



Fossil free road transport?

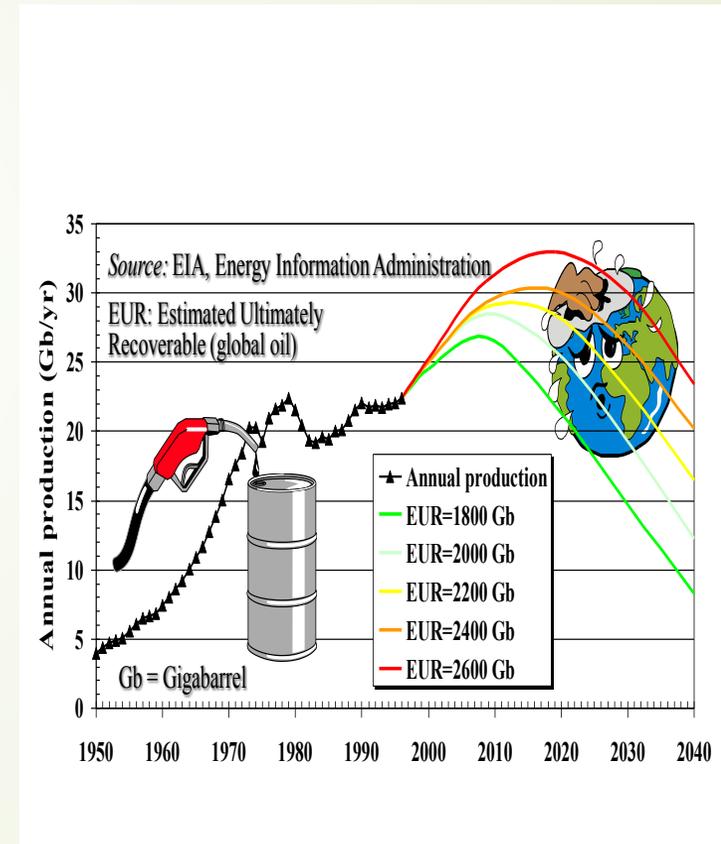
Trends and ideas in Sweden

JOINT WORKSHOP WITH IEA BIOENERGY
Infrastructure Compatible Transport Fuels

Olle Hådell

Sustainable supply of energy to transportation is a crucial issue.

- Transportation is a cornerstone in a modern society.
- But climate change is a real threat/ Use of fossil fuels has to be reduced to a fraction of the volumes today
- How can a 2-degree target be combined with mobility worldwide?



Means of promoting EEC's in Sweden (environmentally enhanced cars)

Incentives addressing the cars

- Tax exemption for 5 years for EEV's
- Procurement of vehicles purchased by governmental authorities
- Exemption from congestion taxes in Stockholm
- Free parking in bigger cities
- Reduced taxation of car benefit
- Vehicle taxation based on CO2 emissions
- Obligation for fuelling stations to provide biofuels

