



Impacts on the Nordic Energy System of the EU 2020 Directive Proposals

– A model analysis

Thomas Unger
Bo Rydén



The EU energy- and climate-policy targets ("20-20-20 until 2020")

- ✓ Reduce **CO₂-emissions** by 20% until 2020 compared to 1990
 - ⇒ ETS-sector 21% by 2020 rel. 2005,
 - ⇒ non-ETS-sector 10% by 2020 rel. 2005
- ✓ Increase the share of **renewables** from 8,5% to 20% of total final energy use in 2020
- ✓ Reduce **total energy use** by 20% until 2020 compared to a baseline projection for 2020

⇒ **Significant impact on the Nordic energy systems that will affect most of the energy markets and sectors !**



The scenarios

✓ **Reference scenario**

Existing policy instruments (incl 25 EUR/t, which we assume fulfills the CO₂ target for the EU in 2020)

⇒ How far do we reach towards our "Nordic goals" with existing policy measures?

✓ **"Green Package" scenario**

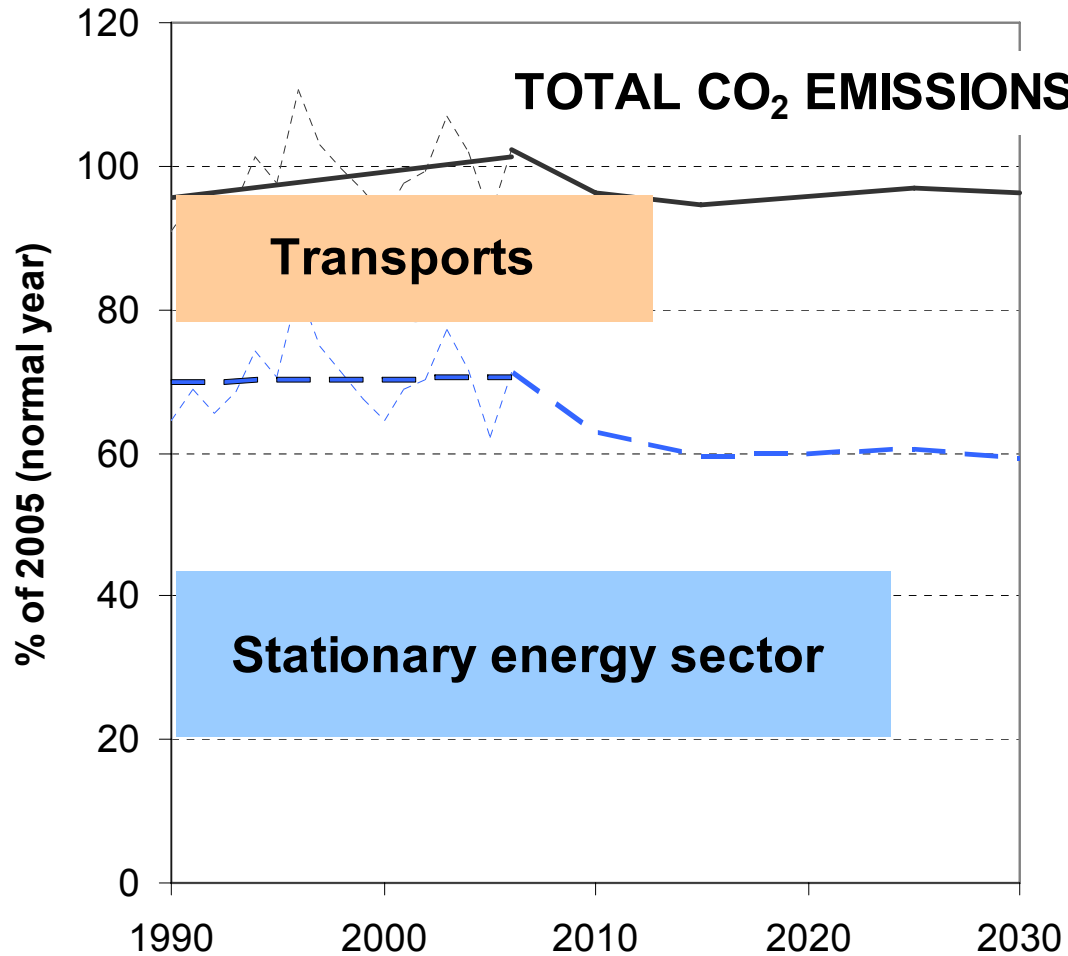
Existing policy instruments+Renewable target according to EU Directive (+160 TWh renewable energy (final) including transports in the Nordic countries as a whole; Biofuel Directive in transports + ~30TWh)

✓ **"Extended green package" scenario**

As "Green Package" but INCLUDING increased energy efficiency with 20 % in the Nordic countries as a whole (Biofuel Directive+EV in transports → Transports take their efficiency-target share)

