

Vattenfall BU R&D Projects

January, 2012

Energy systems of the future – balance between numerous viewpoints

Vattenfall's reality has three dimensions:

Security of supply

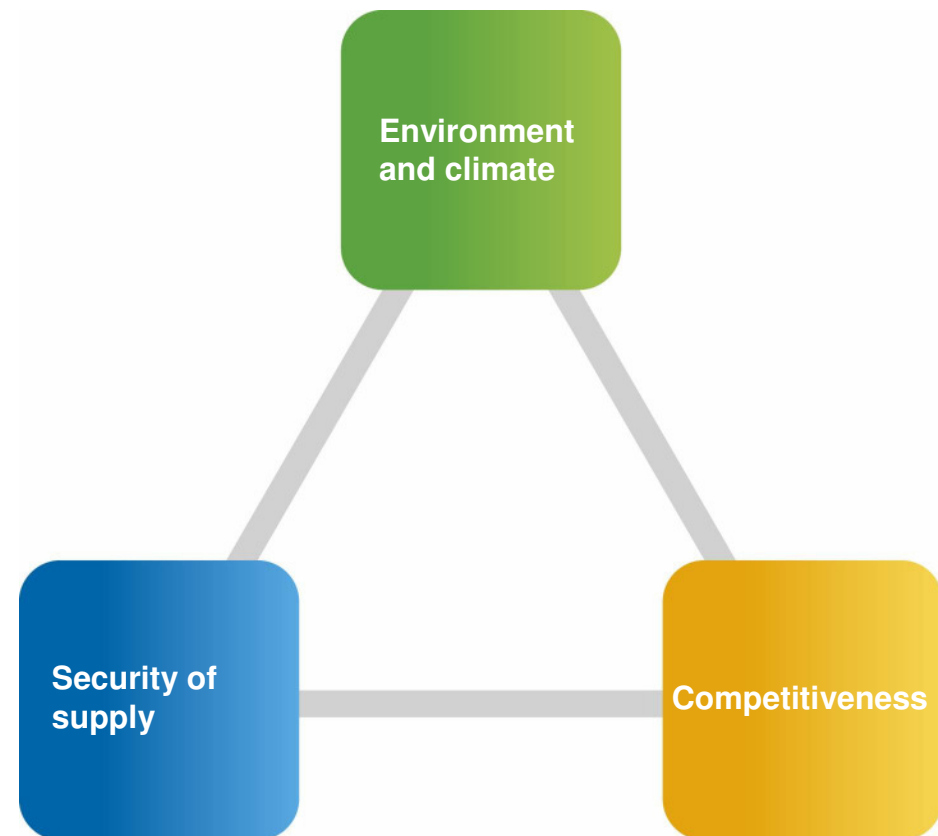
To produce the energy we need...

Competitiveness

...at the lowest cost possible...

Environment and climate

...and with the least impact on the environment



Vattenfall's R&D is re-structured to match the new strategy

Vision

“Vattenfall will create a strong and diversified European energy portfolio with sustainable and increased profits, significant growth options and will be among the leaders in developing environmentally sustainable energy production ”

Strategic Direction

Profit and value creation

Focus on core markets

Reduce CO2 exposure and grow in low CO2-emitting energy production and gas

Three products – electricity, heat and gas

Vattenfall's six energy sources: all are needed



Vattenfall will continue to be committed to hydro, growing through acquisitions in Central and Western Europe when possible.



Vattenfall aims to maintain its current nuclear positions in Sweden and Germany, and will keep its options open for future growth.



Vattenfall will continue to expand offshore wind in the North Sea countries and onshore in prioritised markets.



Vattenfall will increase co-firing of biomass in existing coal-fired plants to reduce CO₂ emissions.



Vattenfall is investing to enhance efficiency and reduce CO₂ emissions in existing plants, but will not build any new plants without commercially proven CCS.



Vattenfall will maintain its current portfolio and will continuously monitor the potential for longer term growth.