➤ Incentives addressing the fuels

- Exemption of energy- and CO2-taxation for biofuels
- Support to pilot plants

favoured

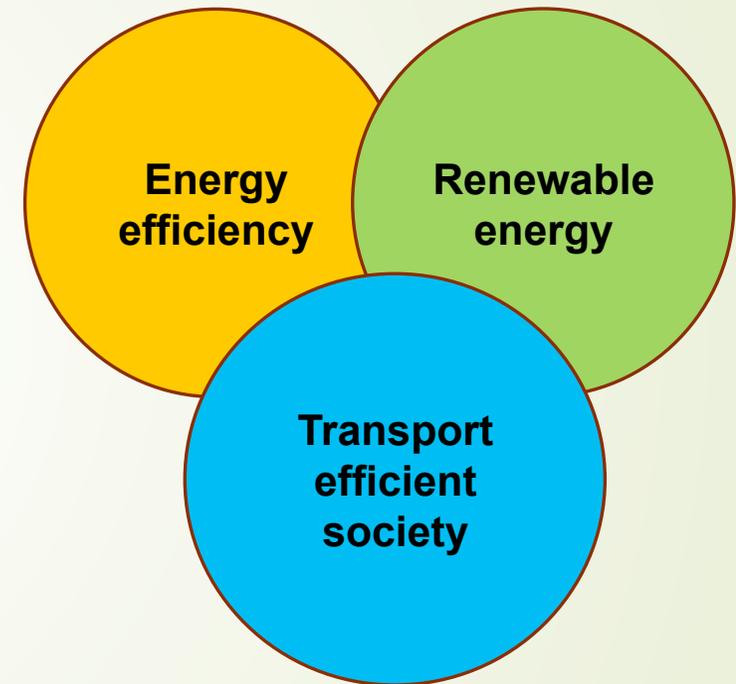
Biofuels, efficiency,
Biofuels,
Biofuels
Biofuels, efficiency
Biofuels, electricity
Efficiency
E-85

Biofuels

Lignocellulose, gasification

Fossile free road transportation - is that possible ?

