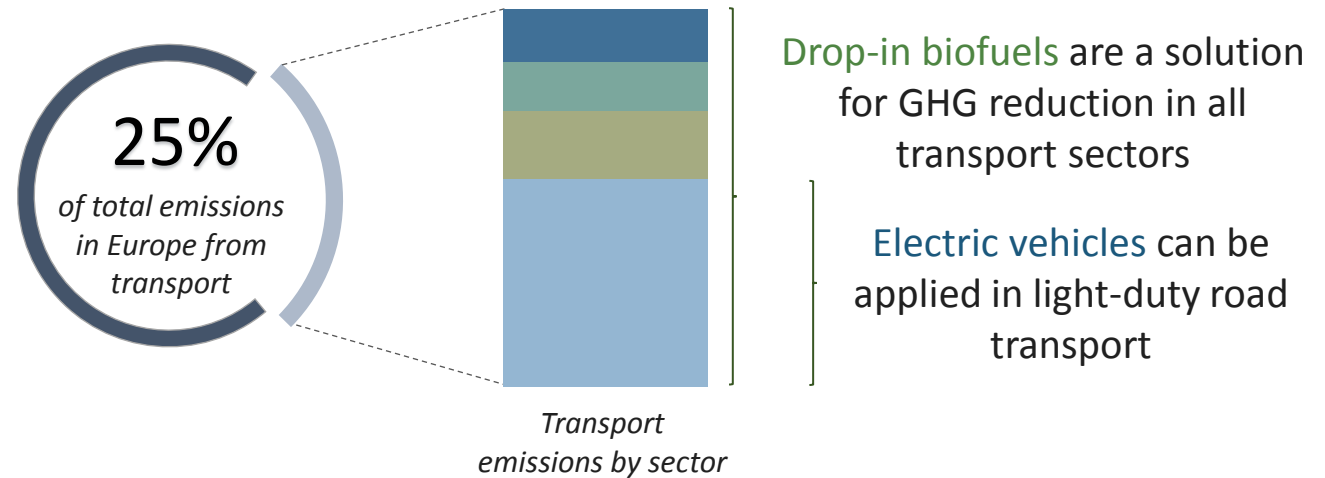
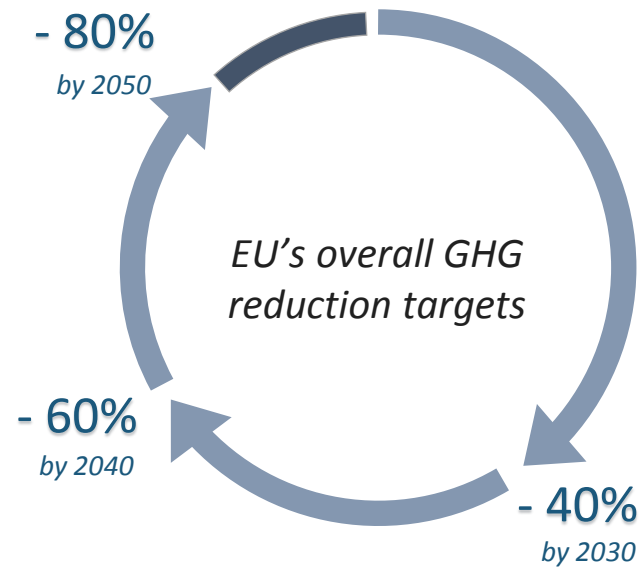




Biopolttoaineet: ohituskaista vähähiilisyteen

Marko Janhunen,
Vice President, Stakeholder Relations, UPM Biorefining
TransSmart-loppuseminaari
16.02.2017

EU's greenhouse gas reduction targets cannot be met without significant emission cuts in transport – actions needed in all sectors

