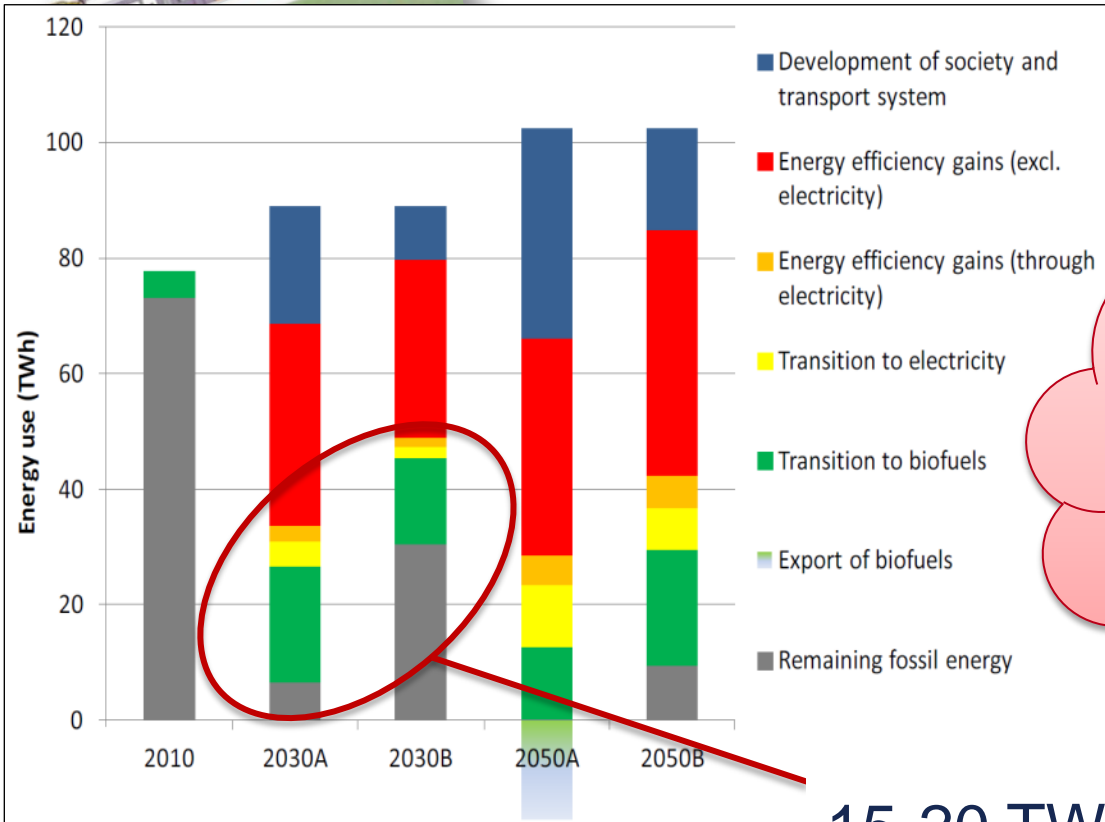




# Fossil-free road transport

**2030**  
**Fossil fuel independent vehicle fleet**

**2050**  
**Resource-efficient energy supply with zero net emissions of GHG**