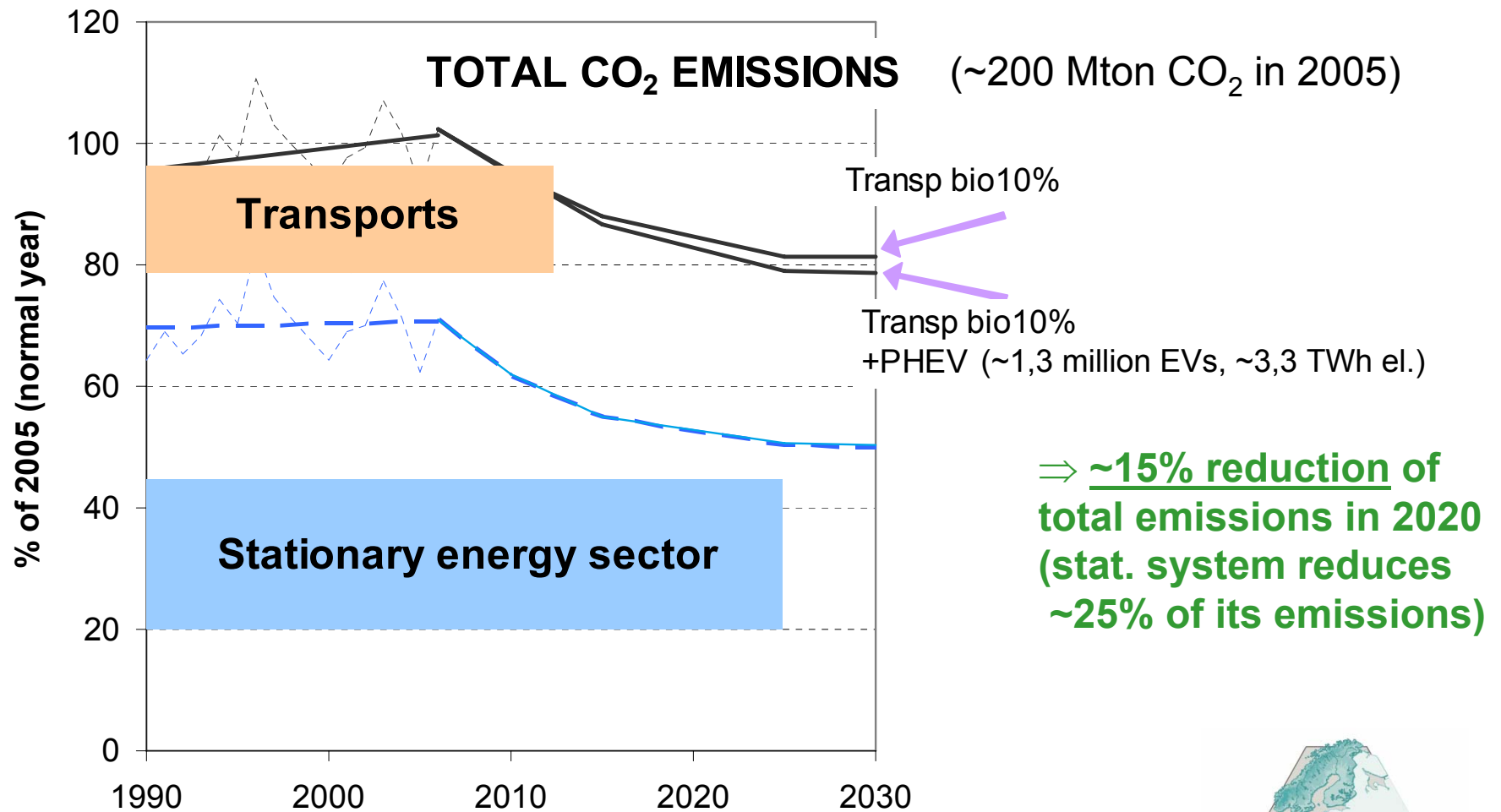


Nordic CO₂ emission – The reference scenario

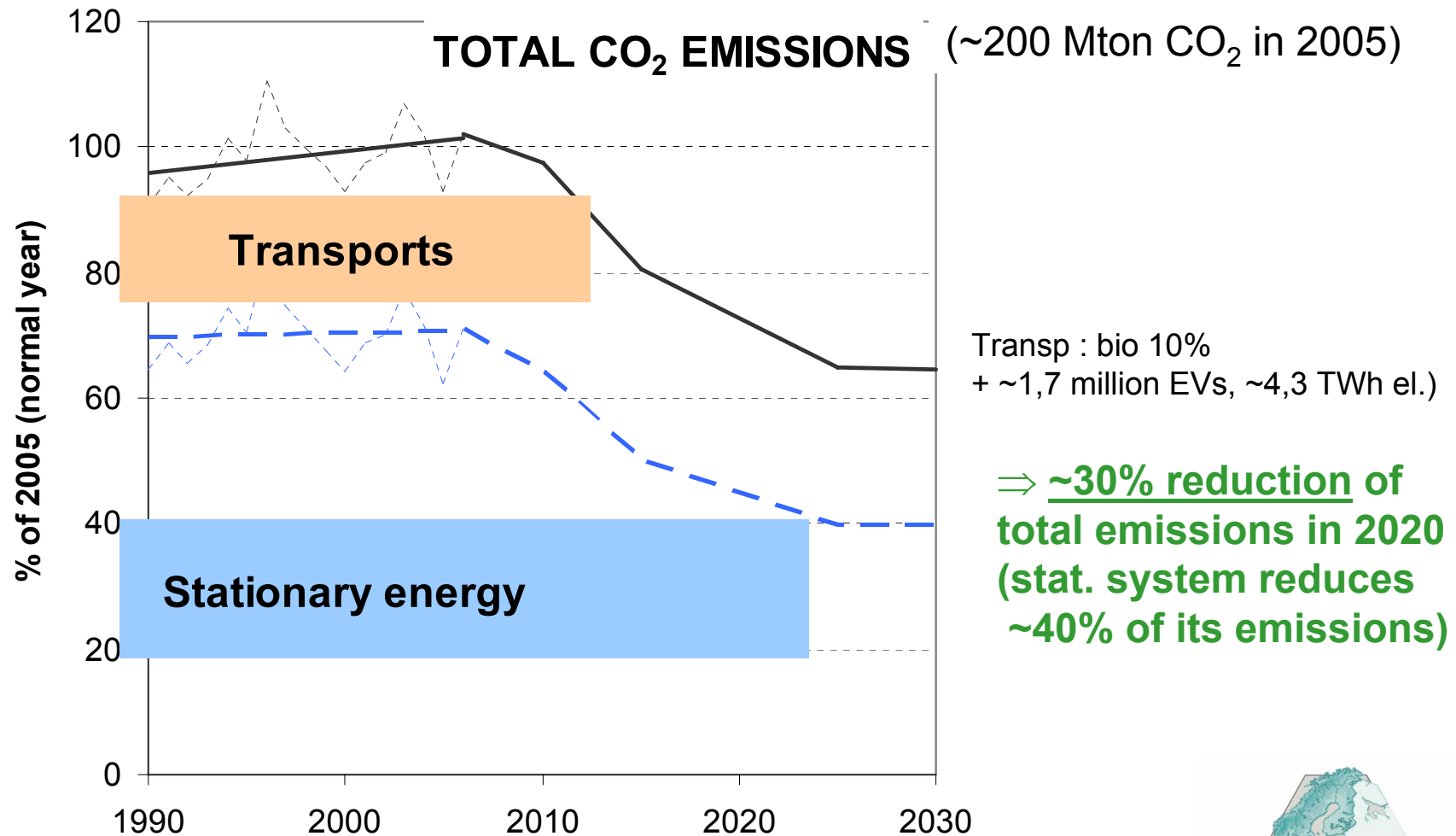


⇒ ~5% reduction of total emissions in 2020 (stat. system reduces ~10% of its emissions)