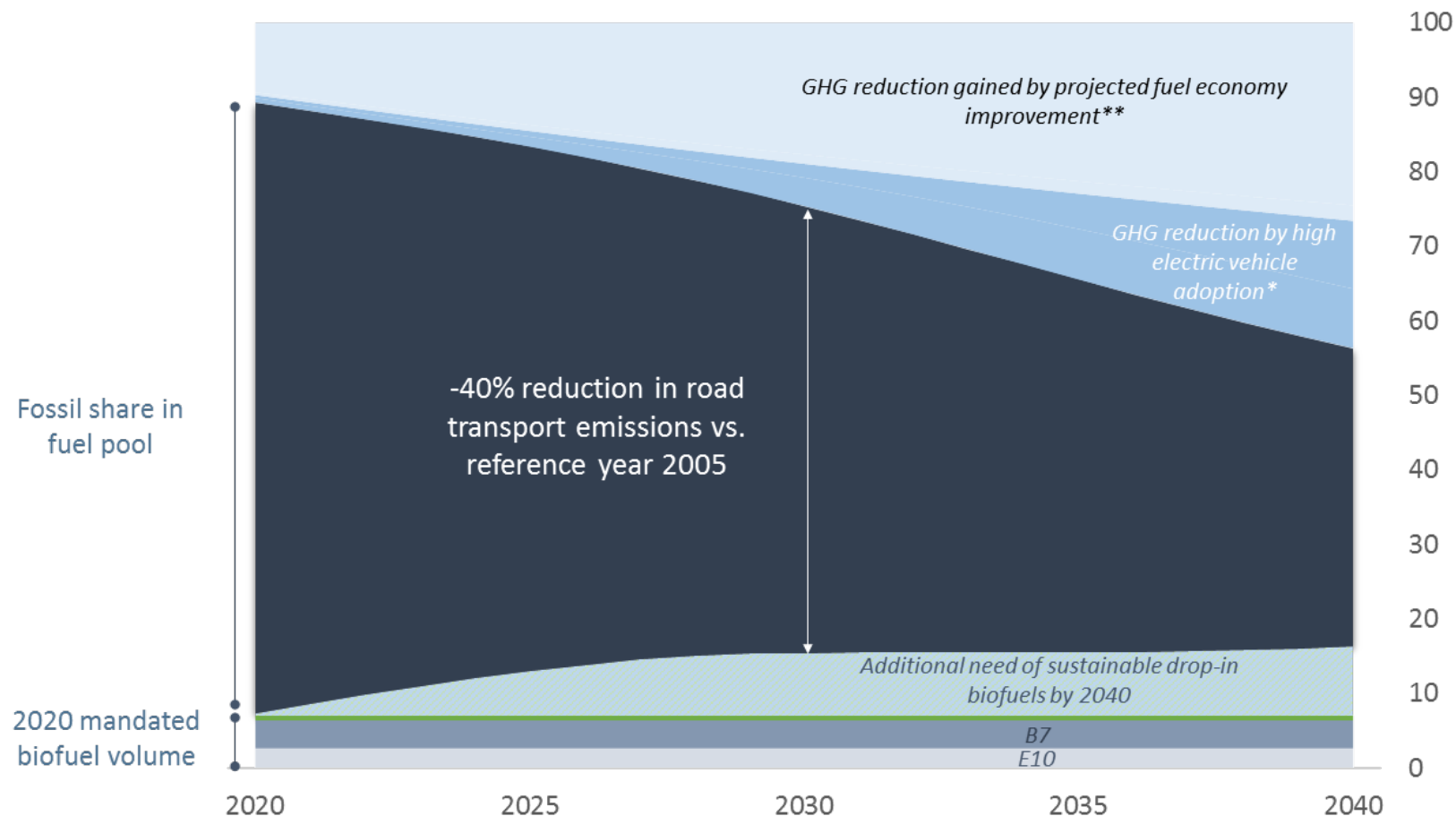


Biofuels are needed in short and long-term to meet EU's ambitious greenhouse gas reduction targets

EU targets 40% reduction in GHG emissions by 2030 to keep global warming below two degrees

Targets cannot be met without significant emission cuts in transport

Decarbonizing European
transport requires effective
use of all energy and
technology options –
Renewable drop-in fuels:
a fast-lane solution



* Calculated based on "Global EV sales outlook to 2040" by Bloomberg New Energy Finance
* Assuming EV's represent 38% of new car sales in Europe by 2040 + EV's are fully emission free
** Assuming annual energy efficiency improvement of 2% in light-duty, 0,5% in heavy-duty

