

Green ammonia vessels for door-to-door transport and logistics service in a multimodal setup

ELECTRIC

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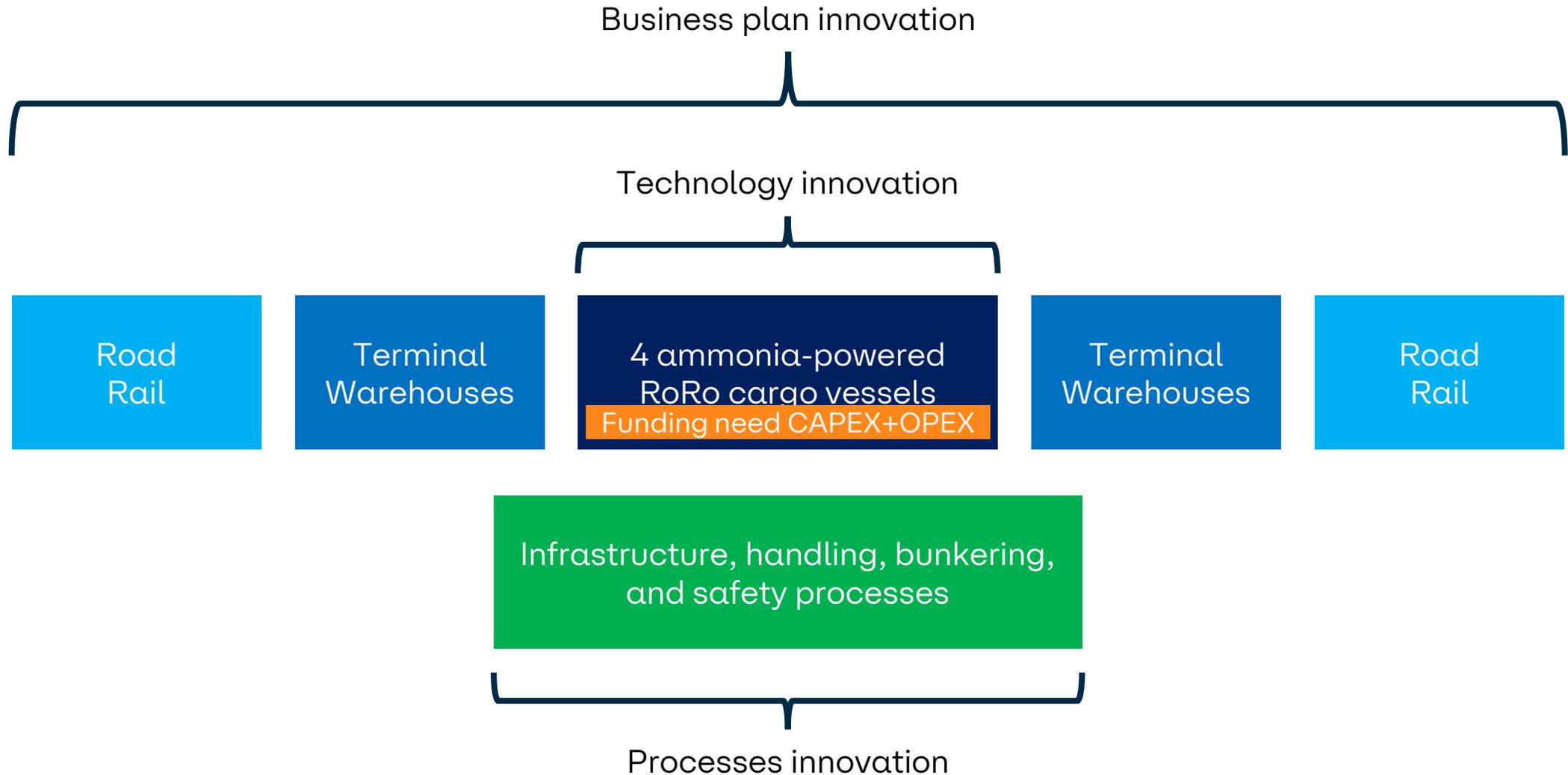
1 February 2024