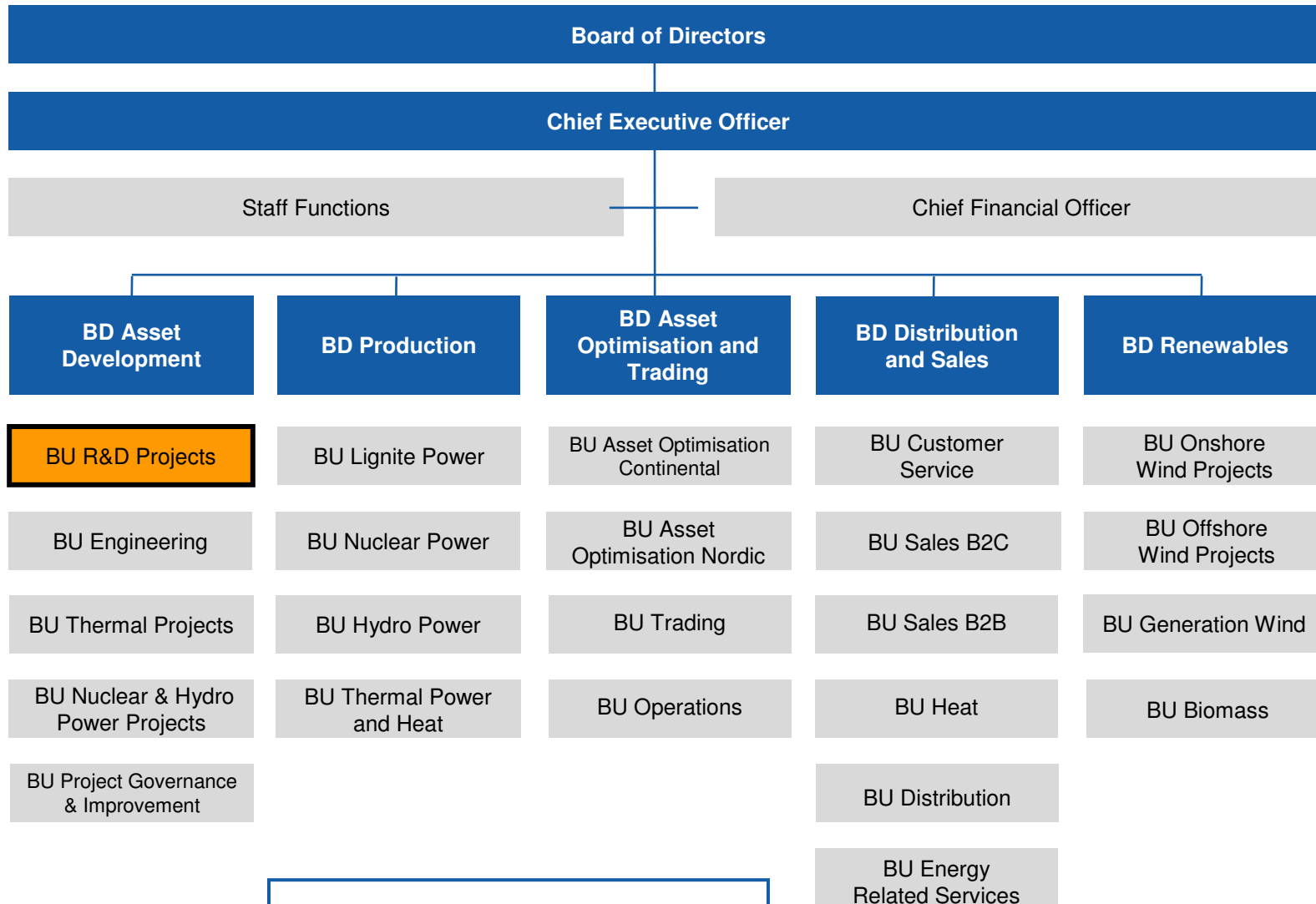
“At Vattenfall we will continue to rely on our six sources of energy: hydro, wind, nuclear, coal, biomass and natural gas.

We will also continue to work in all parts of the electricity value chain and concentrate on our three products – electricity, heat and gas.

