

THE ROLE OF REFINERIES IN THE ENERGY TRANSITION



EU Refining Forum – 02/02/2017
Allard Castelein – CEO Port of Rotterdam Authority

Content

- Background refinery cluster and energy transition at Port of Rotterdam
- Decarbonization pathways for the industrial cluster
- Energy Transition strategy:
 - renew the existing
 - welcome the new
- Join us!



Rotterdam oil hub

10 refineries supplied via Rotterdam



Rotterdam
Cologne



Antwerp
Flushing

bp



Rotterdam
Gelsenkirchen



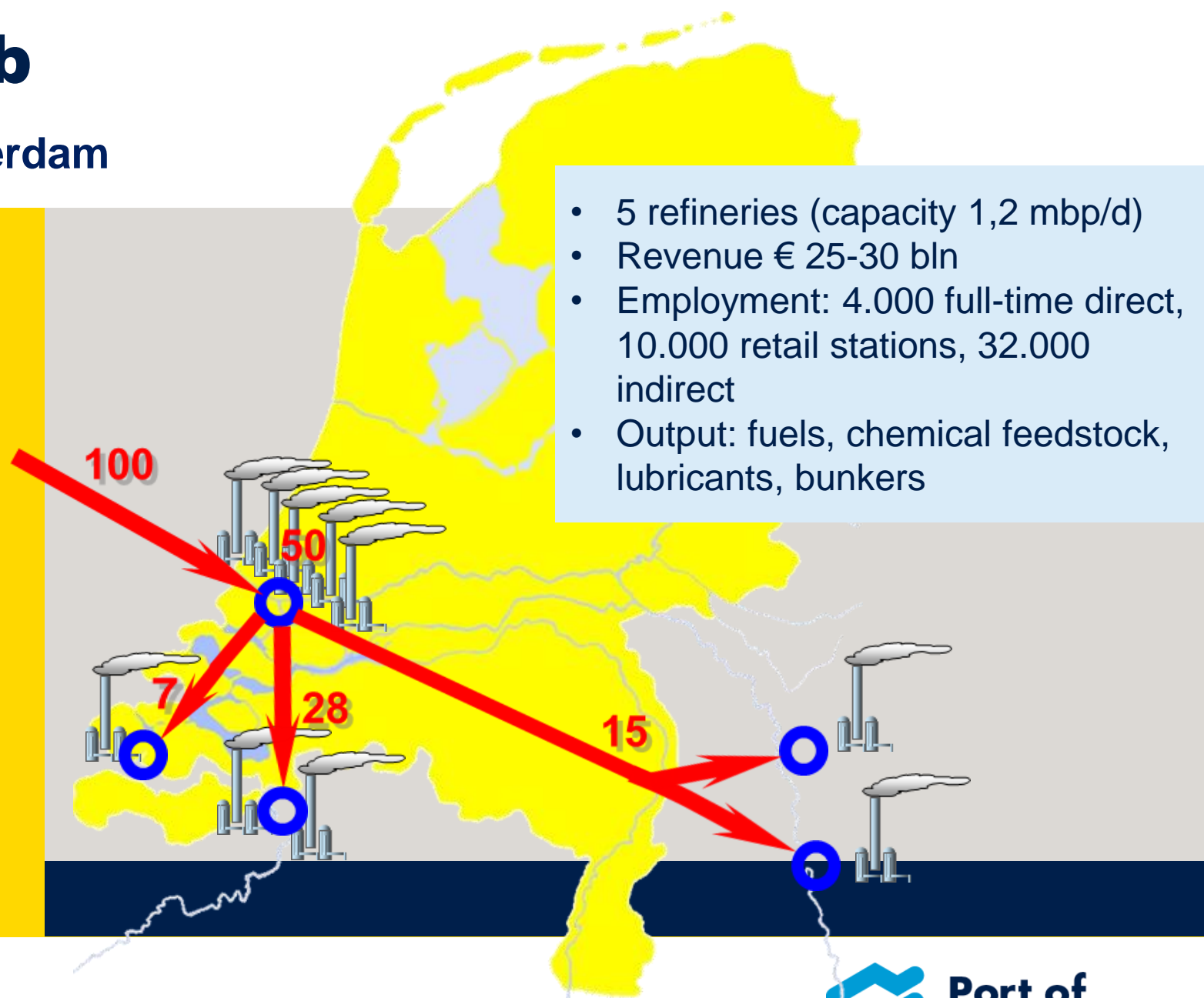
Rotterdam
Antwerp



Rotterdam



Rotterdam



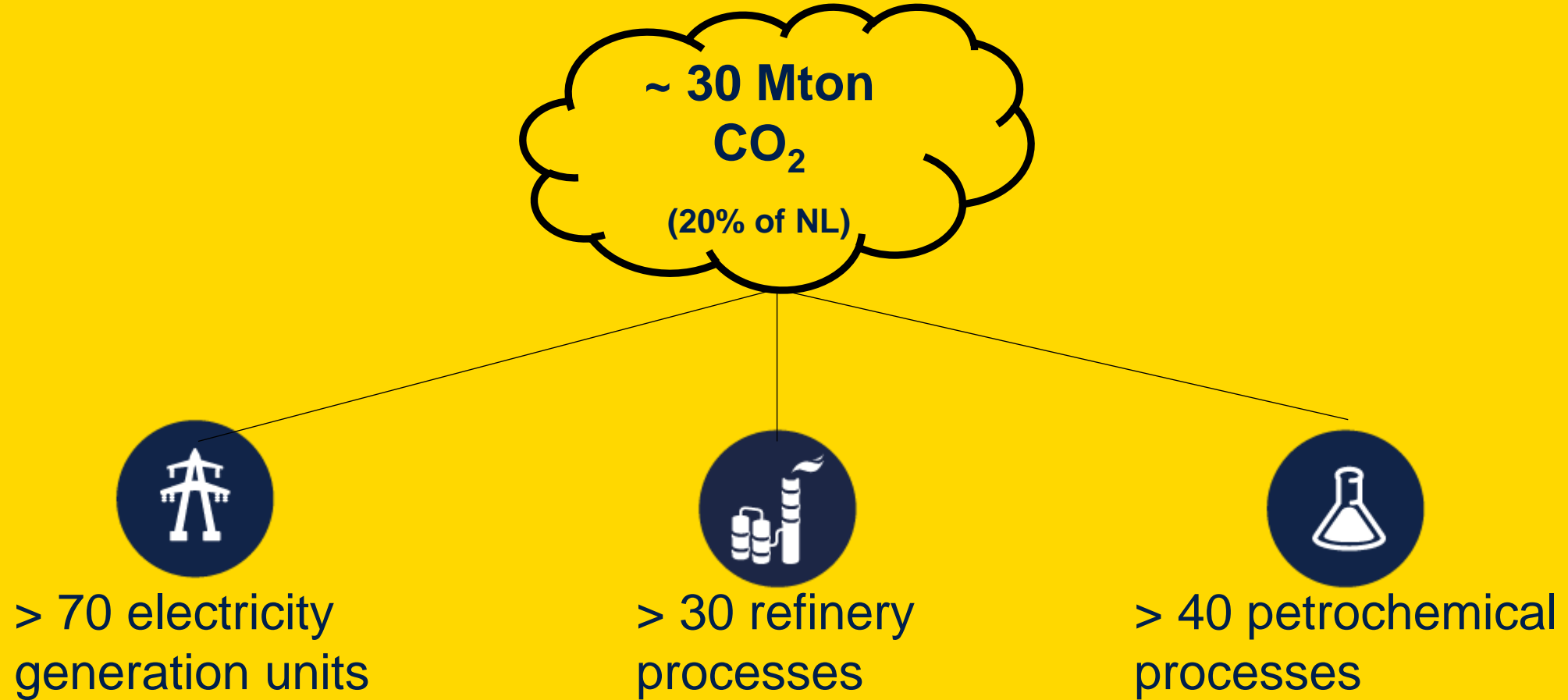
Strong investments in Rotterdam refineries: € 2 billion in current projects



**‘Construction starts on
ExxonMobil Hydrocracker’**

**‘Shell takes final investment decision
to build Solvent Deasphalter’**

The port's business model is 'carbon-intensive'



Decarbonization pathways for the industrial cluster

- **Study Wuppertal Institute:**
4 deep decarbonisation pathways
- 80 / 95% CO₂ reduction in 2050 (in line with the EU Paris Agreement Pledge)
- All pathways have specific challenges and opportunities for the refinery sector, such as:
 - shift towards middle distillates,
 - residual heat,
 - CCS/CCU,
 - new markets such as biofuels / synfuels
- Refineries have an important role to play in the energy transition