- Yes, if you can combine:
 - More efficient vehicles
 - Biofuels
 - Electrification
 - Change of transportation modes
 - Development of the society



To achieve this, there is a need for comprehensive strategies!



More efficient cars

Driving forces:

➤ EU directives:

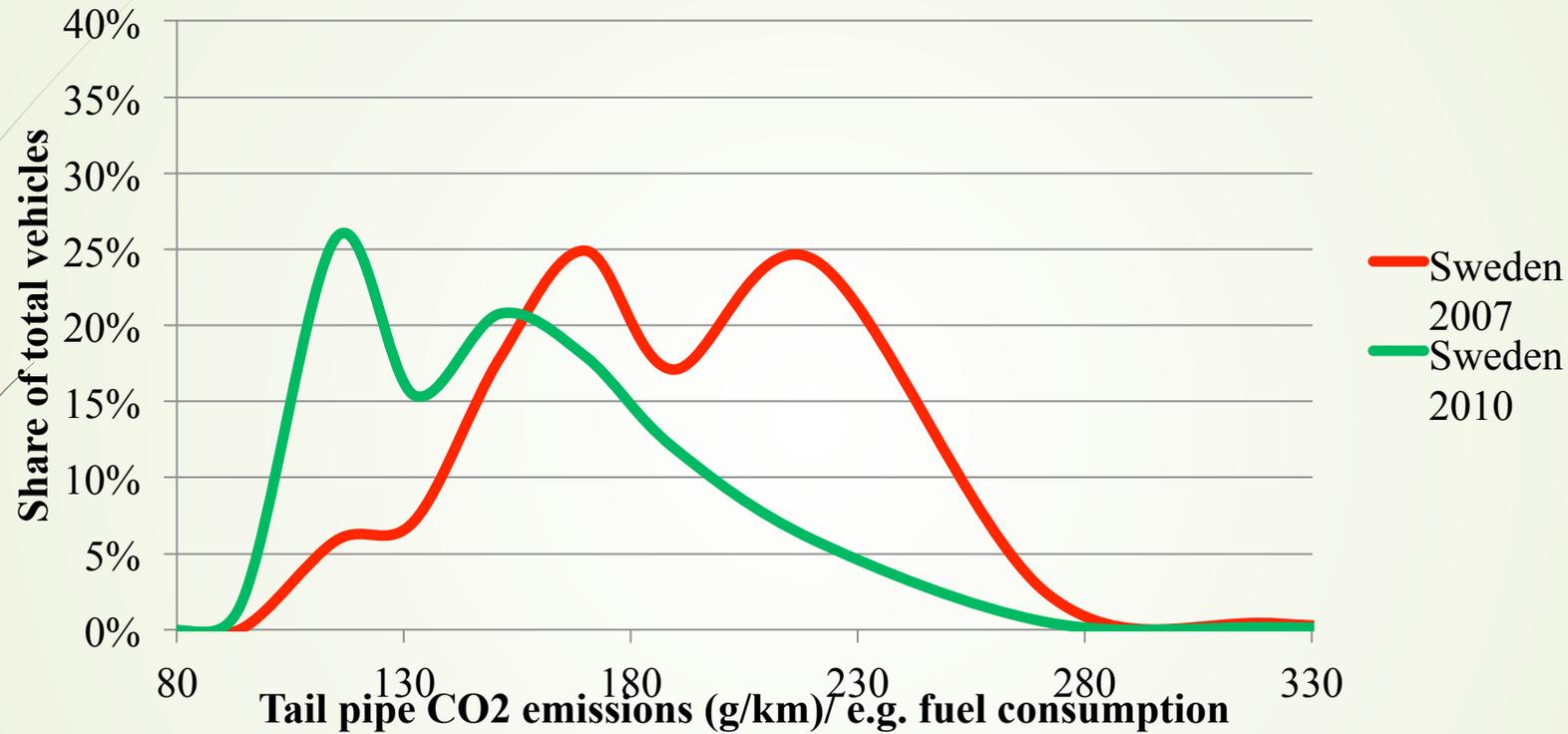
130 g CO₂/km 2012 -2015; 95 g CO₂/km 2020