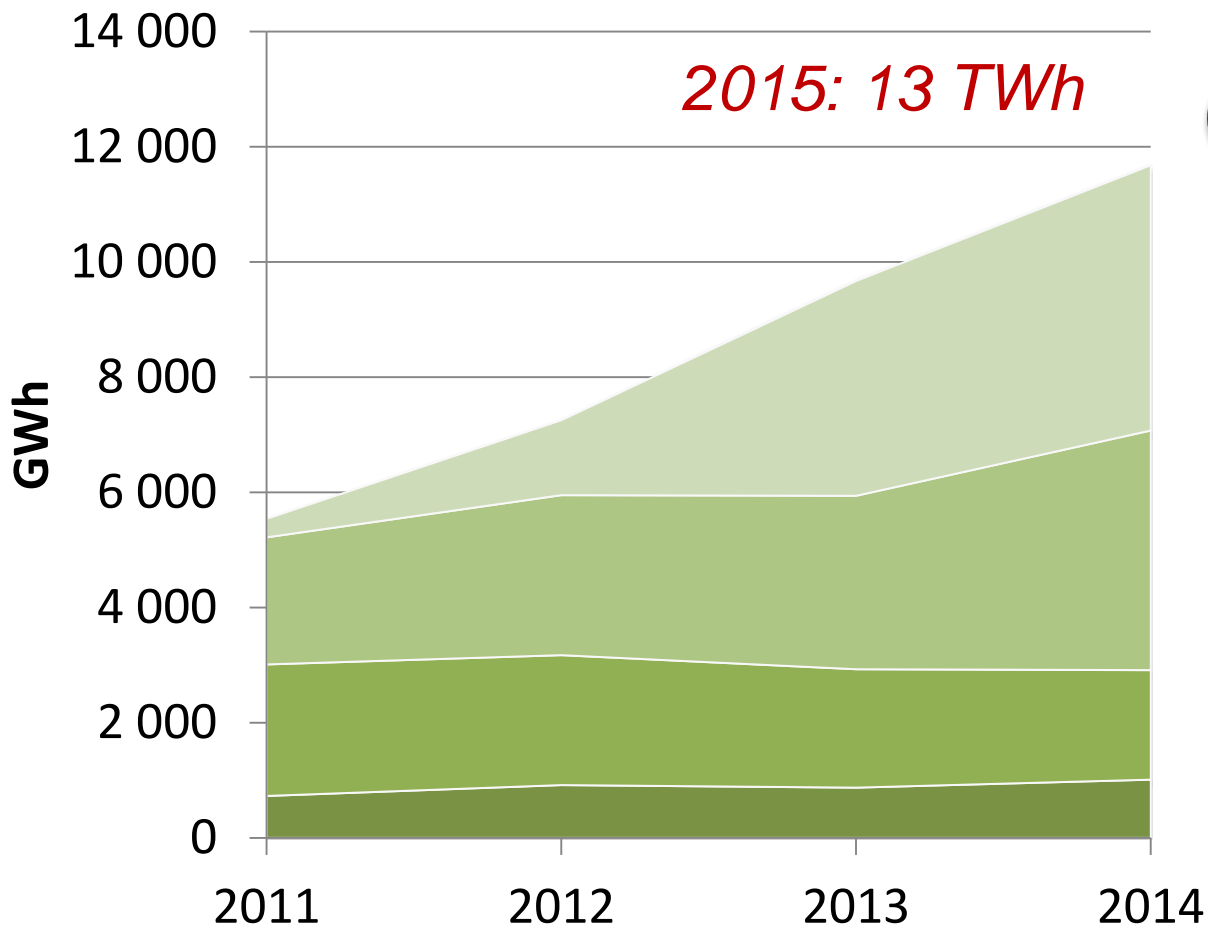


**15-20 TWh**

SOU 2013:84 Fossilfrihet på väg



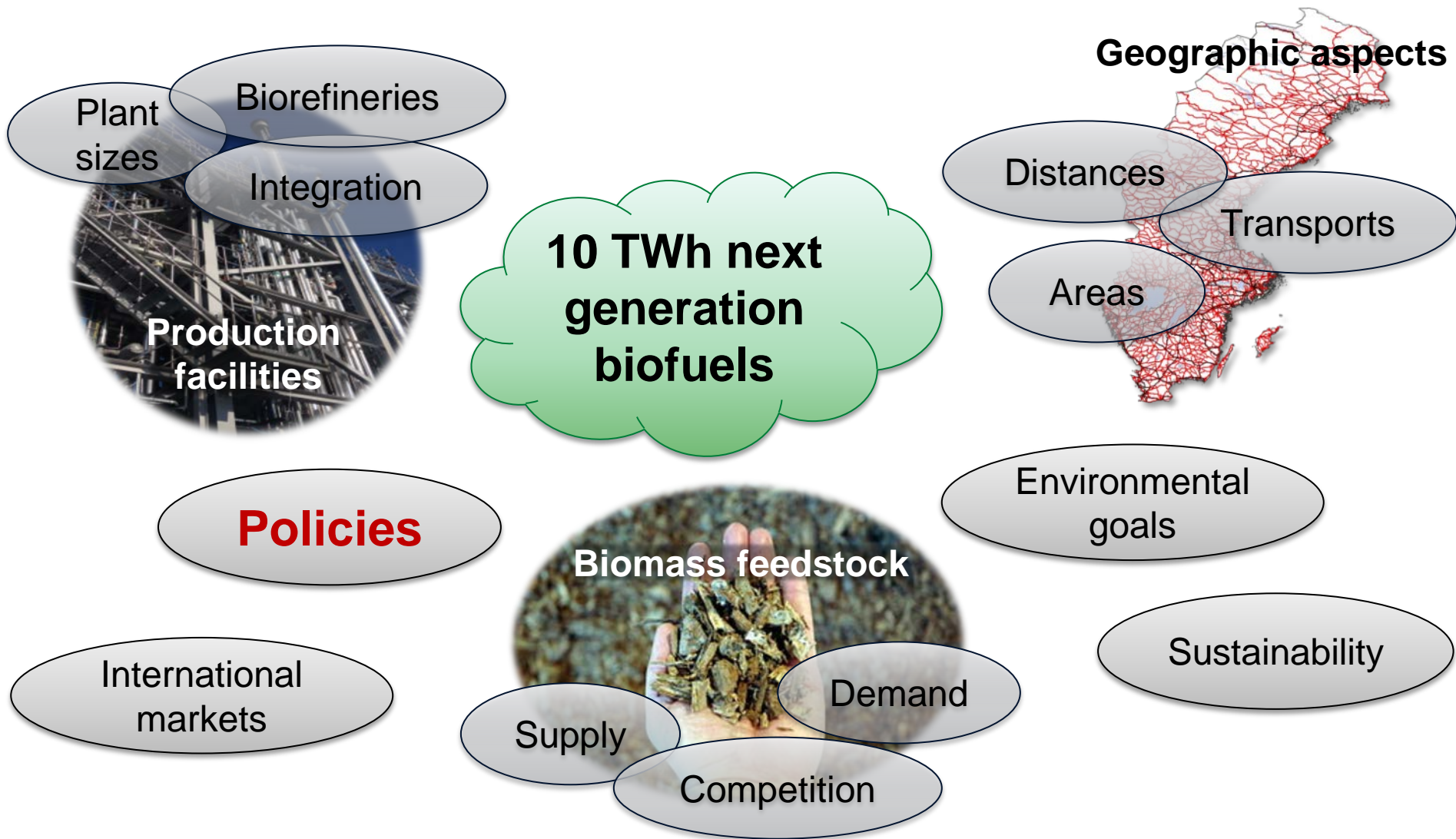
# Fossil-free road transport



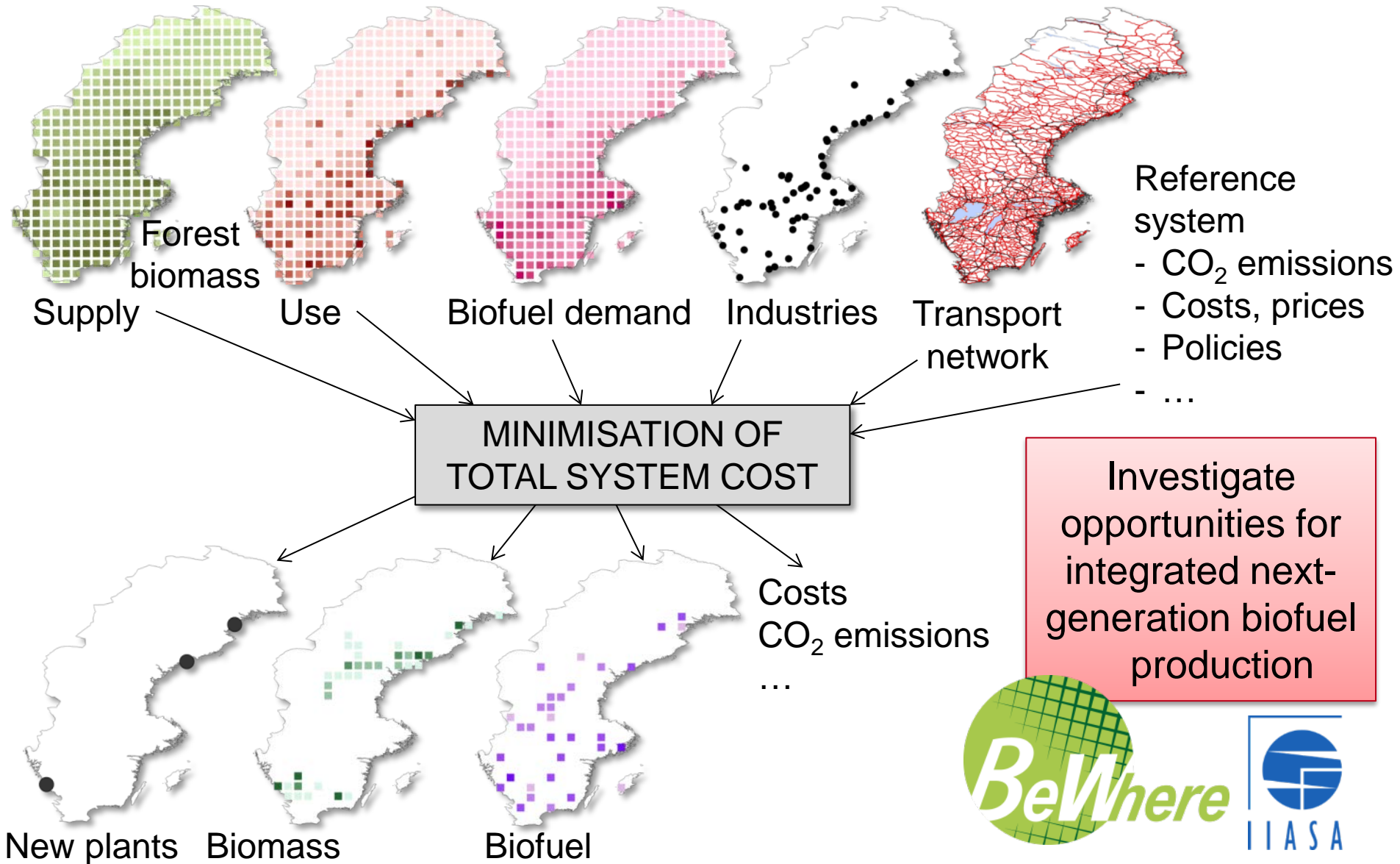