UPM today

UPM BIOREFINING



UPM ENERGY

UPM RAFLATAC



UPM SPECIALTY
PAPERS

UPM PAPER ENA



UPM BIOCOMPOSITES
UPM BIOCHEMICALS



UPM PLYWOOD



Wood is a unique and excellent raw material for mitigation of global challenges



RENEWABLE

RECYCLABLE

VERSATILE

SUSTAINABLE

NON-GMO

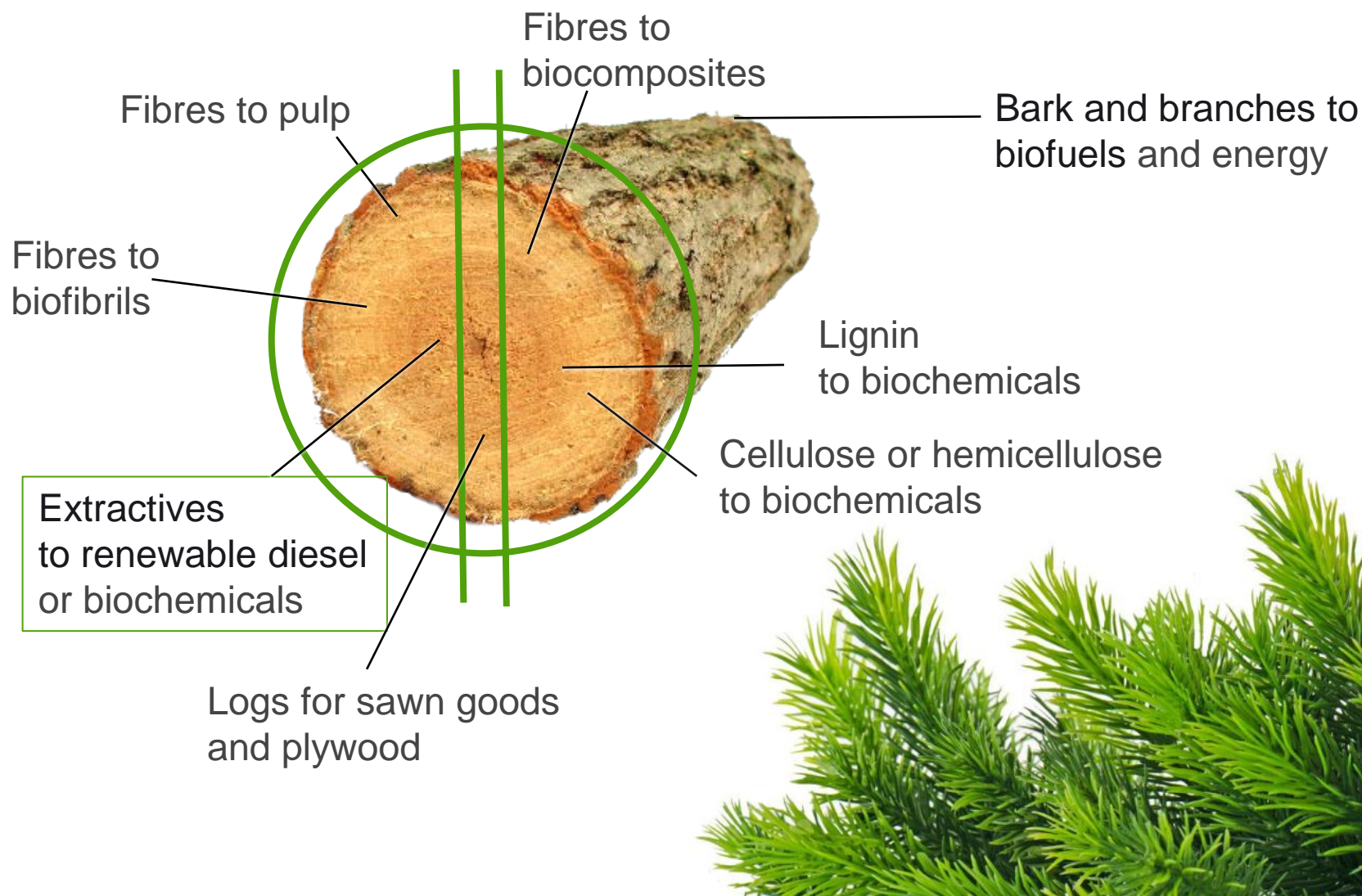
LOW MARKET VOLATILITY

NON-FOOD

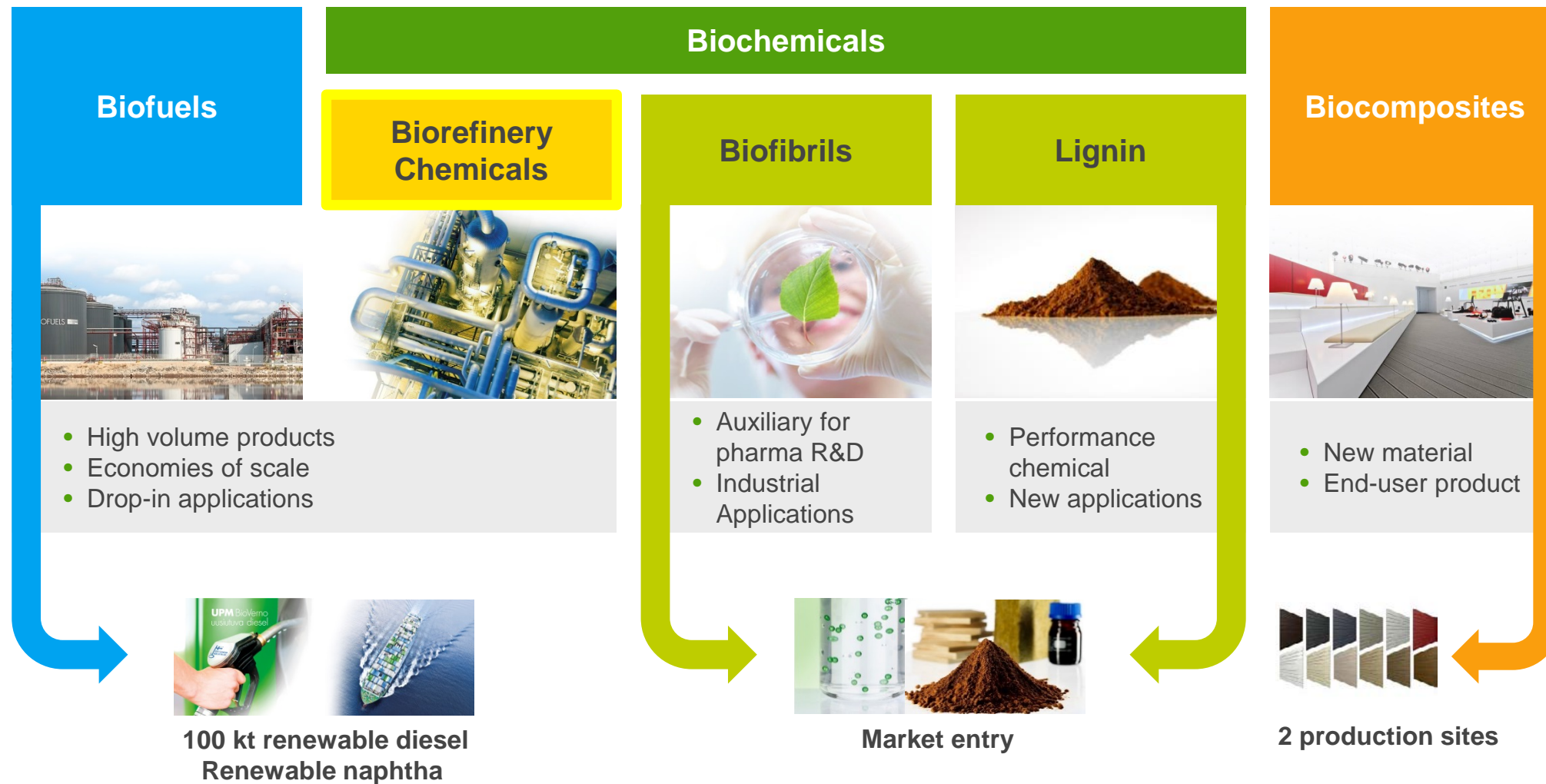
COMPETITIVE



Wood raw material is the basis of many different businesses at UPM



New business opportunities for UPM



Opportunities in Advanced Biofuels



Capturing synergies by full integration into UPM Kaukas mill site in Lappeenranta, Finland



UPM Lappeenranta Biorefinery

Key facts

- Product: Renewable diesel
- UPM investment: 179 M€
- Capacity: 100,000 tonnes/a
- UPM patents and applications: 200
- Employs 250 persons (incl. indirect)