Nordic CO₂ emission – The "Green Package" scenario

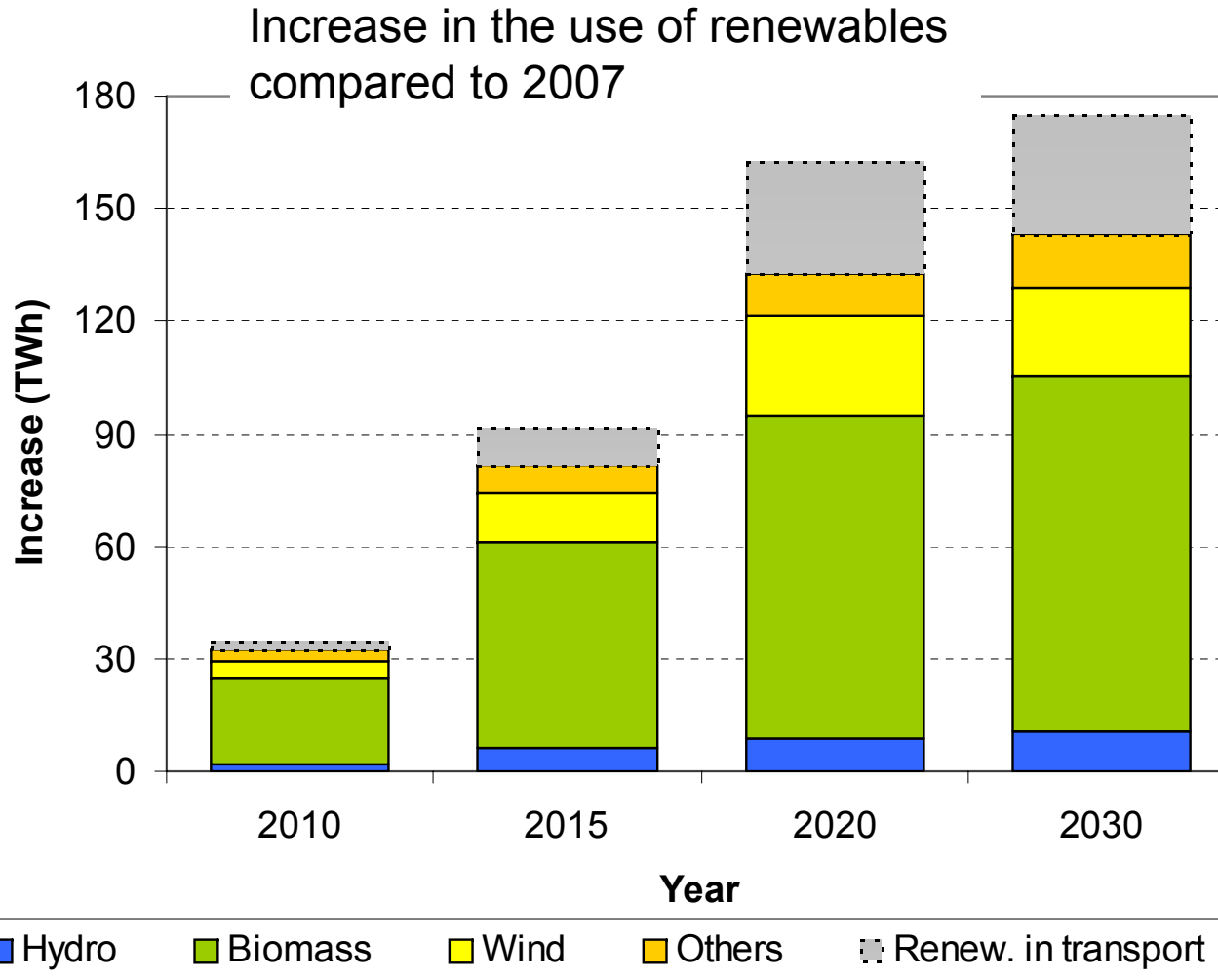


Nordic CO₂ emission – The "Extended Green Package" scenario



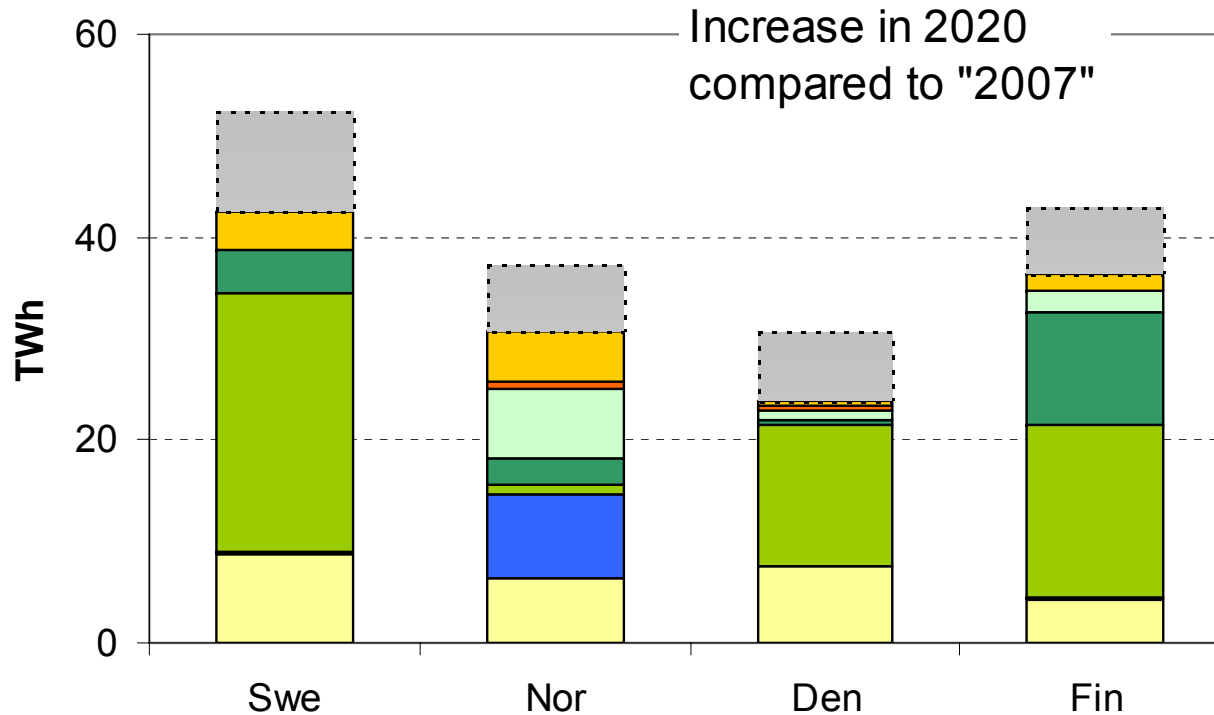
The impact on renewables

- The "Green Package" scenario



The increase of renewables by 2020

("Green package" scenario, country-by-country)