- Offers common rules for all companies selling cars in Europe. Efficiency has become a highly prioritized issue.

➤ Behaviour of Swedish buyers:

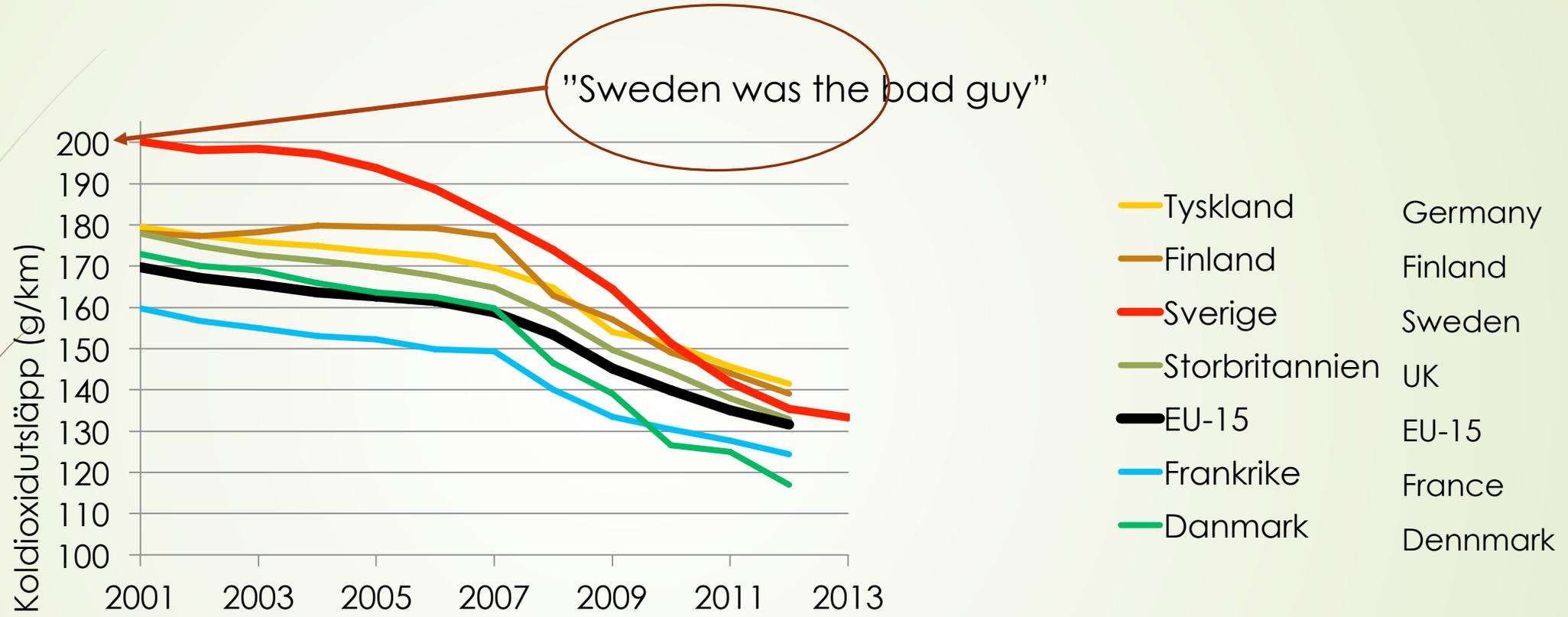
- Sweden can't affect the type of cars produced. But Swedish incentives affect the selection of cars sold in Sweden.