FINAL REPORT

Decarbonization Pathways
for the Industrial Cluster of the
Port of Rotterdam



Authors

Sascha Samadi
Stefan Lechtenböhmer
Clemens Schneider
Karin Arnold
Manfred Fischedick
Dietmar Schüwer
Andreas Pastowski

On behalf of:

Wuppertal, September 2016
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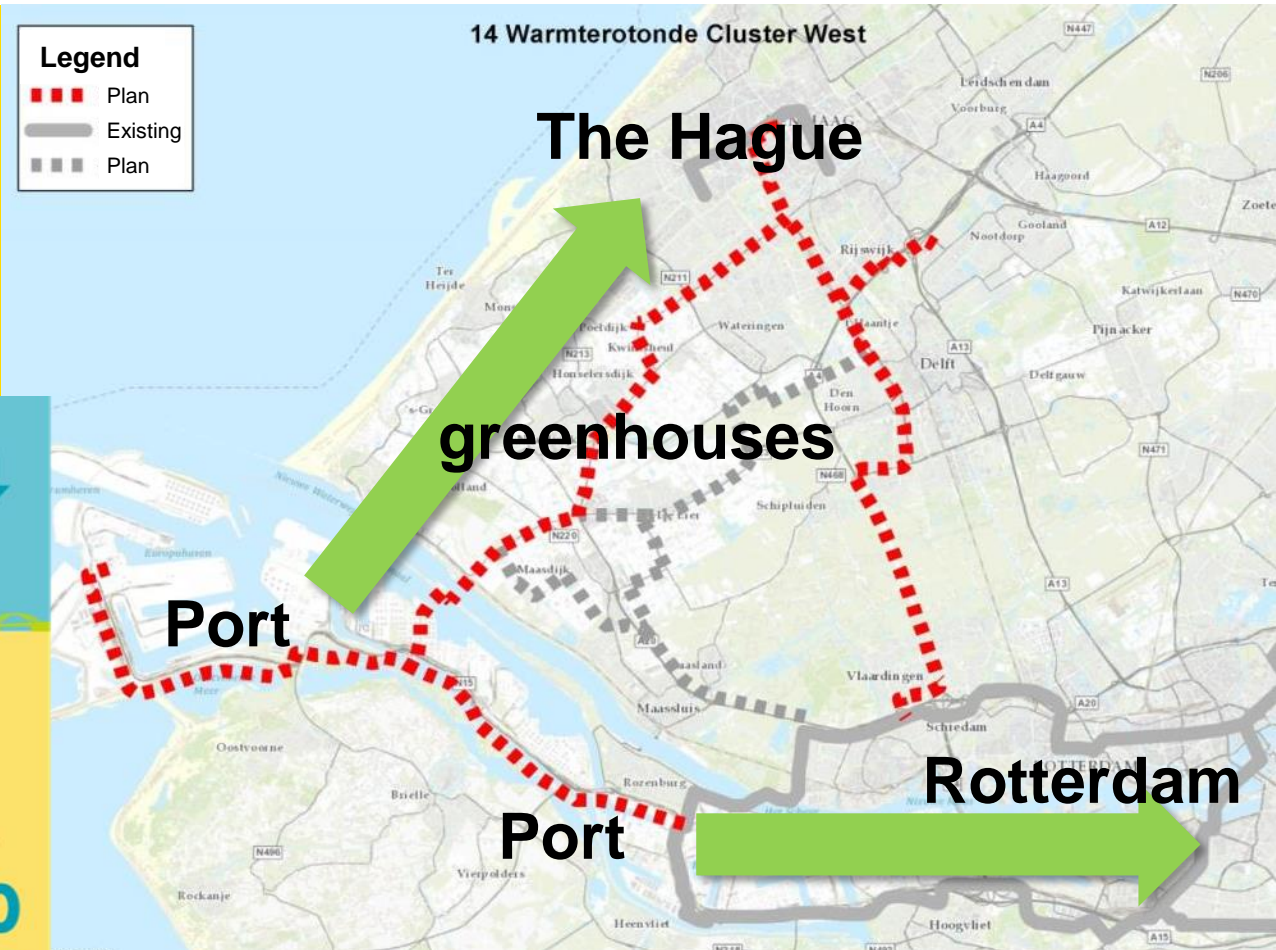
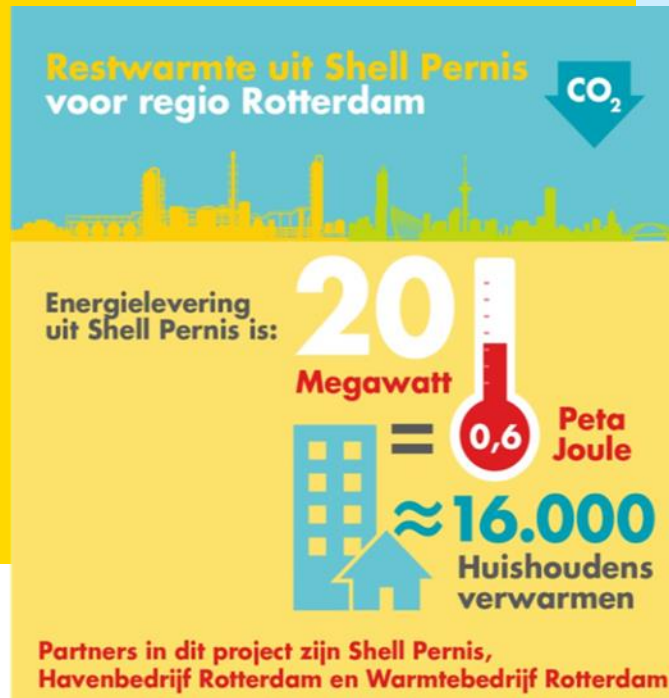