Project highlights

- Third application to EU IF – LSP or MSP?
- Intra-European and long-distance – connecting Scandinavia and western Europe
- Door-to-door and multi-modal transport and logistics service
- 4 ammonia-powered cargo RoRos starting to operate from 2029 on Gothenburg-Ghent/Zeebrugge routes (and available in the North Sea route network)
- Connects with near-zero GHG emissions terminals, warehouses, road, rail, logistics, etc
- Enables customers like SSAB (green steel), Volvo (Cars and Trucks), and Tata Steel Netherlands to significantly reduce their scope 3 emissions
- GHG emissions reduction potential
 - Tank-to-Wake annual average ~285.000 t CO₂e
 - Well-to-Tank annual average ~40.000 t CO₂e
 - Total over the 10-year period ~3.250.000 t CO₂e
 - Including Black Carbon



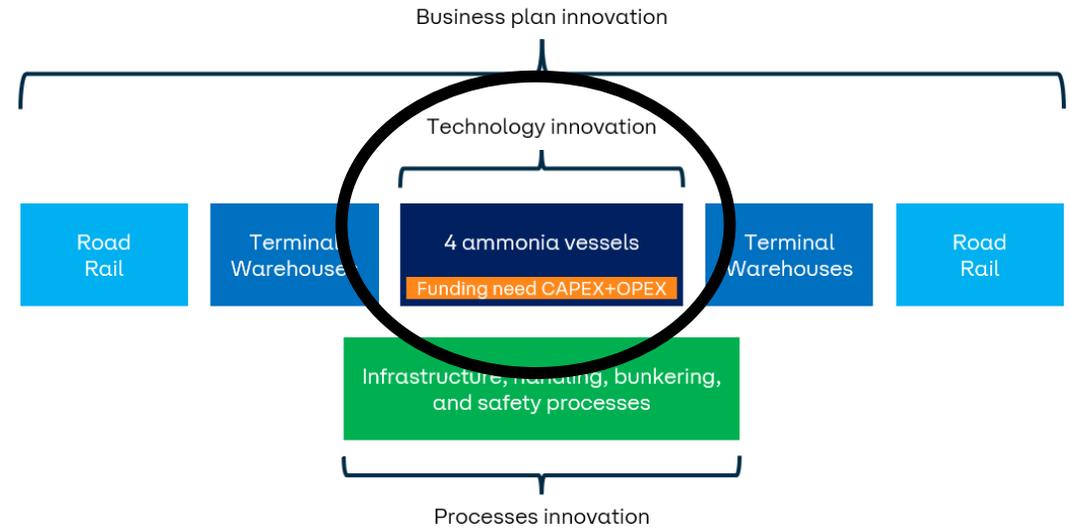
Project boundaries, innovation, and funding need



Technology innovation and funding need

World's first large-scale ammonia-powered RoRo cargo vessels

- Main gensets type: Wärtsilä 8V31DF, 4800/4610 kW/kWA, dual fuel
- Power to combined AC/DC switchboard supplying power to all consumers
- 2 x 11.000 kW propulsion motors and 2 x 2,500 kW bow thrusters
- Batteries: Lithium Ion, 7,2 mWh
- Fuel tanks volume: 1.850 m³ Ammonia and 1.500 m³ pilot fuel
- Fuel split: 85% Ammonia / 15% 2nd gen advanced biofuel
- Engine expected to be commercially ready in Q4 2025, enabling a ship building contract in Q1 2026
- Vessel: length 237 m / breadth 33,5 m / dwt 18.000 t