UPM BioVerno – Renewable diesel

OXYGEN FREE
HYDROCARBON

100%

RENEWABLE
FEEDSTOCK

100%

CO₂ EMISSIONS
(VS. FOSSIL FUEL)

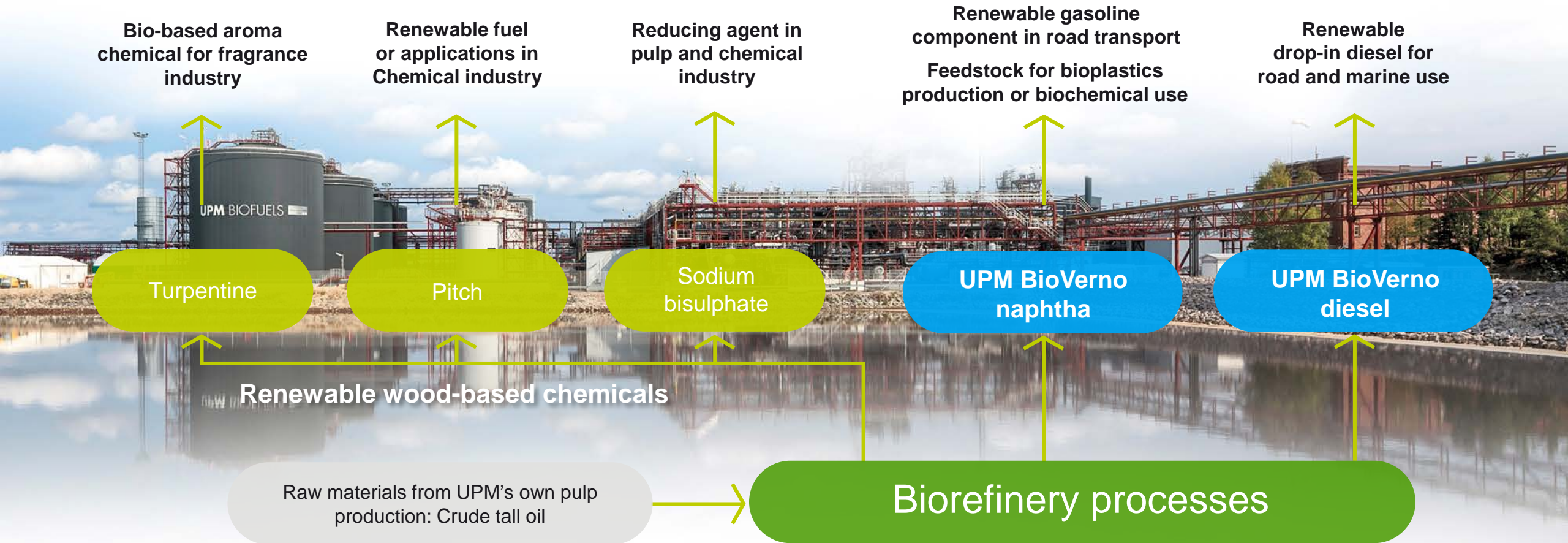
-80%

IN FOOD CHAIN

0%



UPM Lappeenranta biorefinery – all streams add value



UPM Biofuels in existing and future end-use

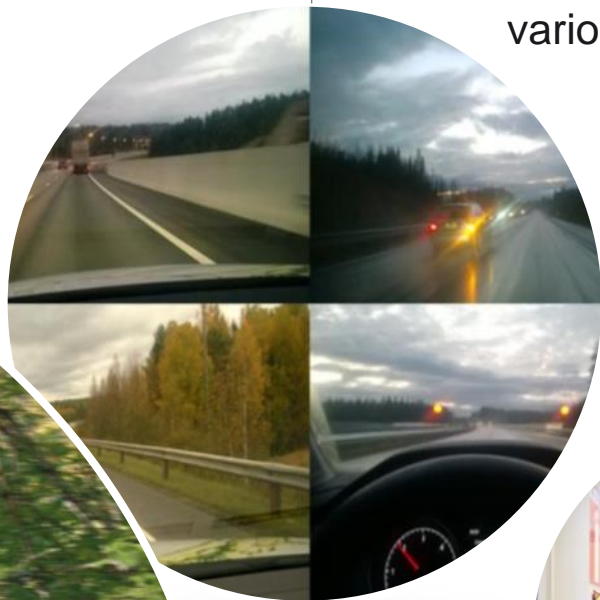


UPM BioVerno renewable diesel - passenger car fleet tests

4 Volkswagen cars,
20 000 km/car



Summer and
winter conditions,
various distances



Fleet testing with 20% UPM BioVerno renewable diesel with 4 Volkswagen cars

- Independent testing by experienced test drivers of Technical Research Centre of Finland (VTT)
- Investigating fuel functionality in engine, emissions and fuel consumption