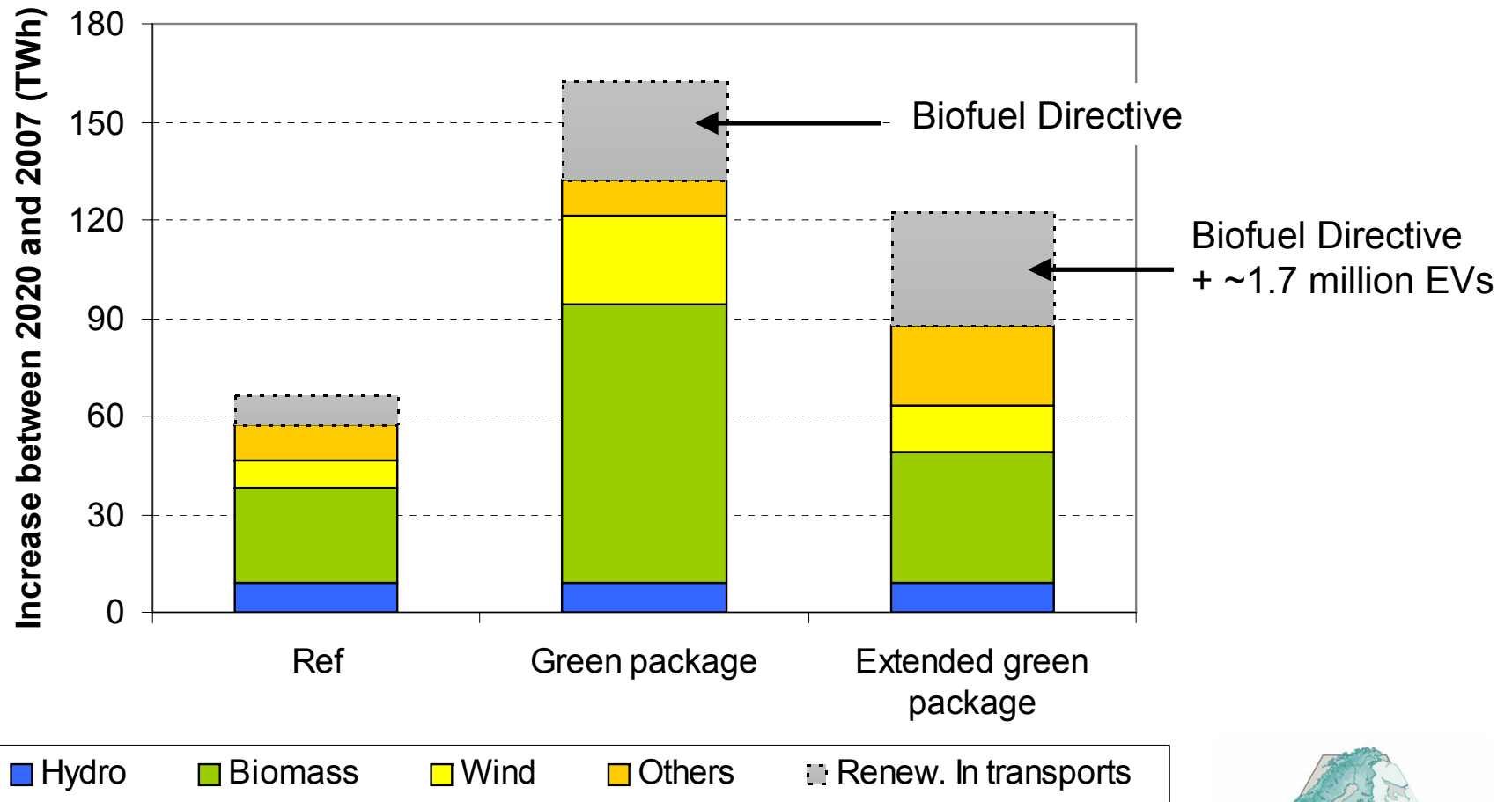


Roughly 50-60% of the increase occurs in supply of electricity and district heating