Our broad energy mix provides flexibility and allows Vattenfall to get the most out of each and every energy source.”

Øystein Løseth, CEO Vattenfall

From a region based to a business-led organisation



Organisation as of 1 January, 2011

Business Unit R&D Projects

Vattenfall's R&D is creating value by developing new solutions for ways to use and produce energy.

The work is devoted to new, or existing technologies to

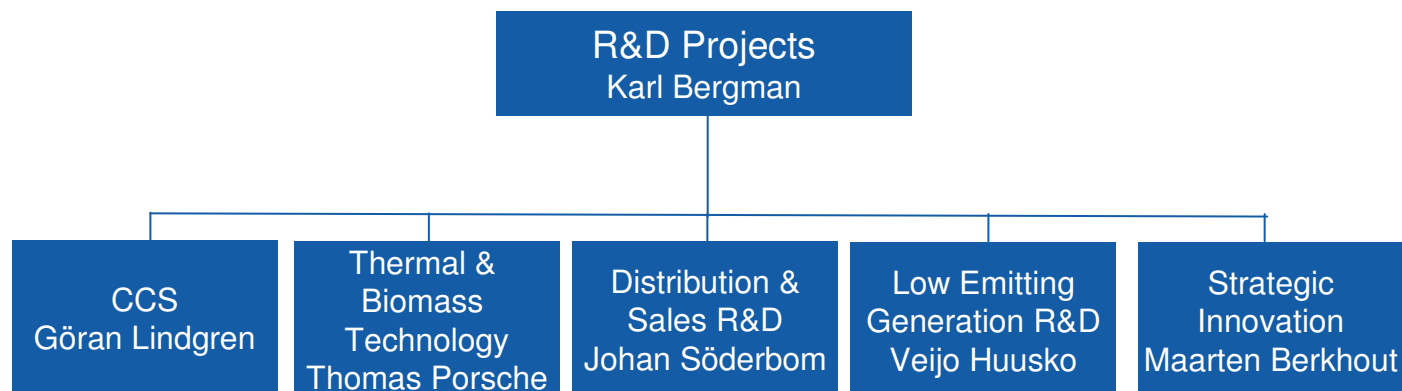
- meet the demands and expectations of our customers
- reduce the environmental impact of our operations
- improve the efficiency of our operations
- contribute to develop environmentally sustainable energy solutions



Business Unit R&D Projects

Business Unit R&D has app. 40 employees, and five focus areas:

- Low Emitting Technologies (Ocean Energy, Wind, Hydro, and Nuclear)
- Thermal Power and Biomass
- Carbon Capture and Storage
- Sales & Distribution (Smart Grids, eMobility)
- Strategic Innovation