Material & laboratory testing

Functions as
premium fossil diesel

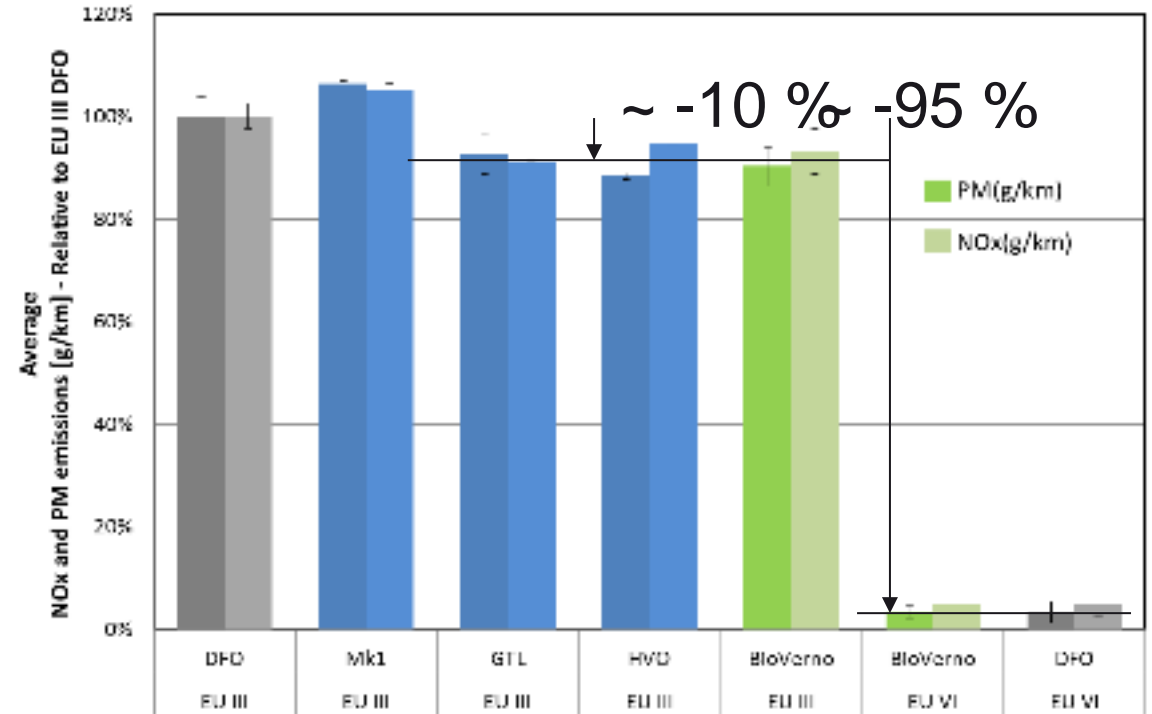
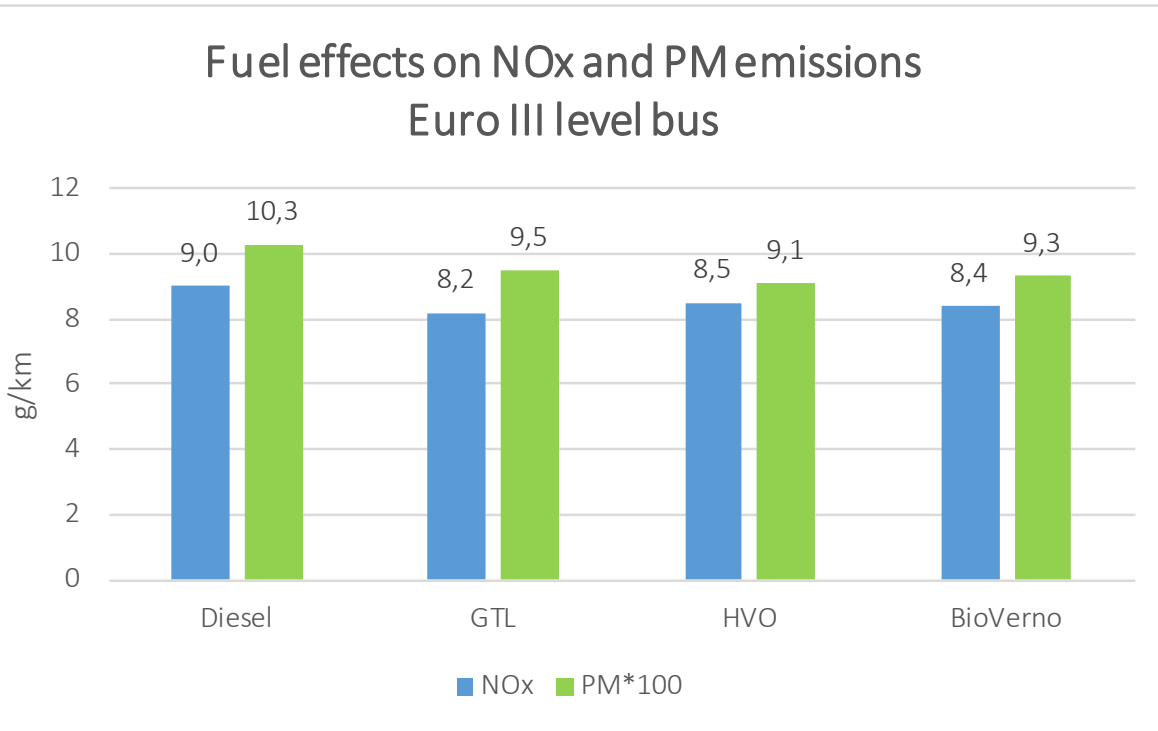
UPM BioVerno renewable diesel - bus fleet tests