Strategy: renew the existing, welcome the new



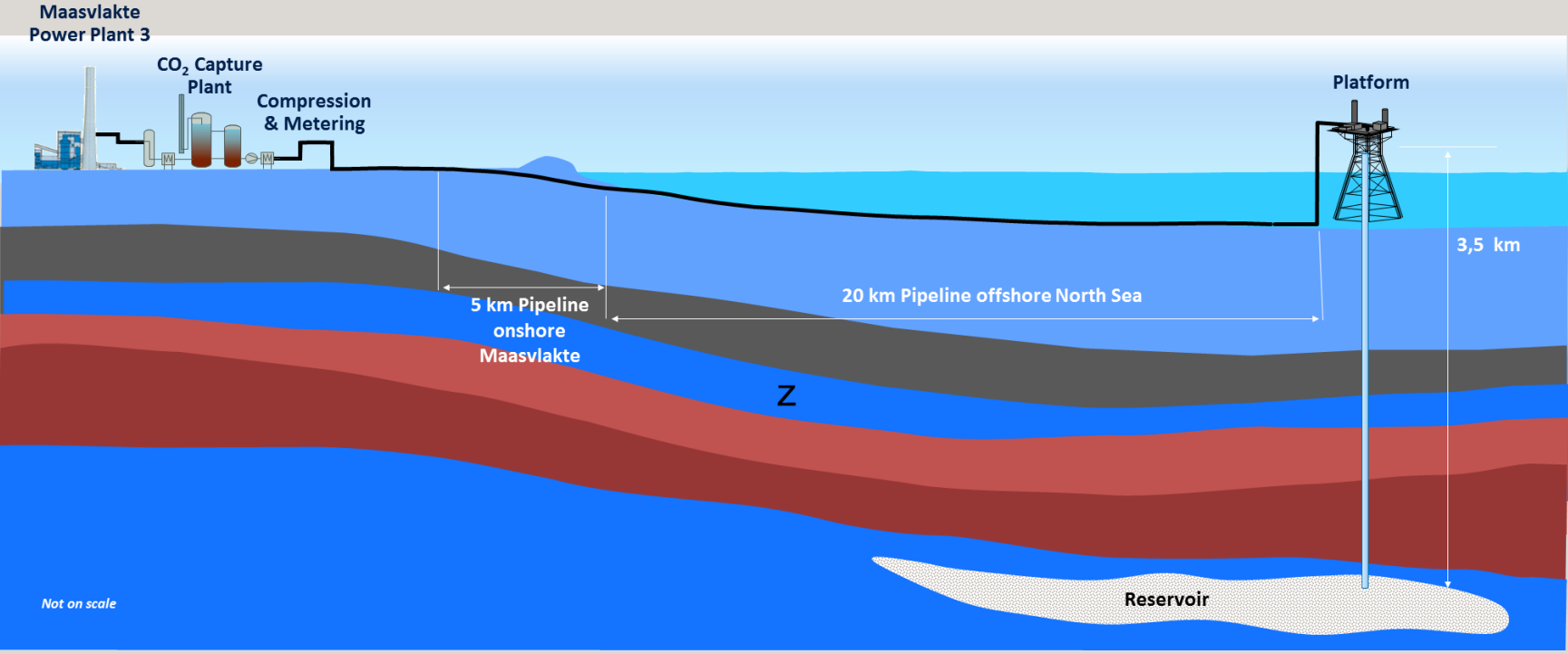
Renew the existing: Residual heat

- Pipeline between the port - Westland greenhouses - The Hague: distribution network for greenhouses
- Energy savings: 7.3 PJ per year
- Reduction in CO₂ emissions: 450 ktons/year
- Reduction in NO_x emissions: 2 ktons/year