**2030**  
**Fossil fuel independent vehicle fleet**

- HVO
- FAME
- Ethanol
- Biogas

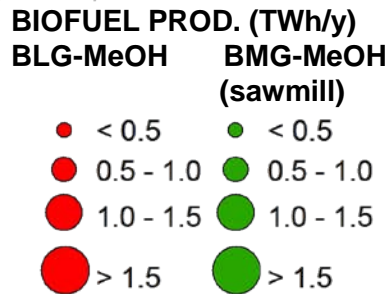
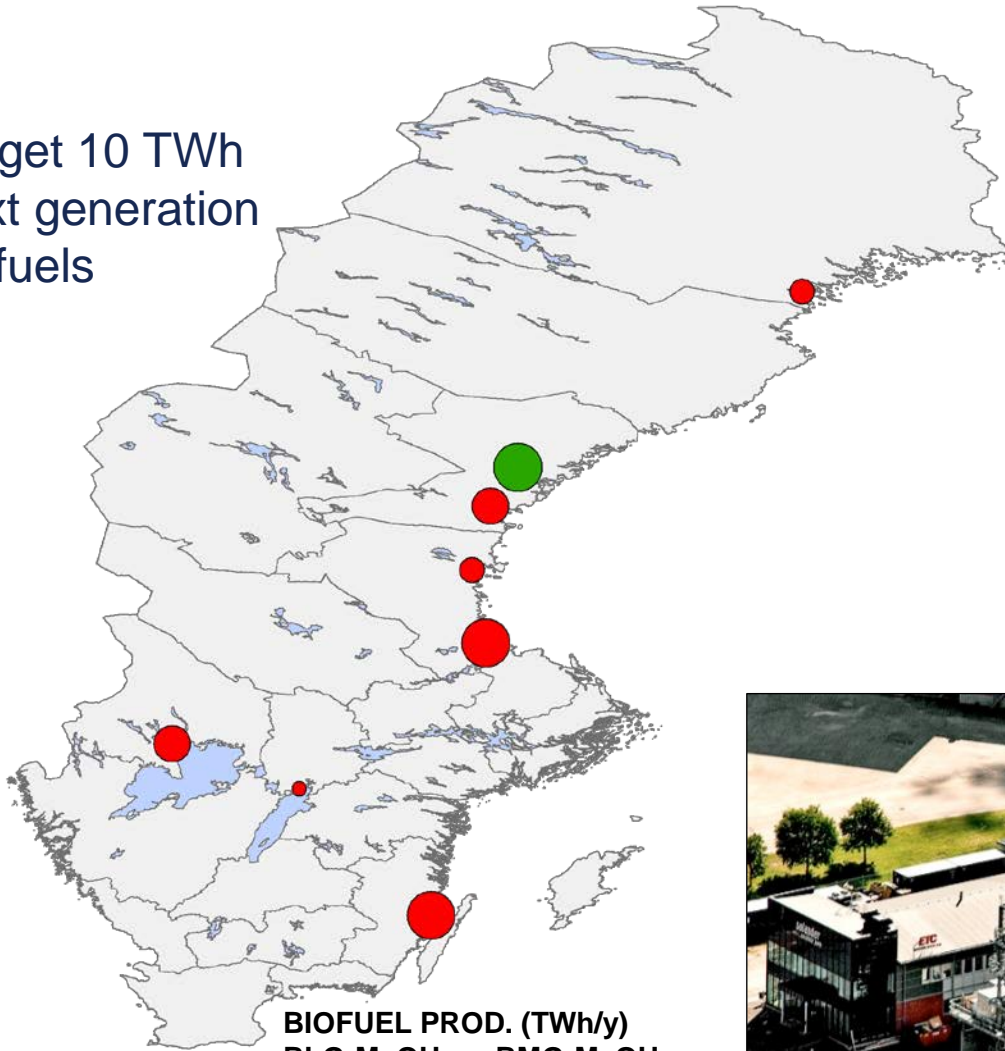
# Large-scale biofuel plants where...?