- Phase II in TEKES BioPilot by VTT
- Laboratory tests with Euro III busses
- 4 Volvo EuroVI busses operated by Transdev
 - 2 reference & 2 UPM BioVerno busses
 - 20%, 50% & 100% UPM BioVerno
 - 1 year, 100.000 km/bus
- HSL Helsinki-Kerava bus route



UPM BioVerno renewable diesel - bus test results



UPM BioVerno renewable diesel & Euro VI vehicles - very good solution for local as well as greenhouse gas emissions!

Functions as
premium fossil diesel

Driving cleaner traffic – UPM Biofuels

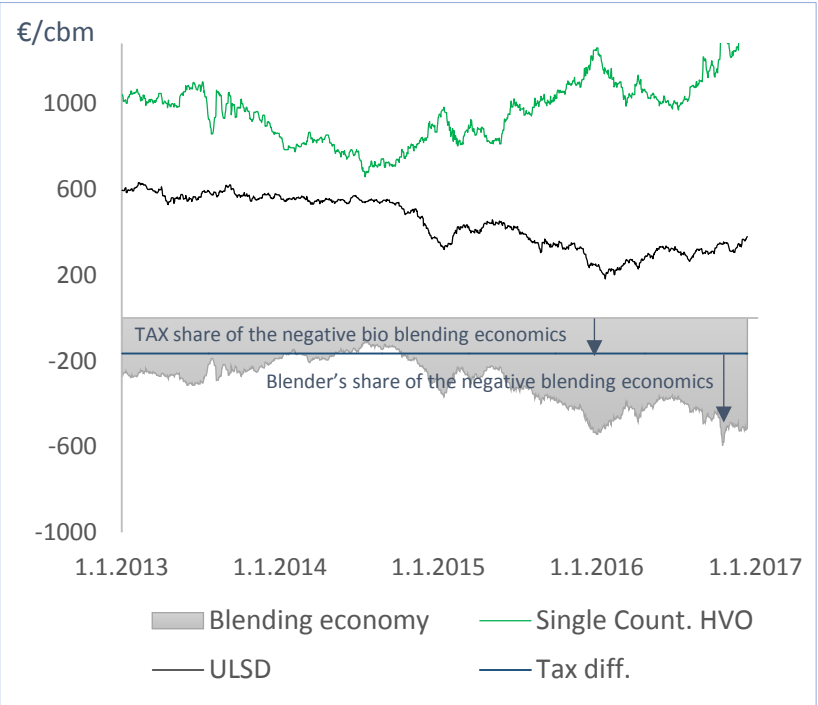
Partner of HSL's BioOneHundred project running on 100 %
biofuels by 2020:
Making strategy to a reality