Renew the existing: Carbon Capture & Storage

ROAD Project

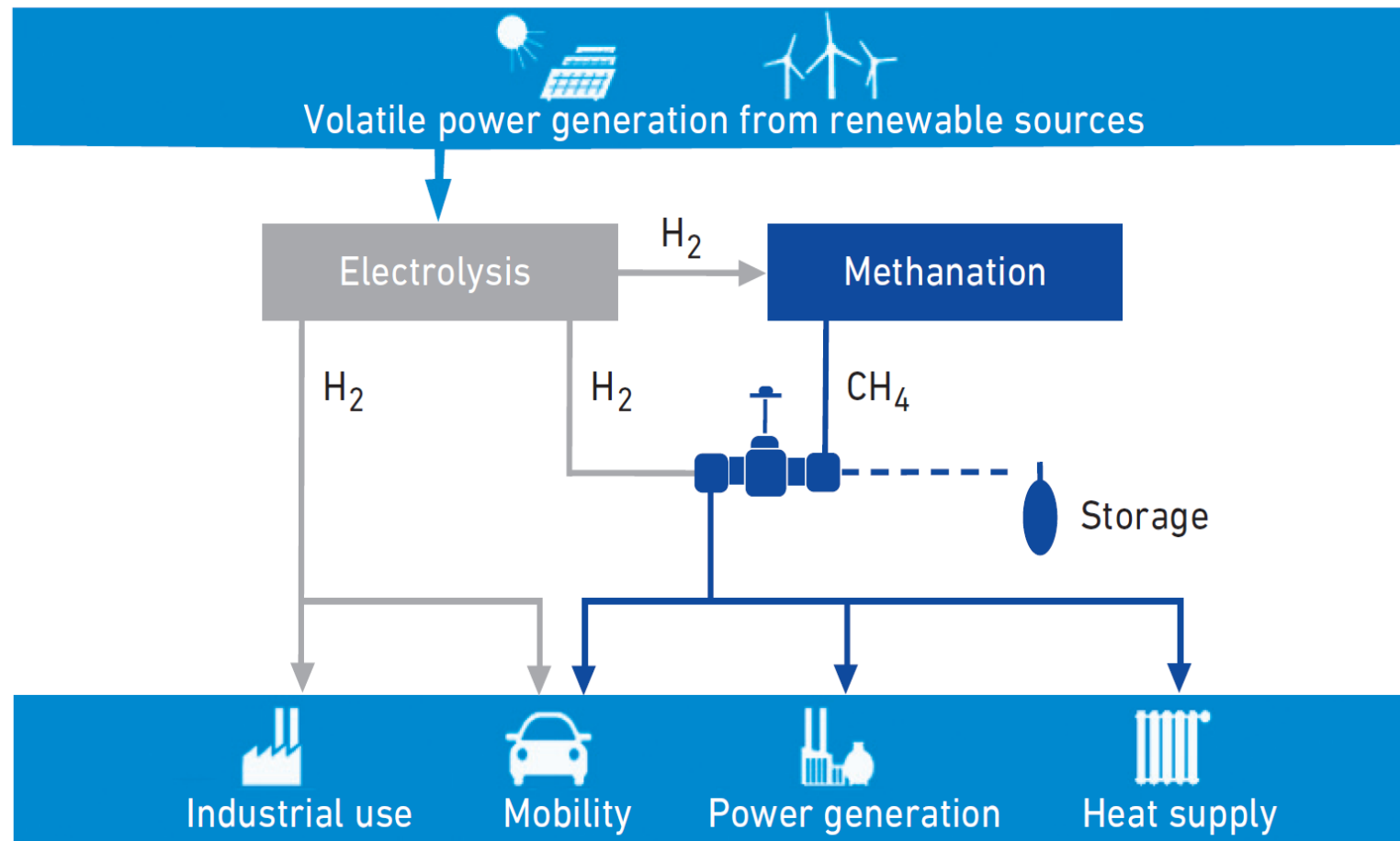


OCAP, CO₂ grid for greenhouses



Welcome the new: Carbon-neutral fuels: Power-to-hydrogen

- Six parties (incl. BP Refinery Rotterdam, Uniper, Port Authority) investigate how sustainably generated electricity, converted into hydrogen, can be used in the production of fuels
- Technical and economic feasibility of a 20 MW power-to-gas plant
- Increased Hydrogen demand with shift to middle distillates