# Finding the sweet spots



Target 10 TWh  
next generation  
biofuels



# Sweet spots



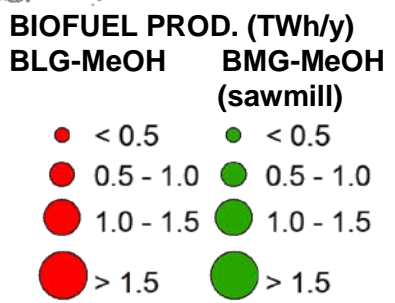
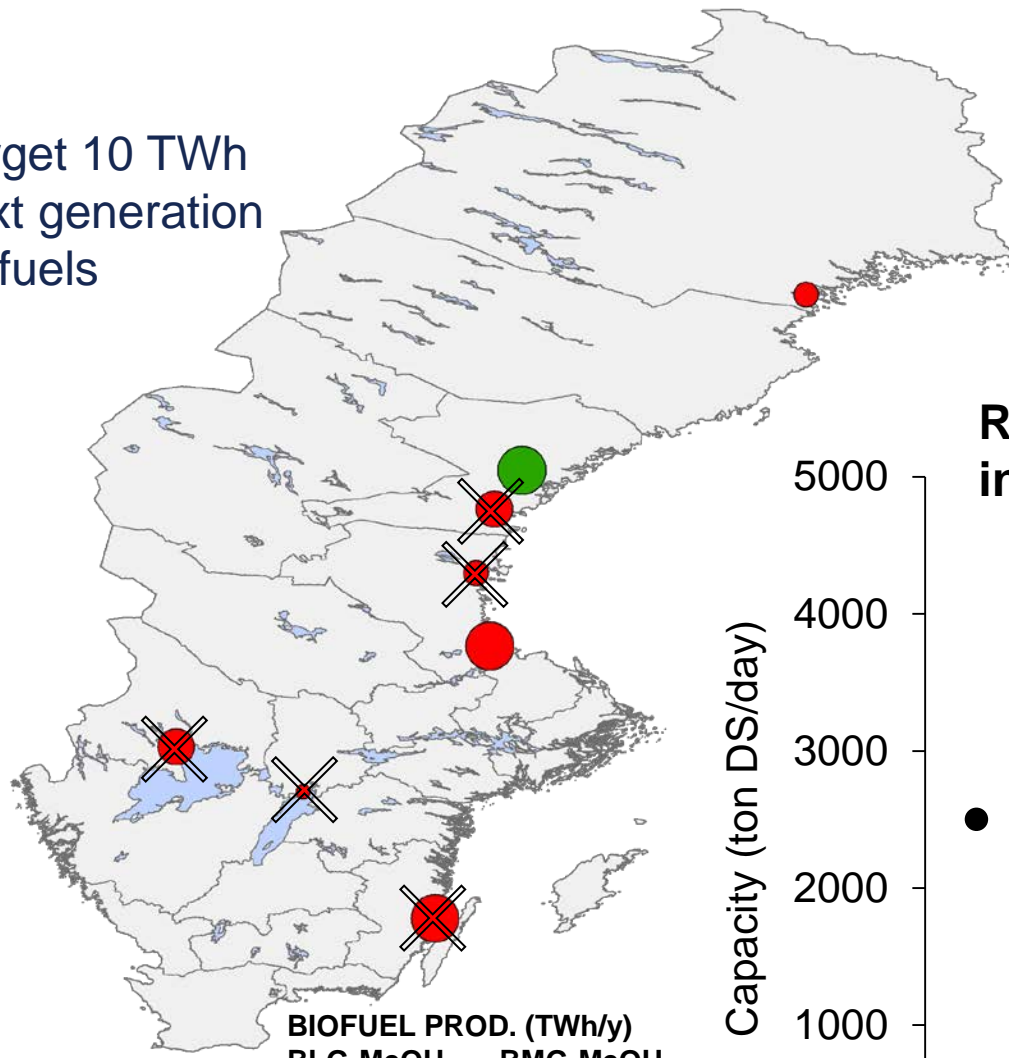
LTU Green Fuels BLG pilot Piteå:  
 > 28,000 h gasification of black liquor  
 > 10,000 h bio-DME / bio-methanol production