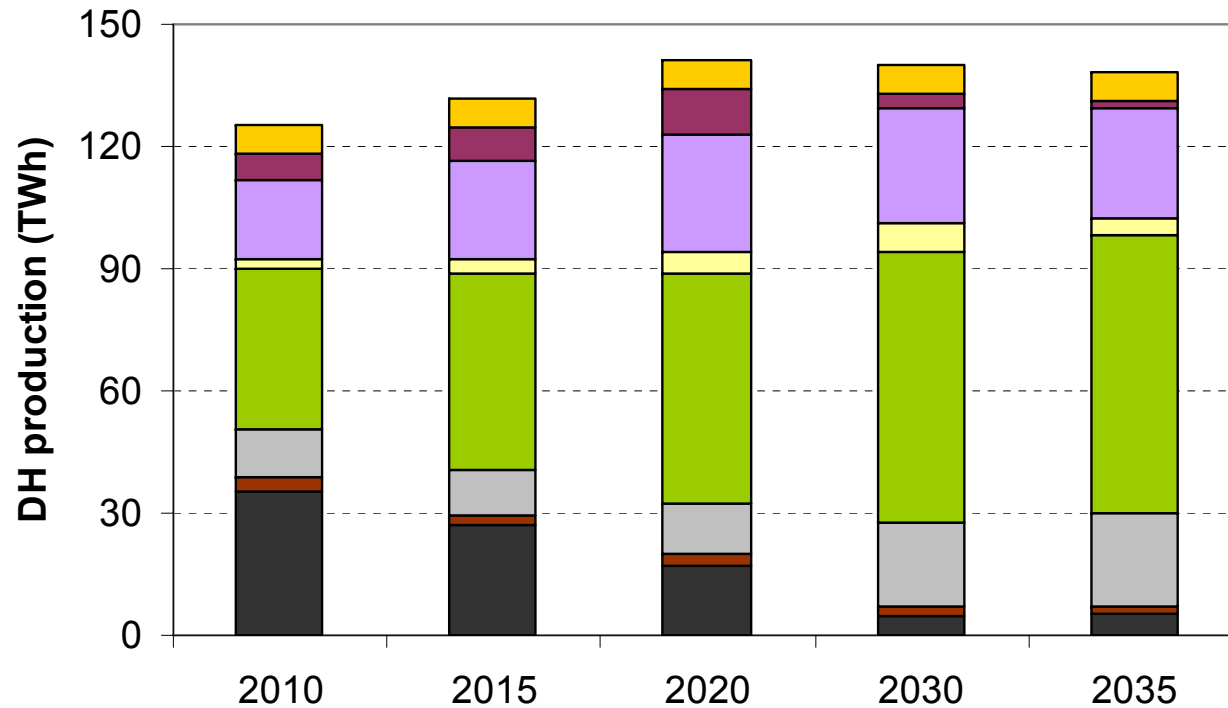
The impact on renewables

- All scenarios (2020)