A radical shift in Swedish car sales....



... caused by incentives, technical progress and image

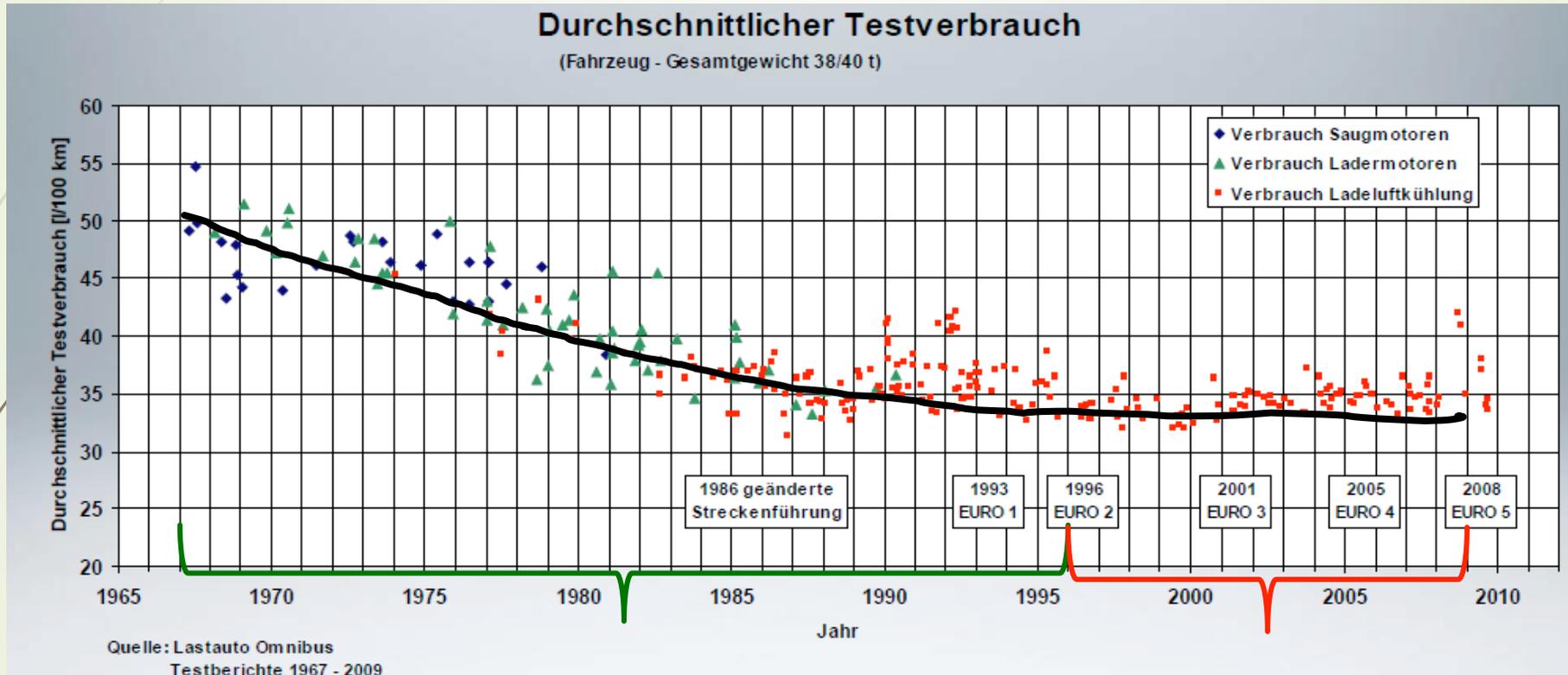
EU trends



"Sweden was the bad guy"

To get more efficient trucks is more complicated..

(40 ton vehicle in real life)



Continuously reduced
fuel consumption

No development in
fuel consumption

Heavy vehicles are a real challenge !



Biofuels

All links in the whole chain from well to wheel must be considered

- Access to sustainable feedstock
- Efficient and economical viable production
- Appropriate number of retail stations
- Access to engines designed for the fuel
- Acceptance from the end user

Substitution of fossile diesel oil is crucial!

Threats

- Already shortage of Diesel oil in Europe
- Higher share of dieselcars due to regulations of fuel consumption.
- Aviation fuels and diesel oil are competitors
- Environmental marine regulations will raise demand for diesel oil?

Solutions

- Biofuels ought to be be used in heavy vehicles
- Biomethane
- Synthetic diesel oil
- Dimethyleter (DME)

- Electrification of roads....