Pettersson K, Wetterlund E et al.  
 (2015) Applied Energy 154:317-332

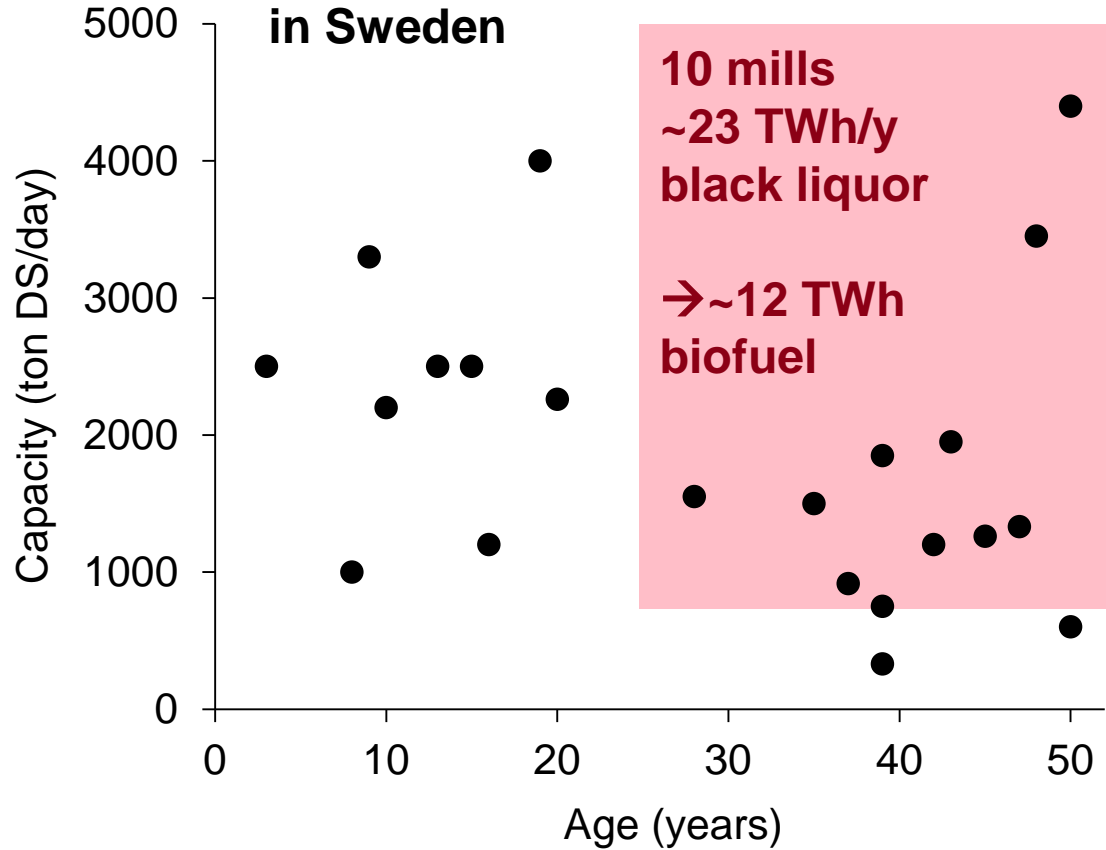


Target 10 TWh  
next generation  
biofuels

# Sweet spots



## Recovery boilers in Sweden



**10 mills**  
**~23 TWh/y**  
**black liquor**

**→ ~12 TWh**  
**biofuel**

Pettersson K, Wetterlund E et al. (2015) Applied Energy 154:317-332



# Co-gasification with pyrolysis oil

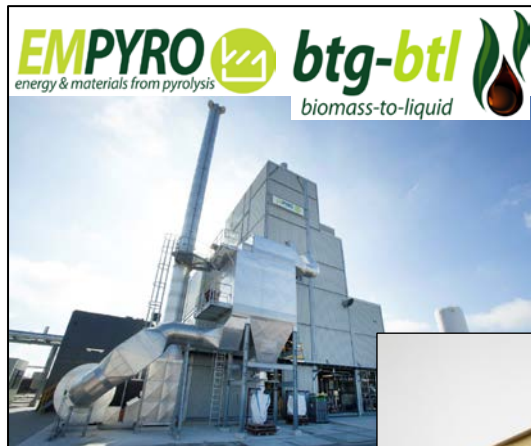
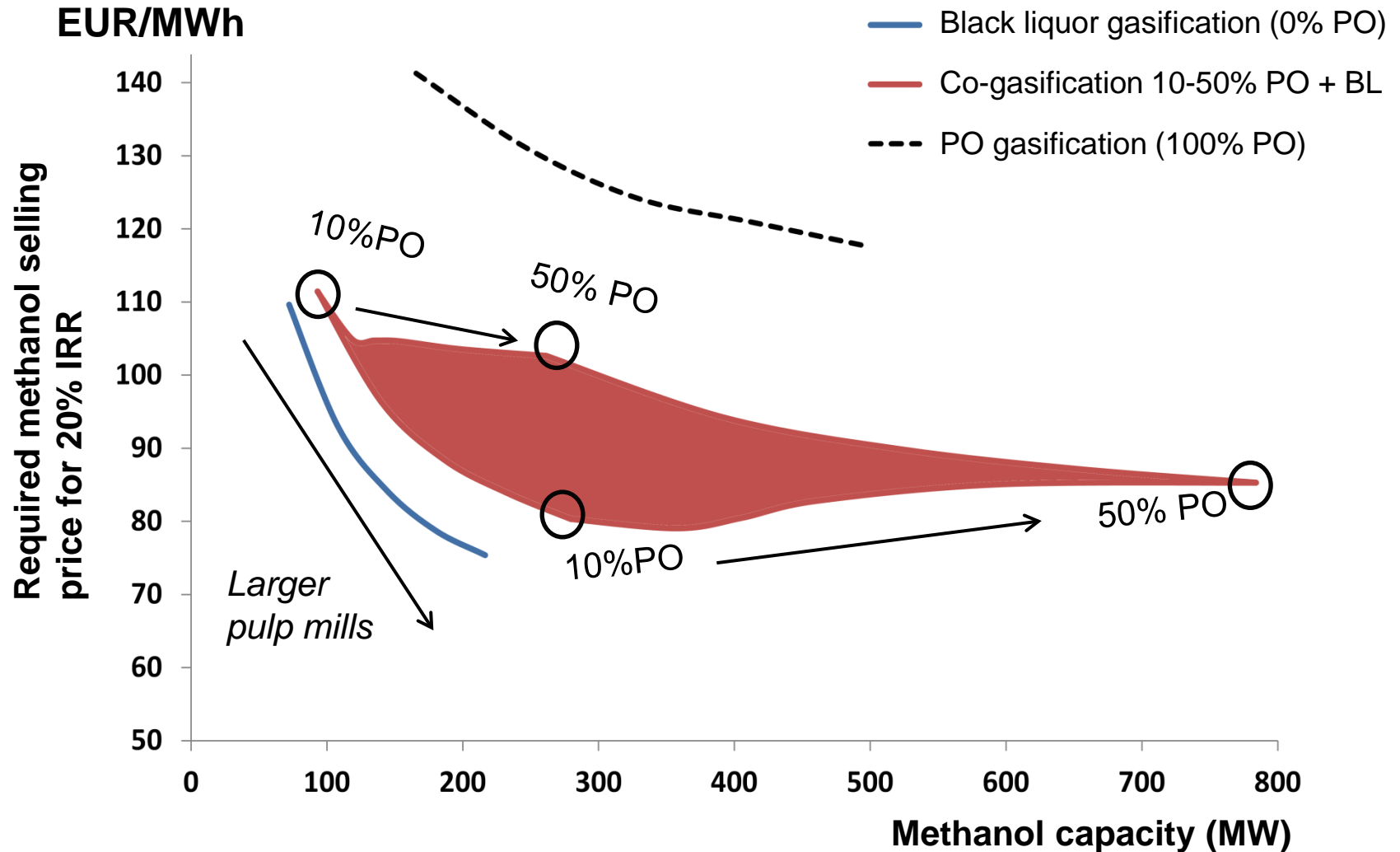