Finland's bio target of 30% (2030) increases fuel retail price by approximately +2% vs. RED2 EU mandate (prices calculated using three-year historical averages)

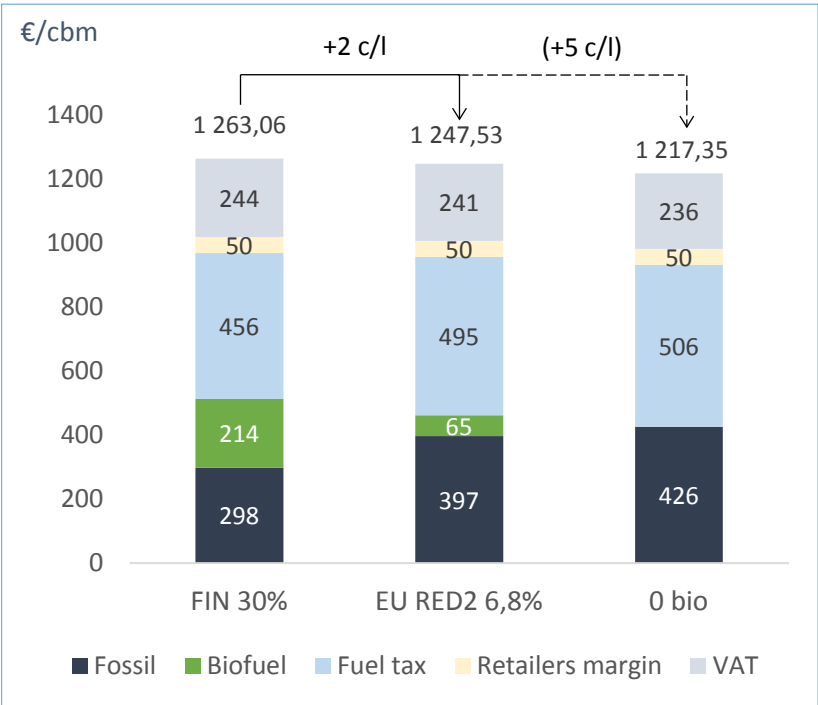


Historical prices



HVO price (single-counted) calculated using RME as reference

Impact of FIN 30% target to fuel retail price



Fossil fuel and biofuel (RME-referenced single-counted HVO) prices calculated using 2014-2016 averages

Impact of Finland's 30% blending mandate to fuel retail price (vs. EU RED2 mandate)



+2%

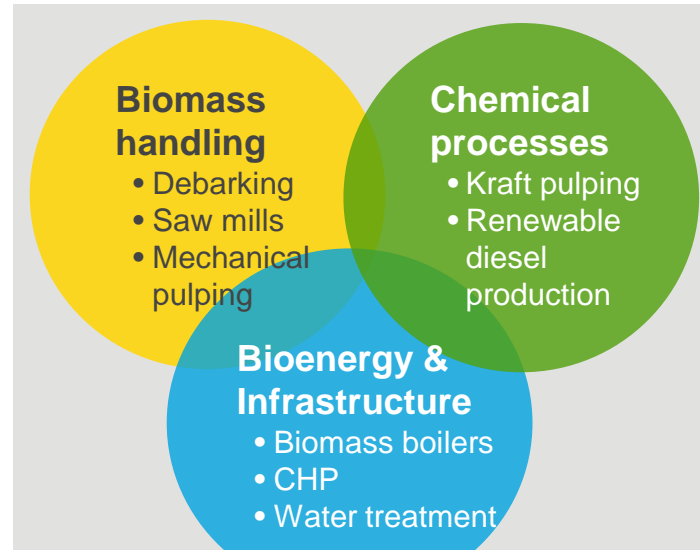
Large scale Biorefining requires new types of collaboration

Chemical, petrochemical and forest industry can create new opportunities

Three areas of competence
are needed for new biomass based innovations



1 Access, management
and sourcing of biomass



2 Processes of biomass
conversion



3 Run sustainably large
industrial processes



Driving **cleaner** traffic
UPM Biofuels



UPM

The Biofore
Company