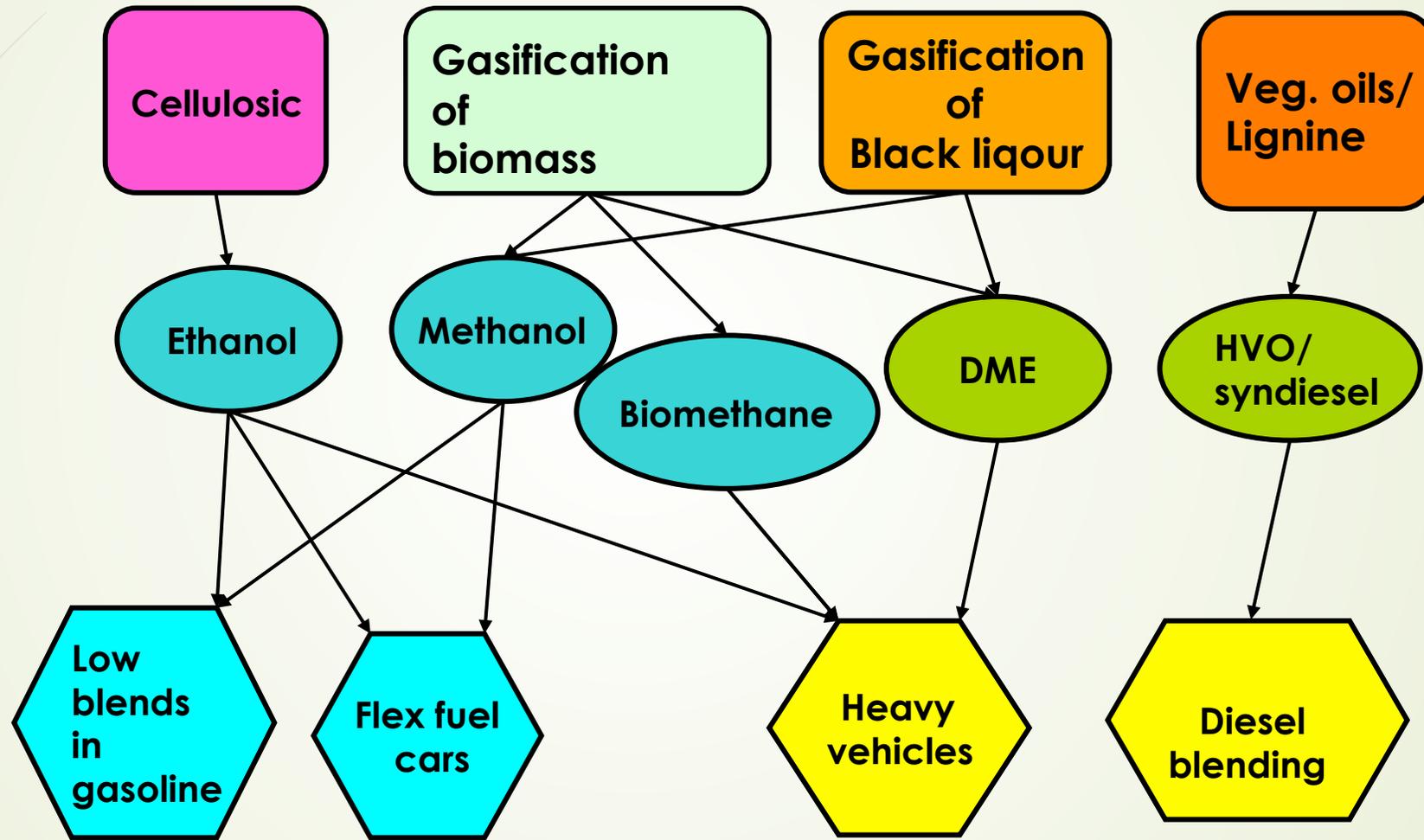




Swedens attempt to develop an E-85 market has failed

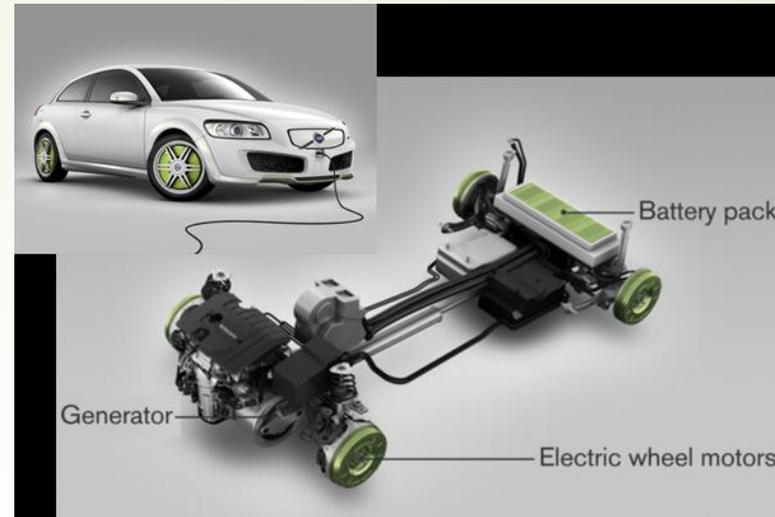
- The incentives were too costly
- Producing ethanol from woodchips was a bad idea
- The Swedish market is too small to maintain an development for E-85 engines