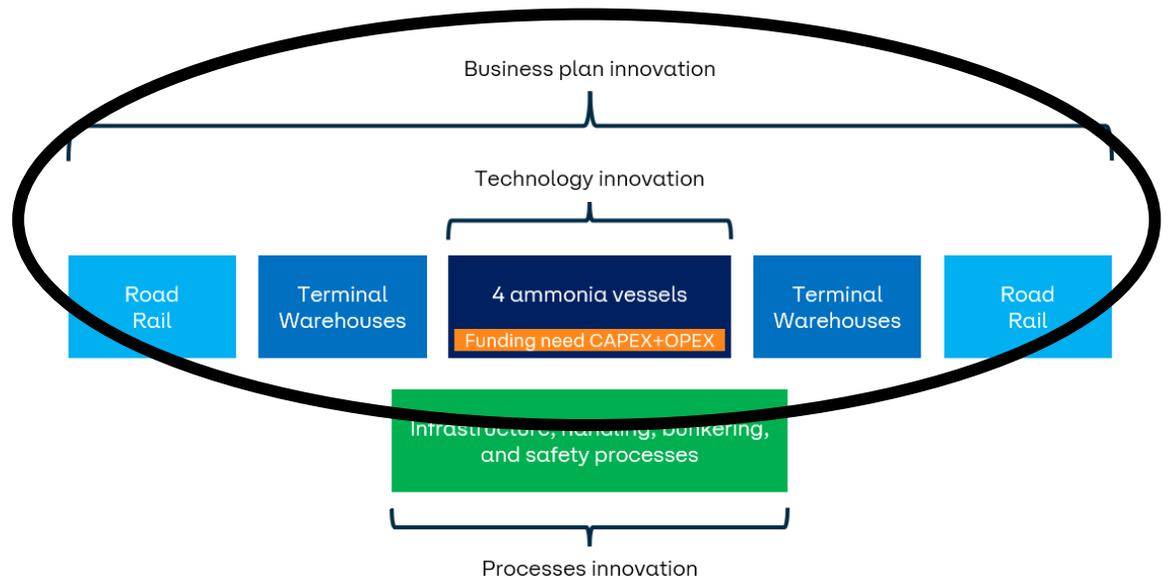
Relevance to the Innovation Fund

- Breakthrough innovation (new technology in new segment) mature enough to operate from 2029
- Not commercially viable without funding for CAPEX
- High replicability across Europe and export potential
- Stable demand for fuel supports emerging ammonia market
- Job growth across several European countries

Business plan innovation

European green land+sea corridor

- Net-zero, door-to-door, multimodal transport and logistics service
- Connecting Scandinavia and western Europe
- Enabling customers to significantly reduce their scope 3 emissions
- New digital tool for customers to track GHG emissions
- New green premium products
- Decarbonising road, rail, terminals, and warehouses will happen faster than otherwise planned



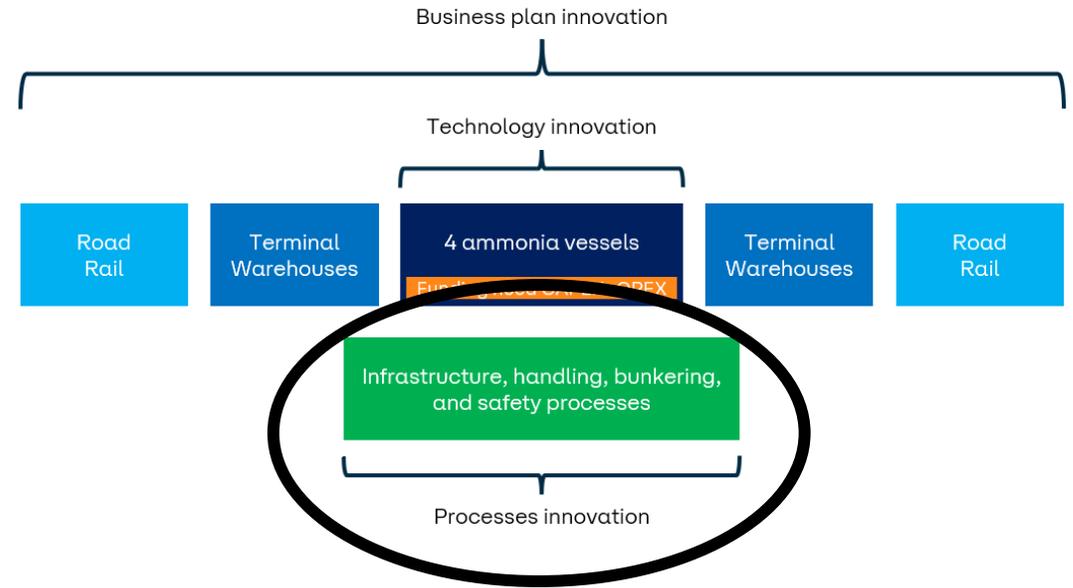
Relevance to the Innovation Fund

- Breakthrough innovation (new products, services, tools in multimodal setup)
- Not commercially viable without funding for OPEX (fuel)
- High replicability/scalability because based on high-demand route network servicing large European freight customers
- Can lead to modal shift and further decarbonisation of road and rail
- Job growth