Photo: Erik Furusjö, LTU

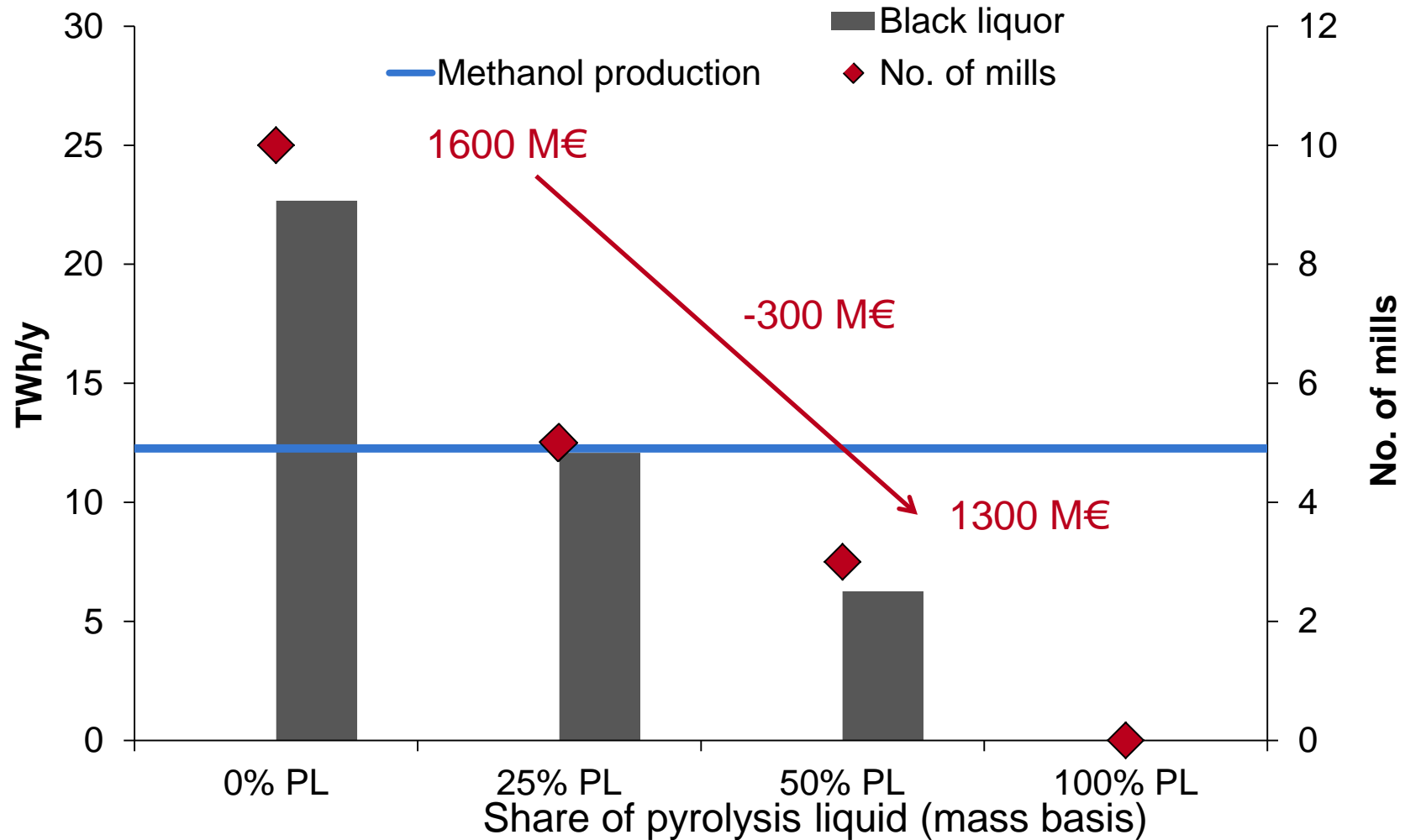


# Co-gasification with pyrolysis oil



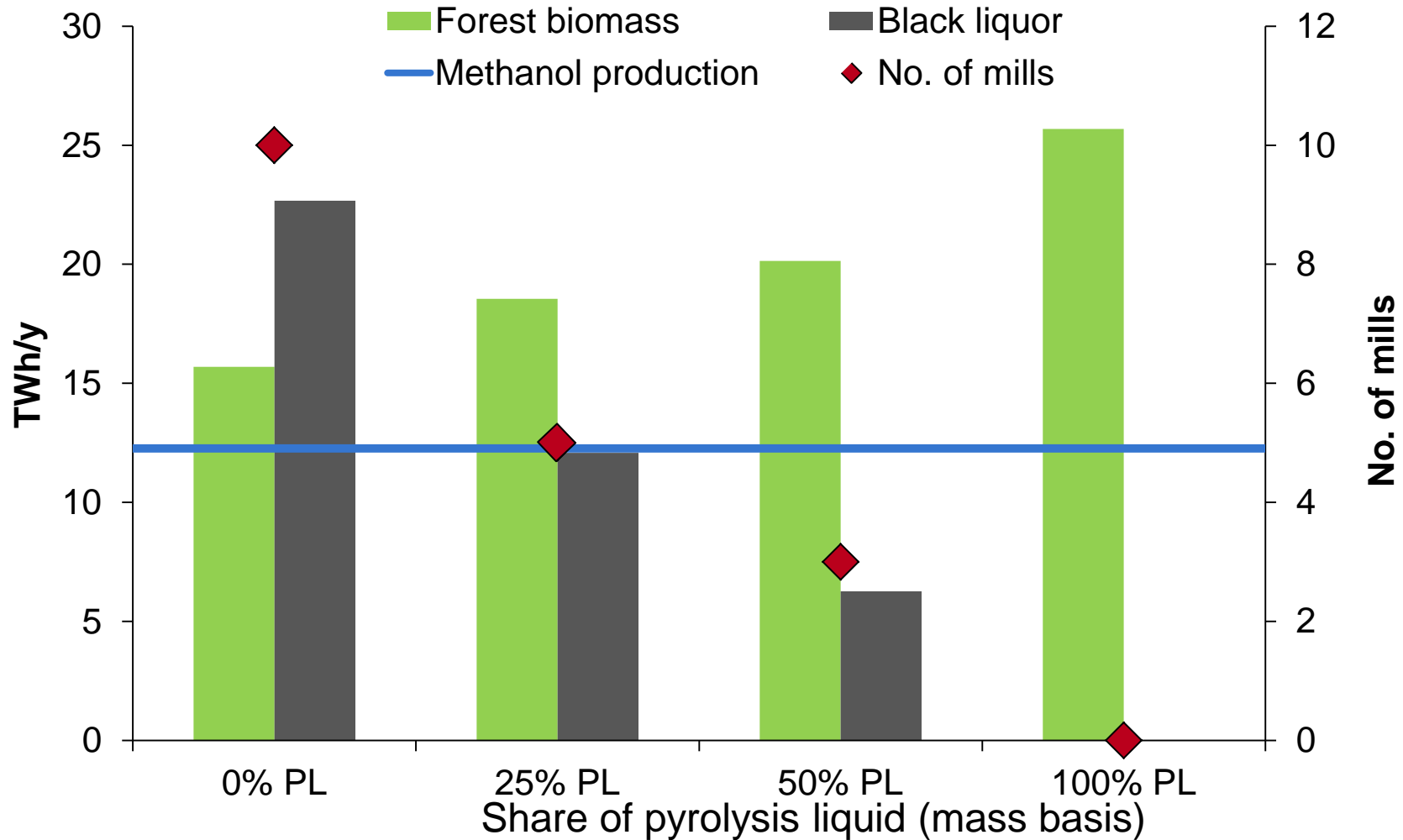
Adapted from Andersson J, et al. (2016)  