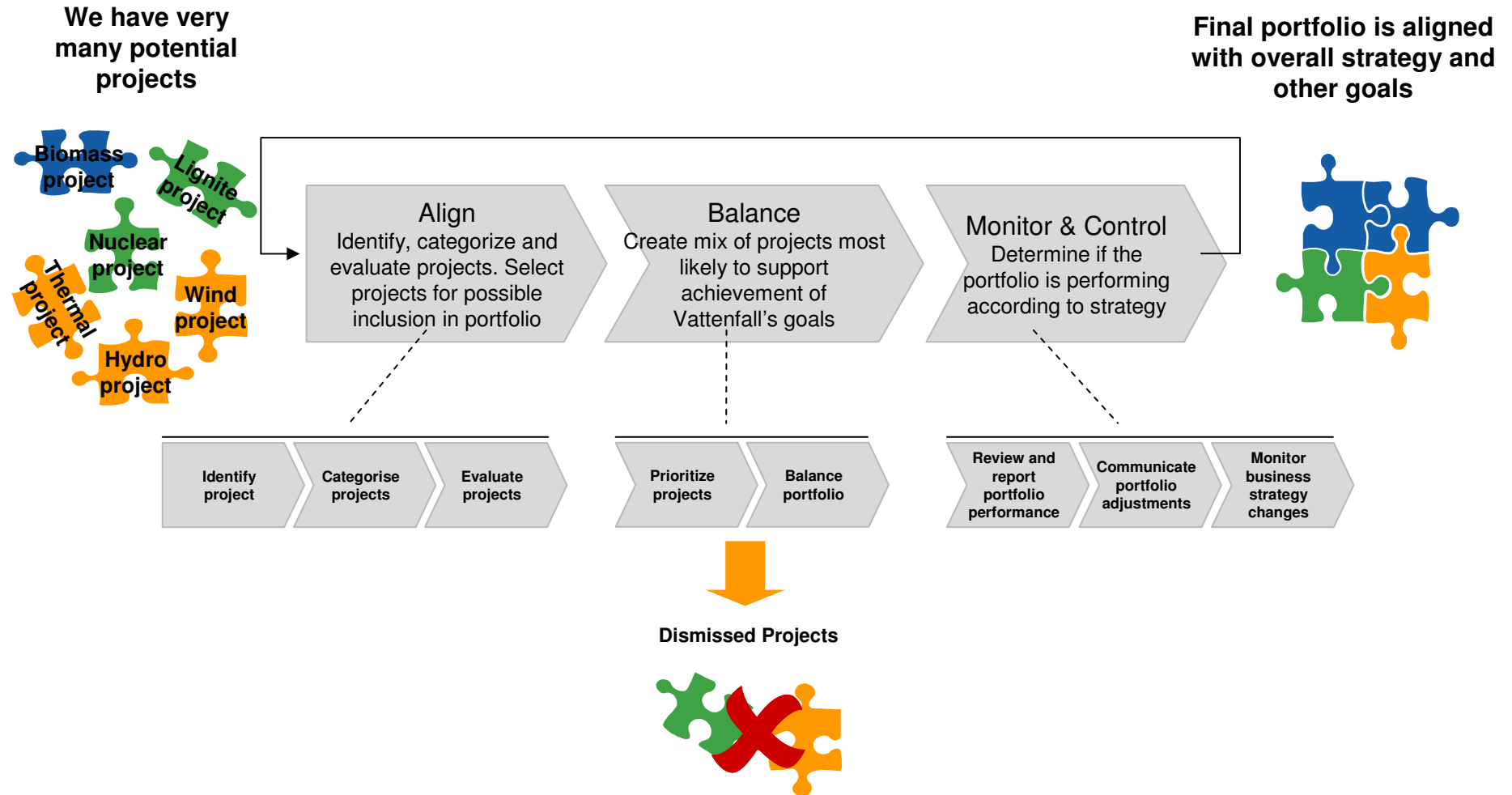


Six Focus Areas of R&D

CCS	The focus of CCS is on supporting the demonstration projects in their efforts to take the technology from the pilot scale, where the technical abilities have been proven, to the demonstration scale.
Thermal and Biomass Technologies	Thermal and Biomass Technologies (TBT) is core business development to create cost saving potential in existing operation and dispatch, as well as development of future concepts for lignite based plants. TBT should also support strategic decisions, i.e. use of CO ₂ -lean fuels (co-combustion), and identify and analyse associated technical and/or economical constraints.
eMobility	Our vision is to facilitate a transition towards sustainable road transport, and its integration in the energy system, as well as to take action on future business opportunities by developing user-friendly driving and charging features.
Smart Grids	In 2030, Smart Grids will be the technical arena where Vattenfall meets EU's climate commitments by optimal use of sustainable energy sources in electricity generation, secure electricity supply, and involve the consumers when becoming producers.
Low Emitting Generation	Our mission is to identify and perform R&D projects which optimize and enhance Vattenfall's generation within ocean energy, nuclear, wind and hydro and maintain our safe, reliable, competitive and environmentally liable generation.
Strategic Innovation	Strategic Innovation scouts technologies that are not current core R&D activities as executed in the other departments, as well as develops capabilities to enable extracting maximum value out of R&D activities.