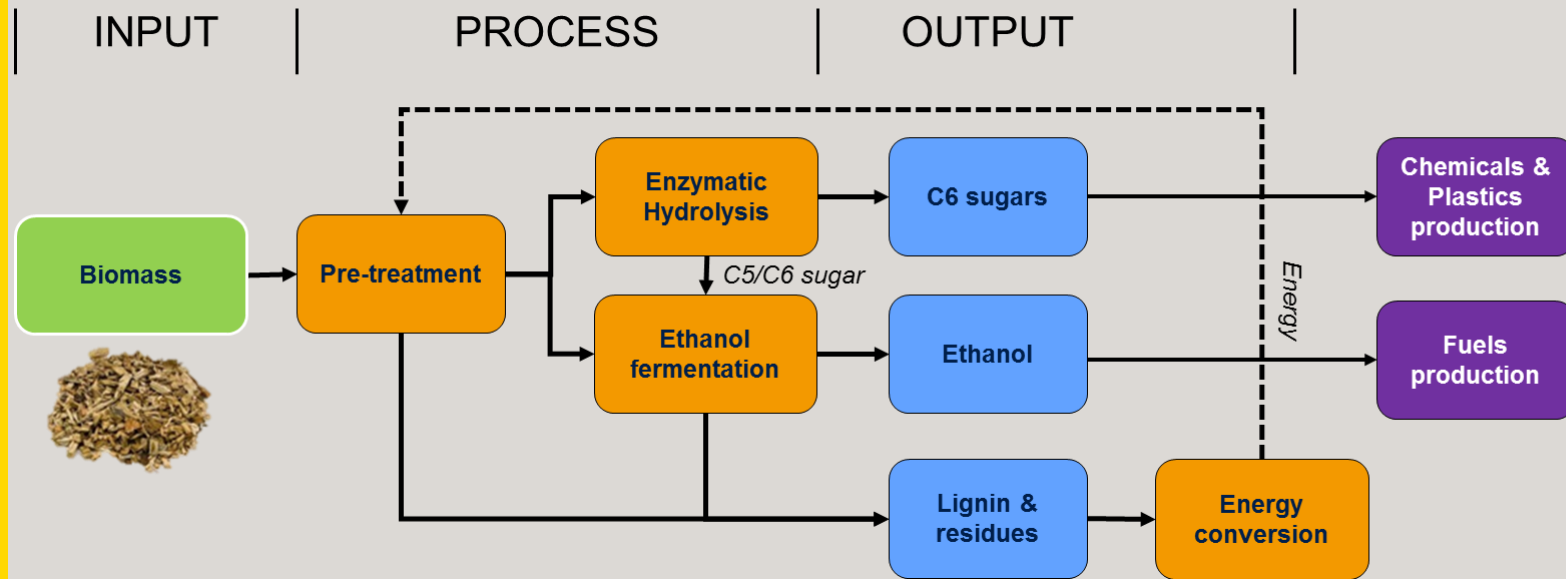


Welcome the new: Waste-to-chemicals initiative



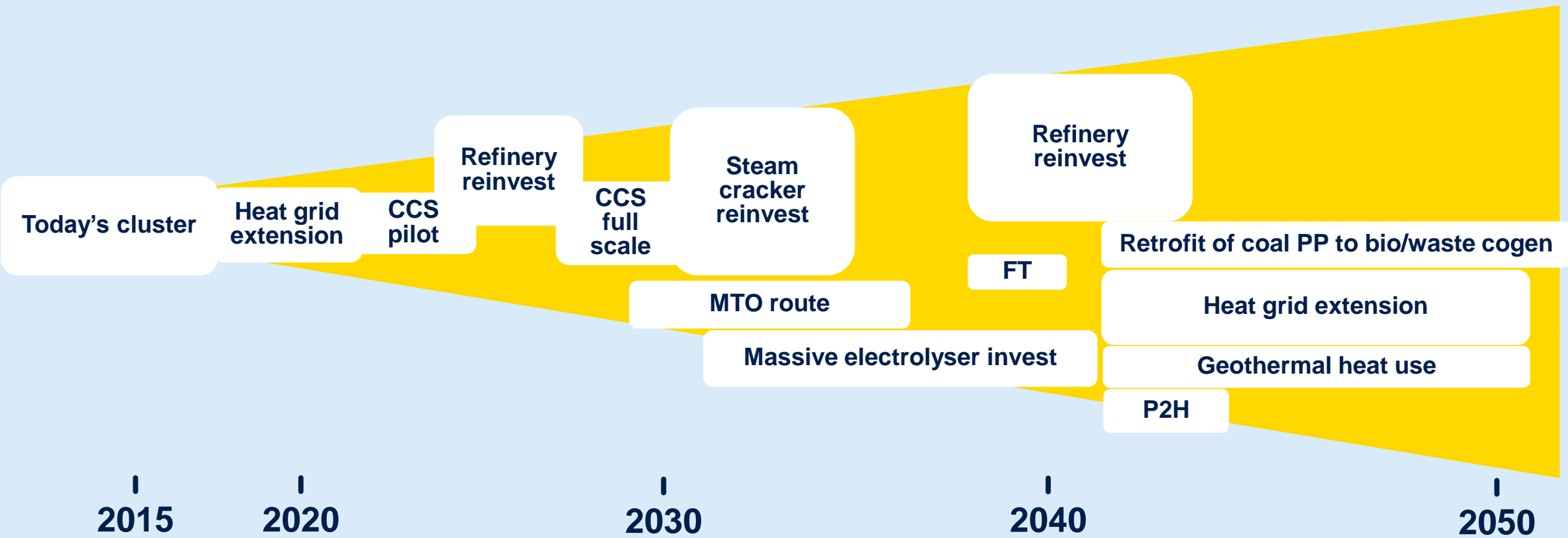
Welcome the new: Fuels from renewable, non-food biomass

- Conversion of lignocellulosic biomass to Chemicals, Fuels and Energy
- Development of large scale facility: 1 Mton of biomass
- Uniper, Corbion, RWE, Evides, BioForever Consortium & Port of Rotterdam Authority
- Reduction in CO₂-emission: 1 Mton/year



Biorefinery development

Essential investments to realize decarbonization / the energy transition



Source: Wuppertal Institut

Role of the refineries in the energy transition

1. Meet existing demand (fuels, chemicals)
2. Increase efficiency
3. Deploy technology to use residual heat and capture and store emissions of CO₂ (CCS)
4. Provide cleaner hydrocarbons



Rotterdam has the ambition to be frontrunner

- Rotterdam has the ambition to be Europe's energy transition fieldlab, frontrunner and flagship region
- 'Renewing the existing' and 'Supporting the new' together will help realising the Paris goals



How can the EU contribute to renewing the existing and supporting the new?

1. Boost competitiveness of European refinery sector and reward the most efficient refineries
2. Increase the cost of CO₂ emissions
3. Stimulate the use of industrial residual heat and capture and store emissions of CO₂ (pilot ROAD/CCS)
4. Support R&D and investments in new low carbon technologies and infrastructure
5. Provide a stable and predictable policy & legal framework



An aerial photograph of the Port of Rotterdam, showing a complex network of waterways, industrial zones with numerous white storage tanks, and surrounding urban and green areas. A thick yellow horizontal bar is positioned across the middle of the image, serving as a background for the text.

THANK YOU FOR YOUR ATTENTION