Energy Conversion and Management 110:240-248

# Fewer pulp mills needed...



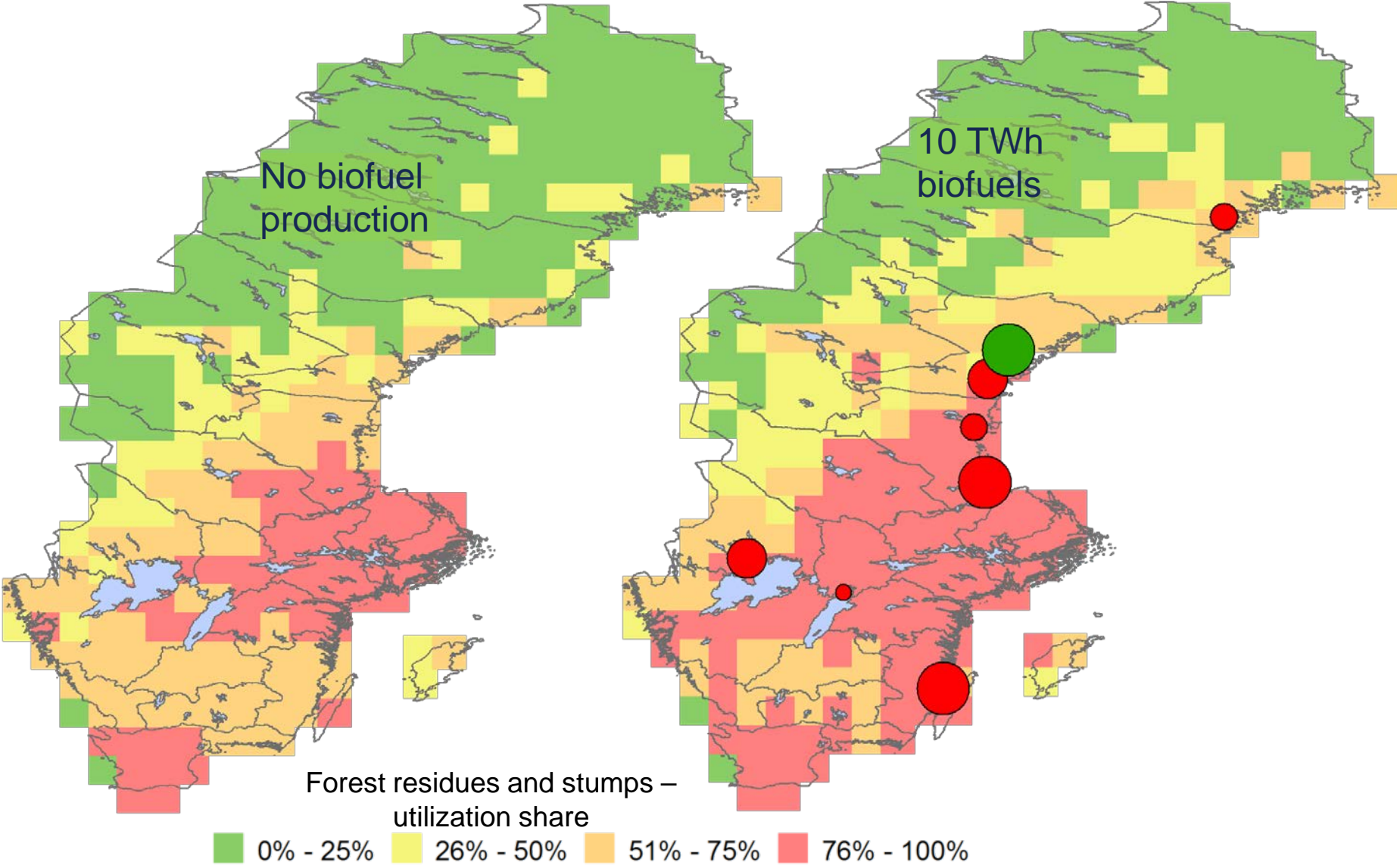
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Energy Conversion and Management 110:240-248