R&D Project Portfolio Management Process

Description of XLPM preliminary project portfolio management framework and its rationale



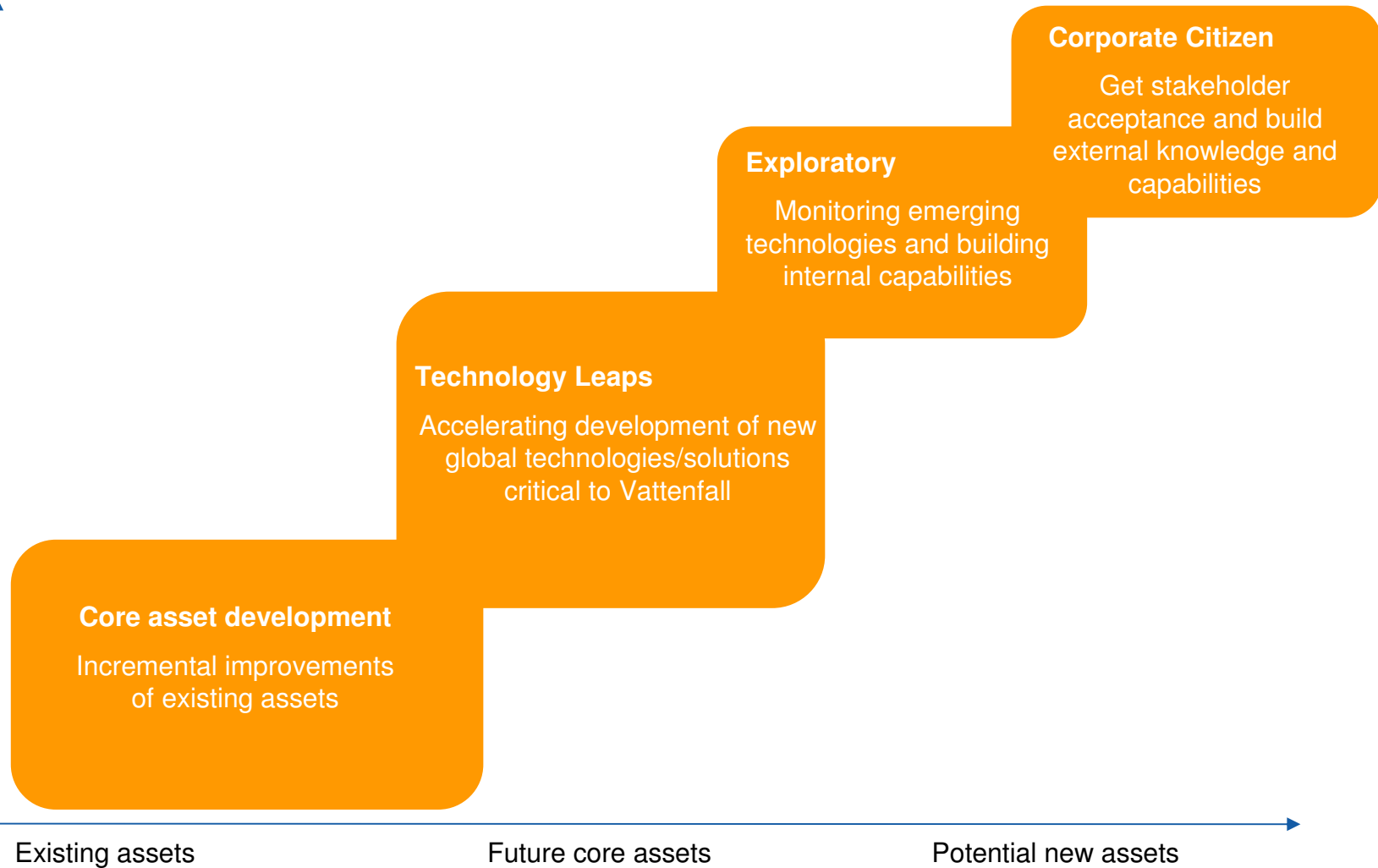
R&D Portfolio

Technology maturity

Emerging, not yet close to commercial

Technology at turning point, close to commercial deployment

Adjustments to existing technologies