Processes innovation

From ammonia as cargo to ammonia as fuel close to large cities and on high-demand routes

- New bunkering infrastructure/equipment in/around Gothenburg and Ghent
- New/adapted guidelines and practices
- New/adapted safety procedures

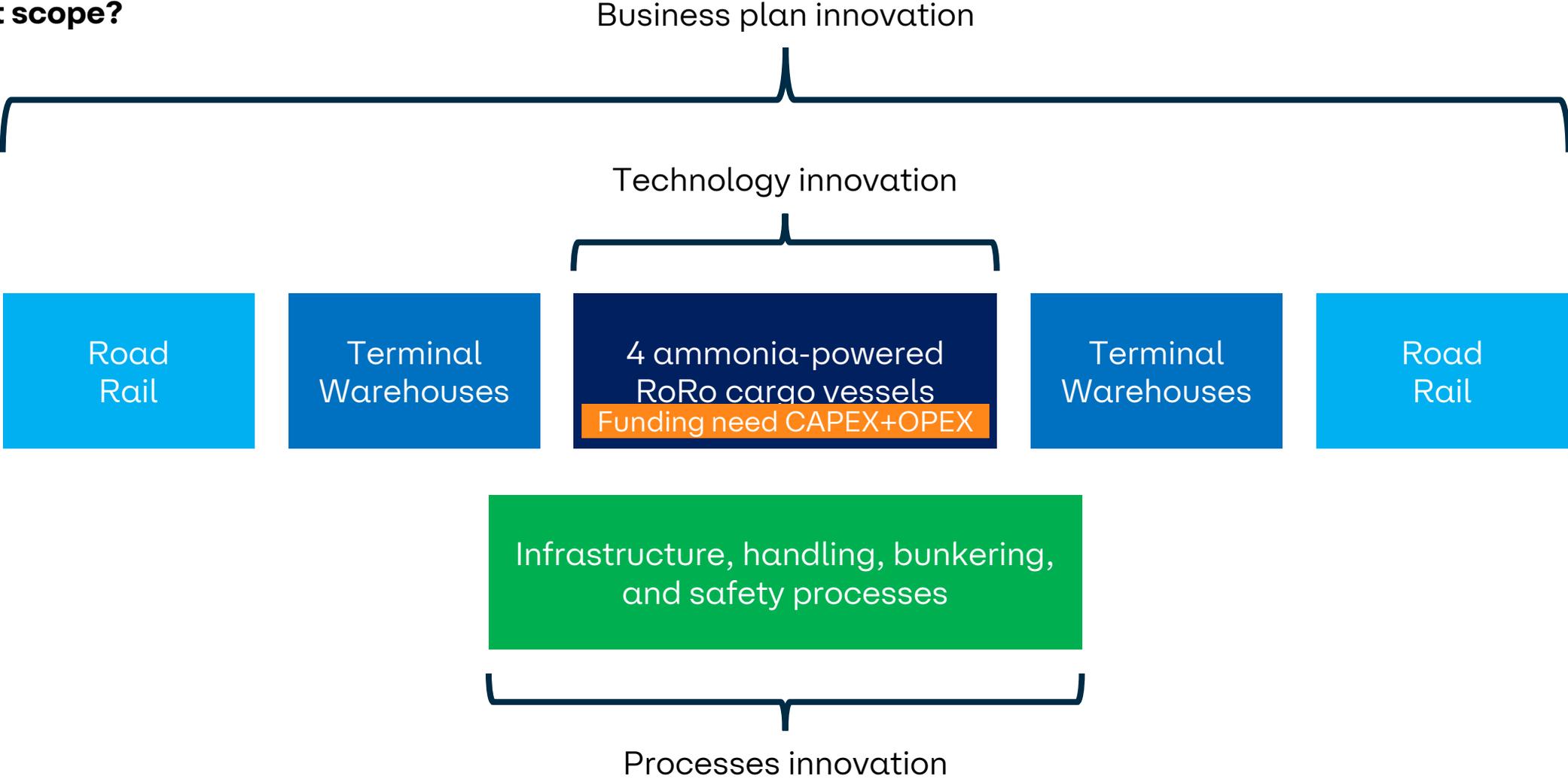


Relevance to the Innovation Fund

- Will help push governments, regulators, and other stakeholders to work together