# ...but more biomass

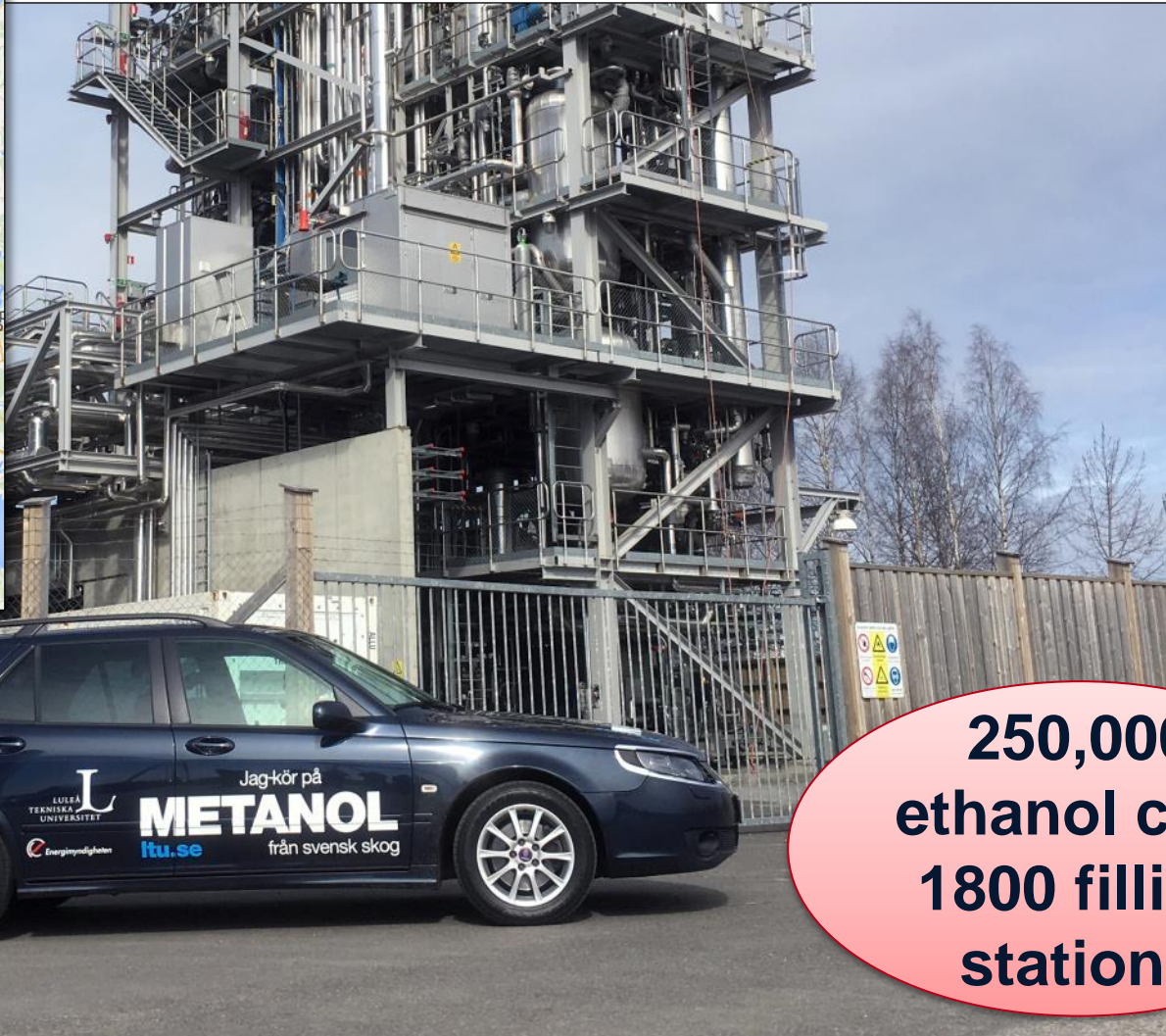


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Energy Conversion and Management 110:240-248

# Total biomass utilization



# Biofuel market?



**250,000  
ethanol cars  
1800 filling  
stations**

Photo: Rikard Gebart



# “Sweet spots” for biofuel production

- Swedish forest industry can host biofuel production to meet 2030 targets
- Economic benefits from integrated production
- Biofuel market already in place, if we want to
  
- Policy commitment
- Competition for biomass feedstock

# Thanks for listening!

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