Main pathways for biofuel development

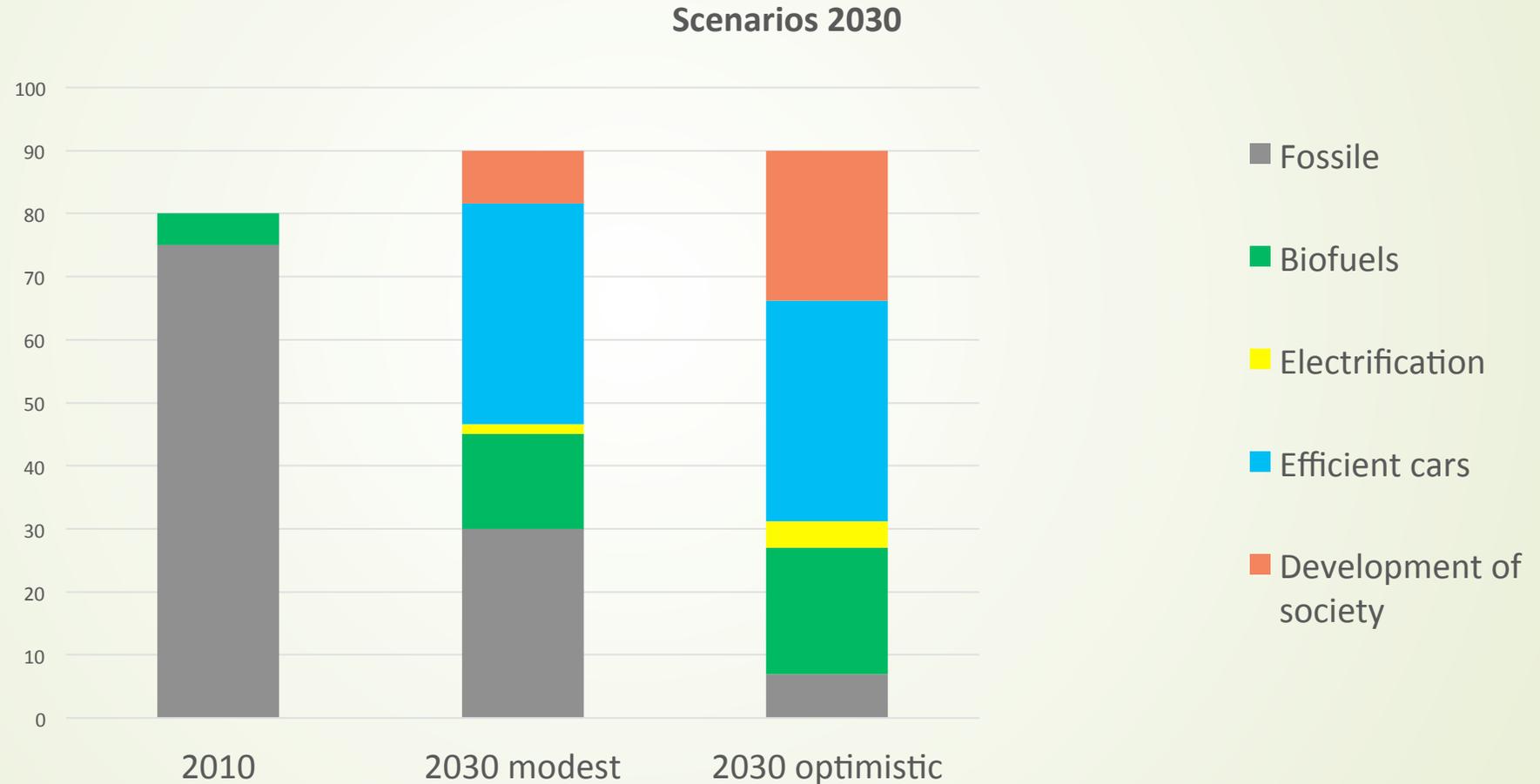


Electrification

- *Battery costs are still a bottleneck*
- *City buses will be the first adaptors*
- *Carpooling and other local fleets comes next*
- *Access to charging points is crucial*
- *Can continous or intermittent charging be realised?*



Reducing use of fossile fuels in road transport in Sweden



Olle Hådel

Source: SOU 2013:84



Conclusions

- Shortage of diesel fuel is likely. Renewable dieselsubstitute is crucial especially for heavy vehicles
- Engine development is costly and need large harmonized markets to be profitable.
- The ability of the carfleets to absorbe dedicated fuels as ethanol, methanol, DME etc. is limited. Drop in is a "dream".
- Three types of biofuel production have to be developed:
 - Fuels from gasification
 - Drop in fuels from lignine
 - Ethanol from cellulose
- A clear long term target is crucial. The development of biofuels have to be continous and comprehensive.



Thank you!

Olle Hådell

ollehadell@telia.com

+46 70 563 71 92

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