to develop and see adoption of new regulation, guidelines, practices supporting the creation of a new market
- Will lead to new training (replicability and export of new equipment and knowhow)
- **BONUS: Shipping's increased demand for green ammonia will help decarbonise European agriculture (green ammonia for fertilisers)**

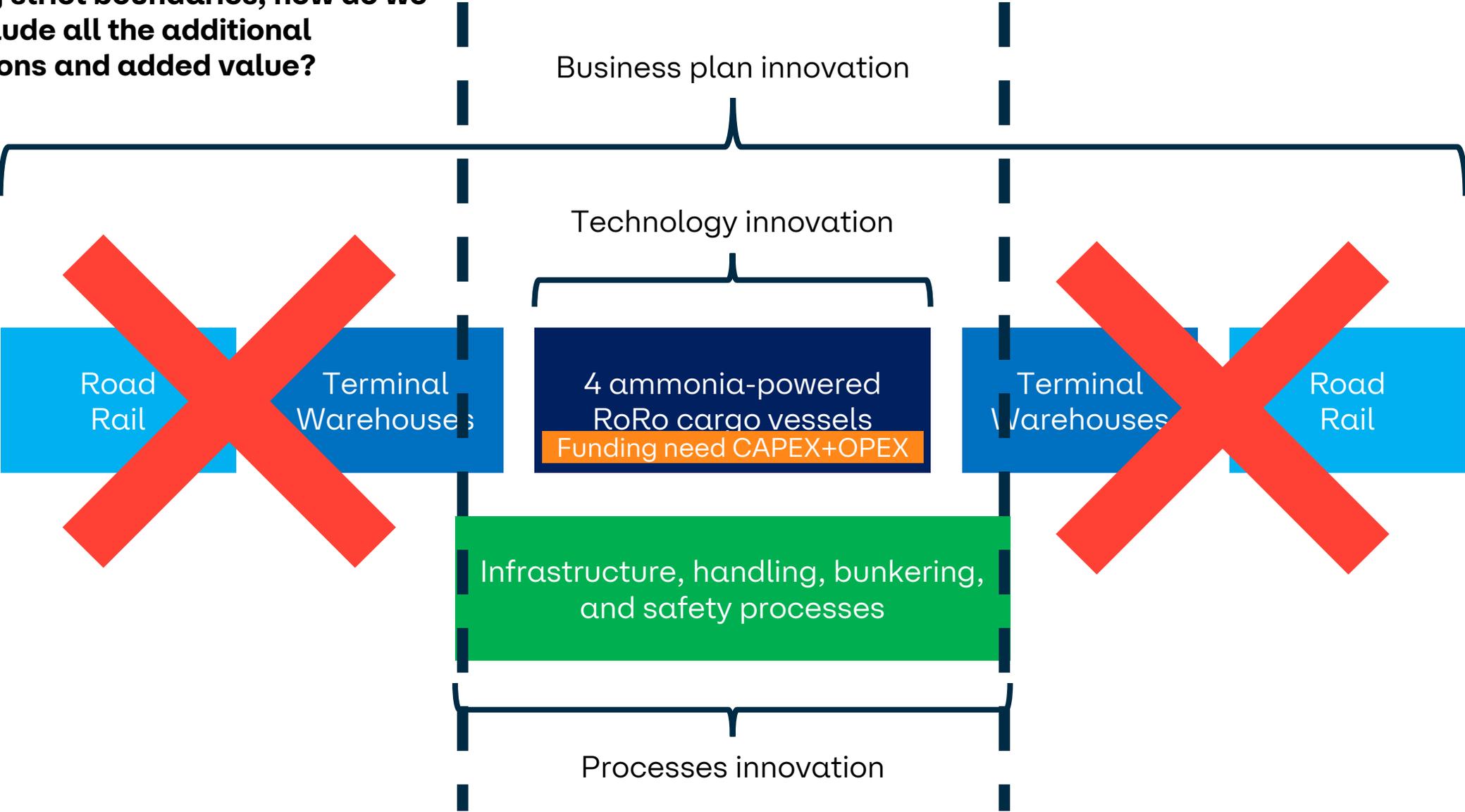
Project boundaries and GHG reference case