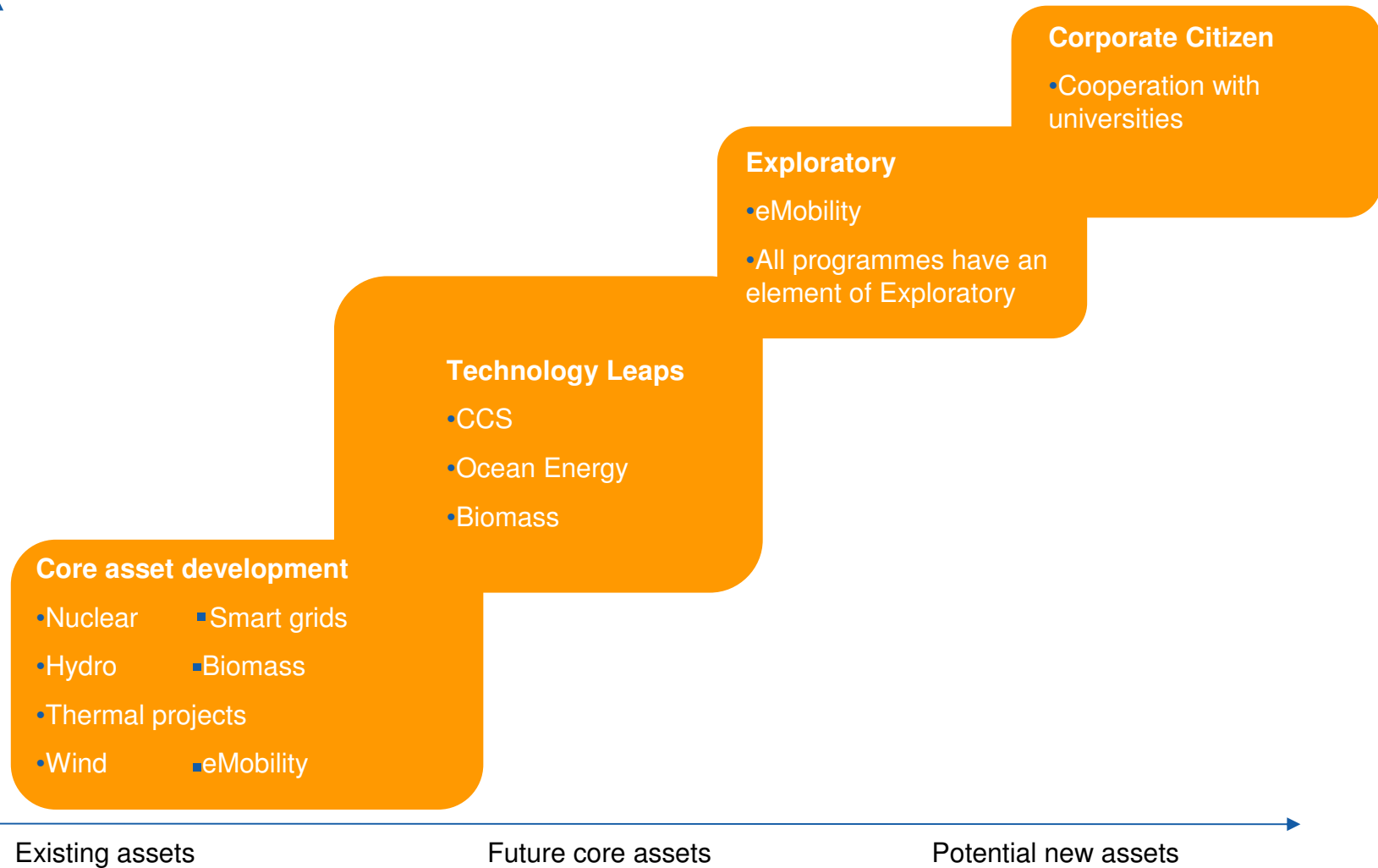
R&D Portfolio

Technology maturity

Emerging, not yet close to commercial

Technology at turning point, close to commercial deployment

Adjustments to existing technologies



R&D Portfolio

Technology maturity

Emerging, not yet close to commercial

Technology at turning point, close to commercial deployment

Adjustments to existing technologies