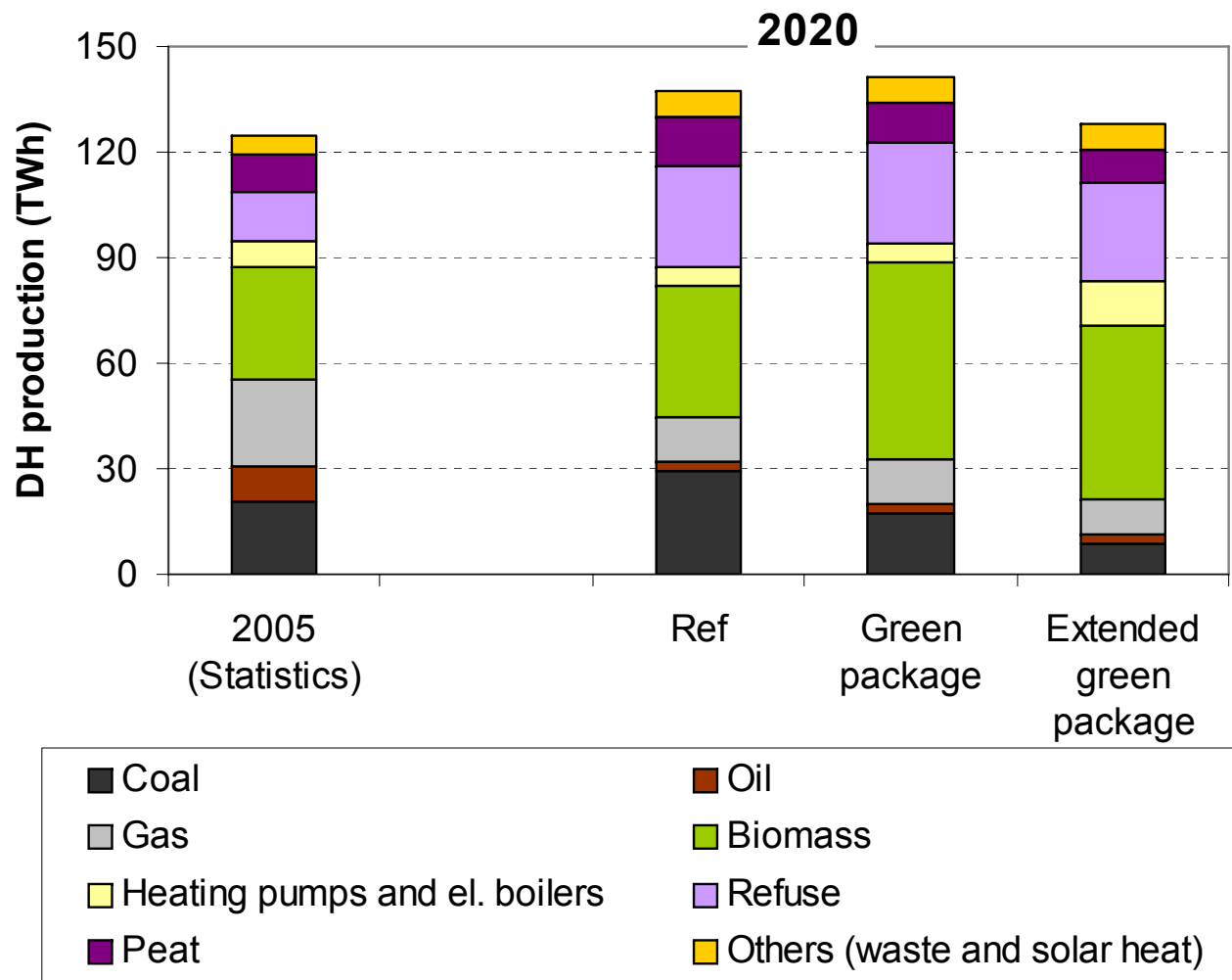
The impact on Nordic district heating

- The "Green Package" scenario



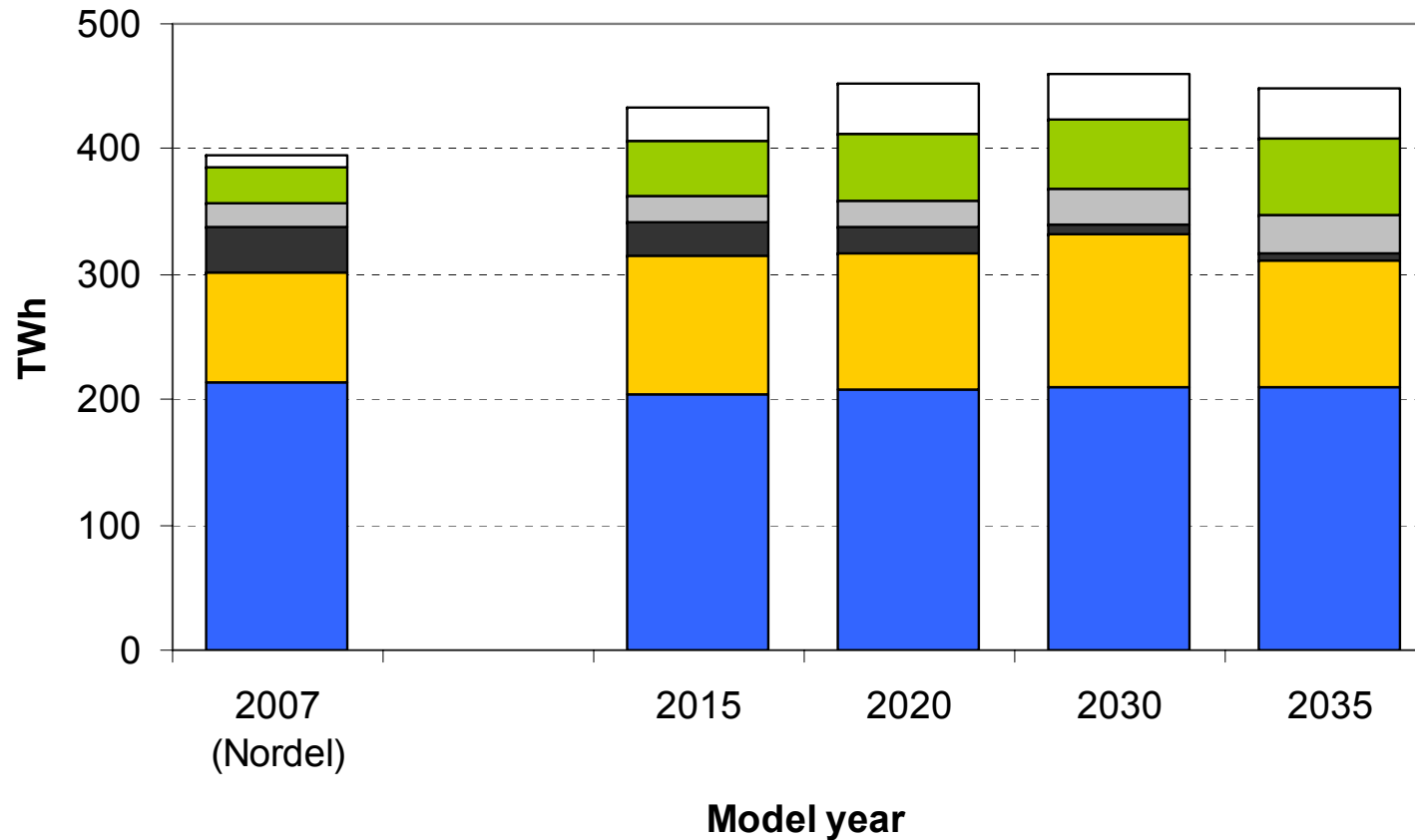
The impact on Nordic district heating

- All scenarios



The impact on Nordic electricity supply

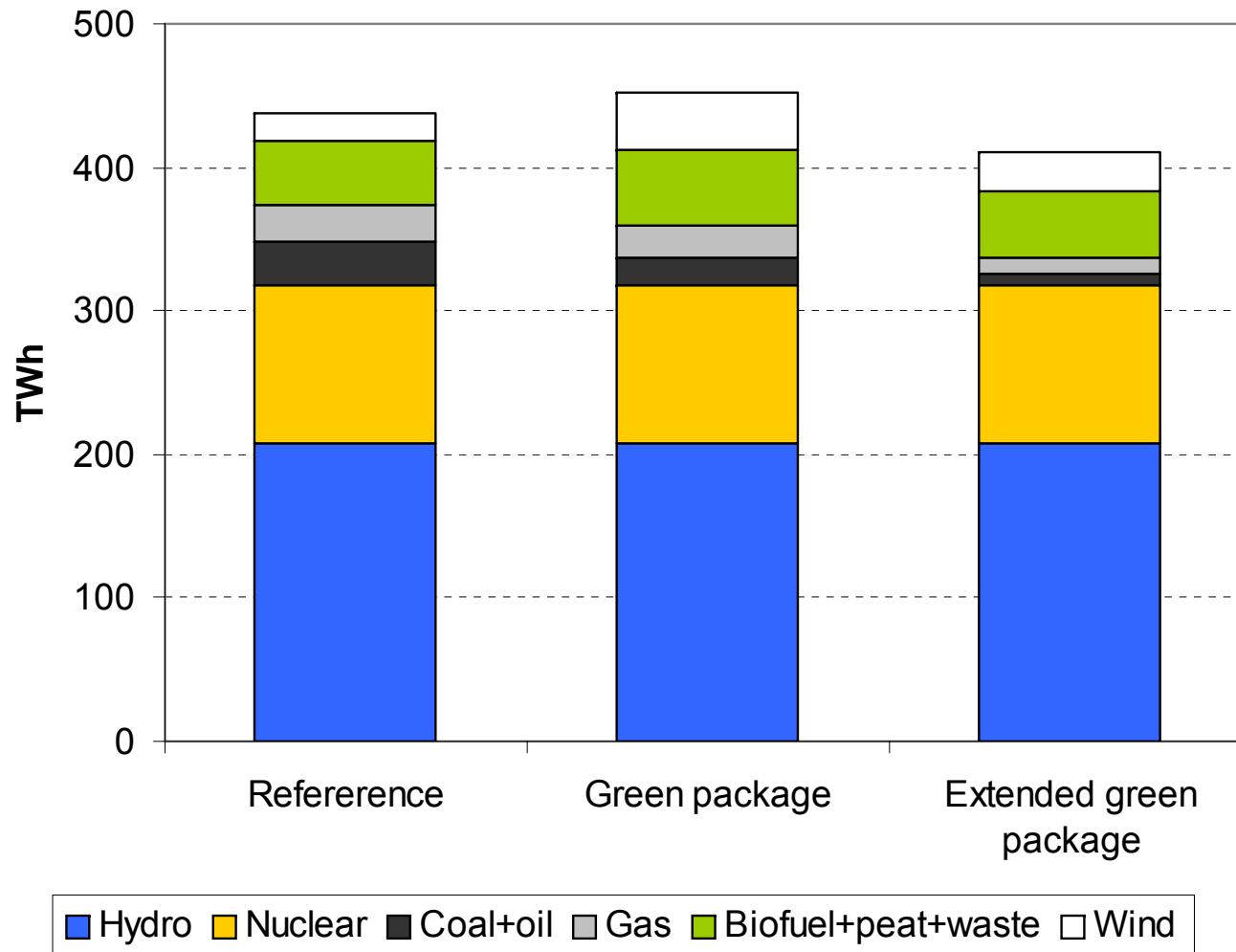
- The "Green Package" scenario



■ Hydro ■ Nuclear ■ Coal+oil ■ Gas ■ Biofuel+peat+waste □ Wind

The impact on Nordic electricity supply

- All scenarios (2020)



Summing it all up ...

- ✓ Significant impact on most sectors and markets
- ✓ Increase in the use of renewables of ~ 160 TWh by 2020 (in the Nordic countries as a whole)
- ✓ Total Nordic CO₂-emissions may be reduced by 15-30 % in 2020 (rel. 2005) if the targets are implemented
- ✓ Trade-off between different sectors: CO₂-burden/Renew redistribr. between non-ETS and ETS-sector (e.g. HPs or EVs), redistribr. between heat market, electricity and transports

Summing it all up (contd.)...

- ✓ Primary energy weighting in the Eff target: favourable for heating pumps. Alternative weighting for renewables (<1)?
- ✓ International trade complicates the issue
- ✓ Impact on fuel mix, technology, emissions has been shown. Impact on market prices will depend on the actual policy instruments that will have to be introduced → *More on this in the afternoon + Upcoming work..*
- ✓ Existing policy instruments lead into the right direction but are, generally, not sufficient for meeting the targets
- ✓ ...