How do we set the project boundaries, when the different innovations have different scope?



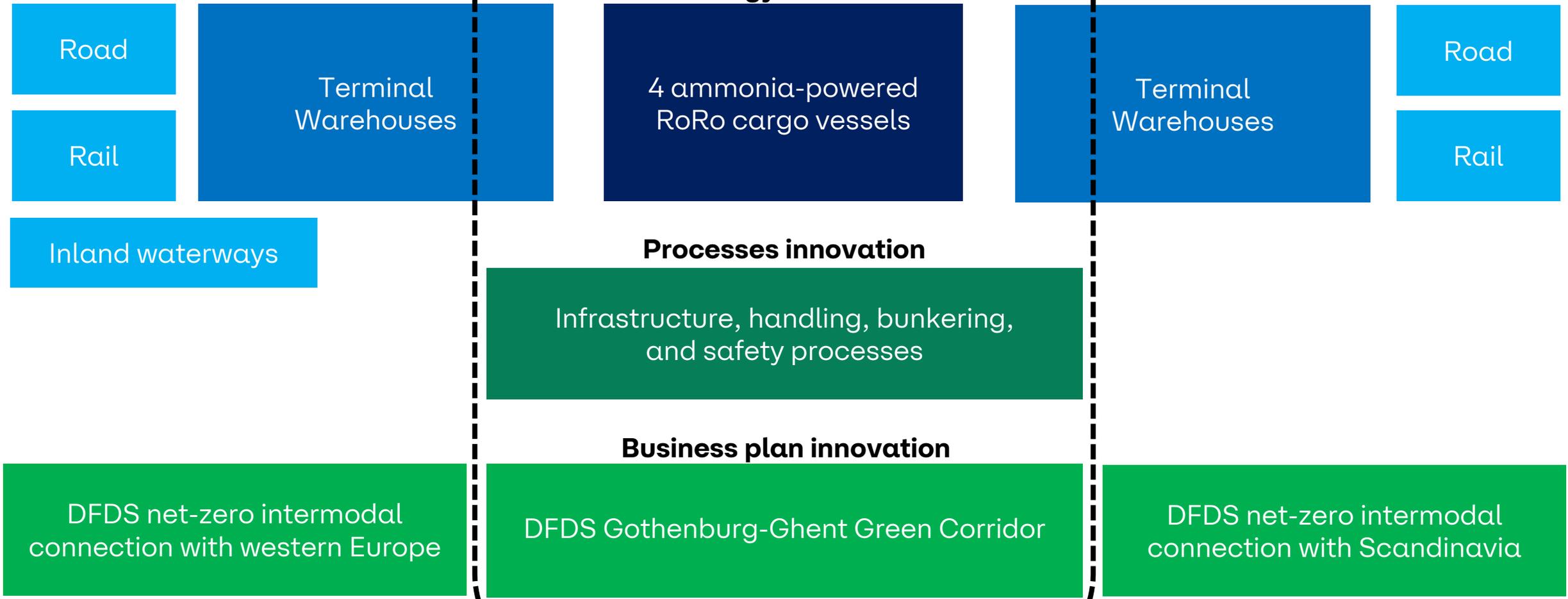
Project boundaries and GHG reference case

If setting strict boundaries, how do we then include all the additional innovations and added value?



(Updated and added after the presentation)

Project and GHG* boundaries



* GHG emissions from relevant energy consumption

Thank you

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