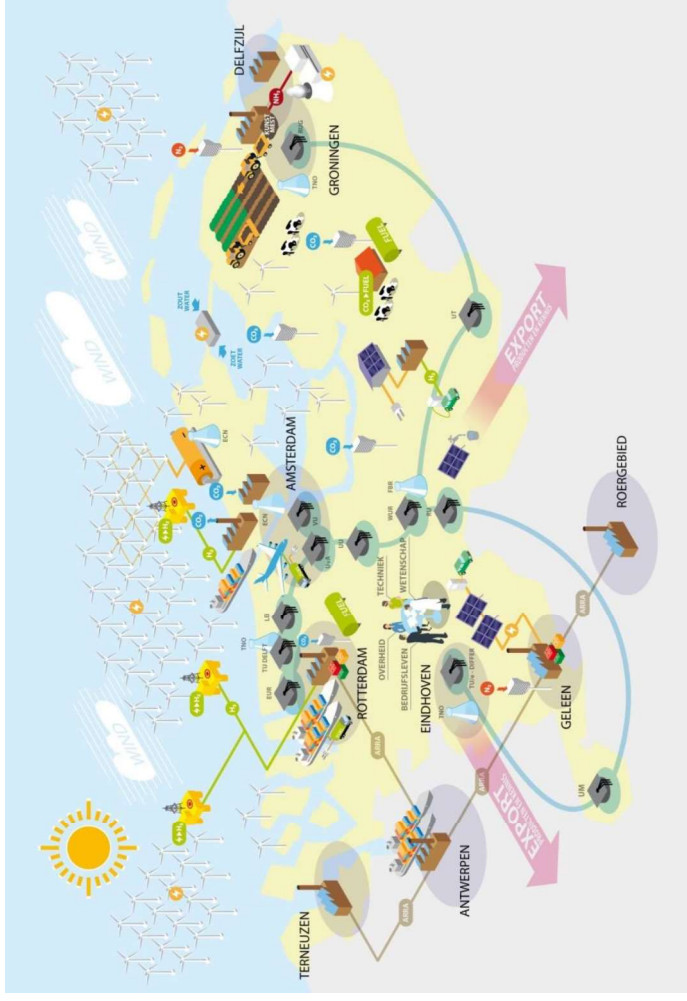




Workshop on the Innovation Fund

with DG CLIMA, EZK and the Dutch Energy and Industry sectors



Chairman: David Pappie
Director Top Sectors and Industrial Policy
Ministry of Economic Affairs and Climate Policy

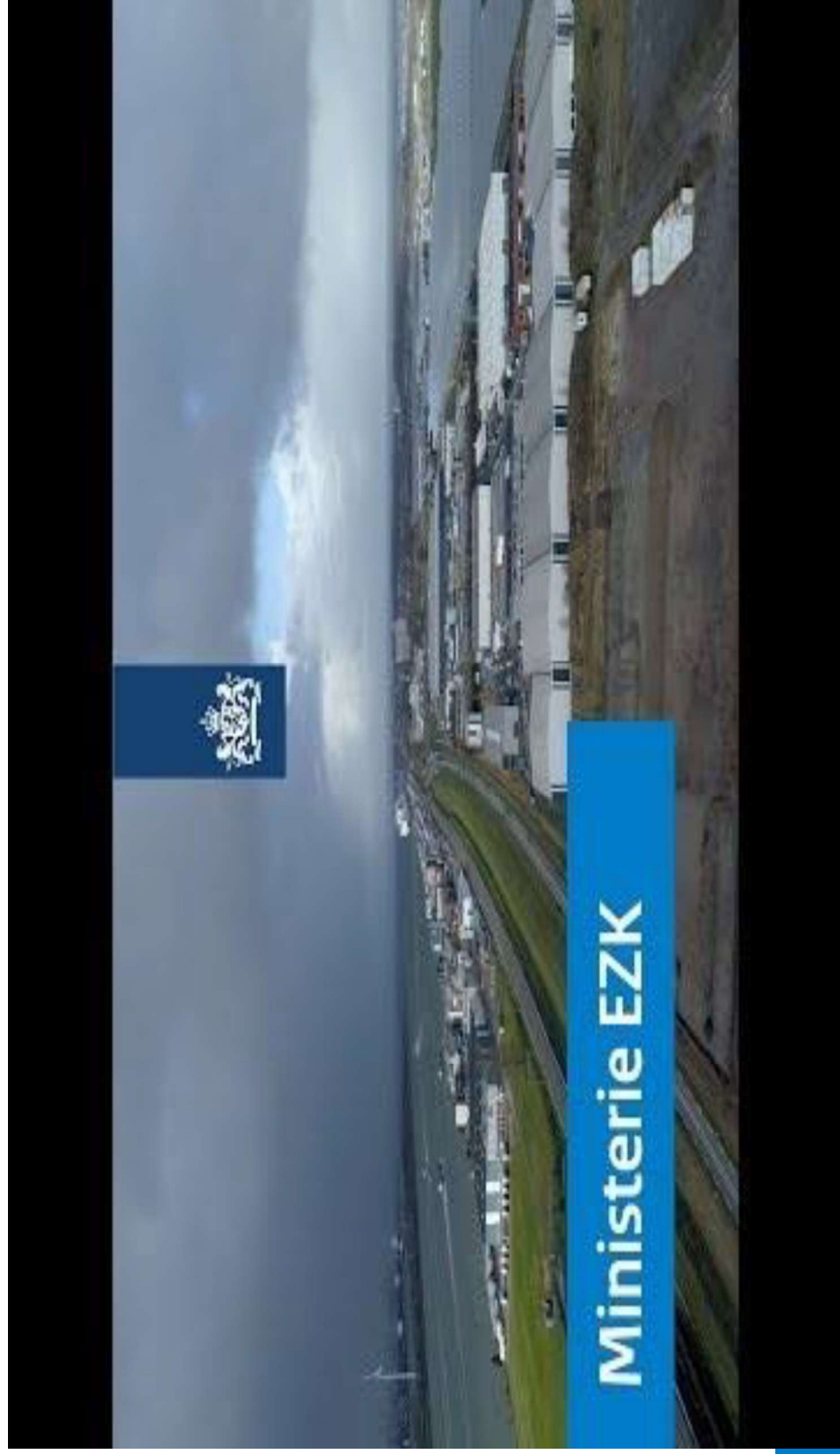
Agenda



11.00 – 11.30	Opening by chair David Pappie
11.30-12.00	Innovation Fund by DG Klima
12.00-12.30	industry sector (Shell en Porthos)
12.30-13.30	Lunch
13.30-14.00	industry sector (Nouryon and paper industry)
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14.30-15.00	SME / start-up / niche sector (Avantium, AVEBE, Stork)
15.00-15.30	Coffee break
15.30-15.50	Summarising presentation
15.50-16.30	Discussion
16.30-16.35	Conclusions by chair David Pappie
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EZK Corporate Story



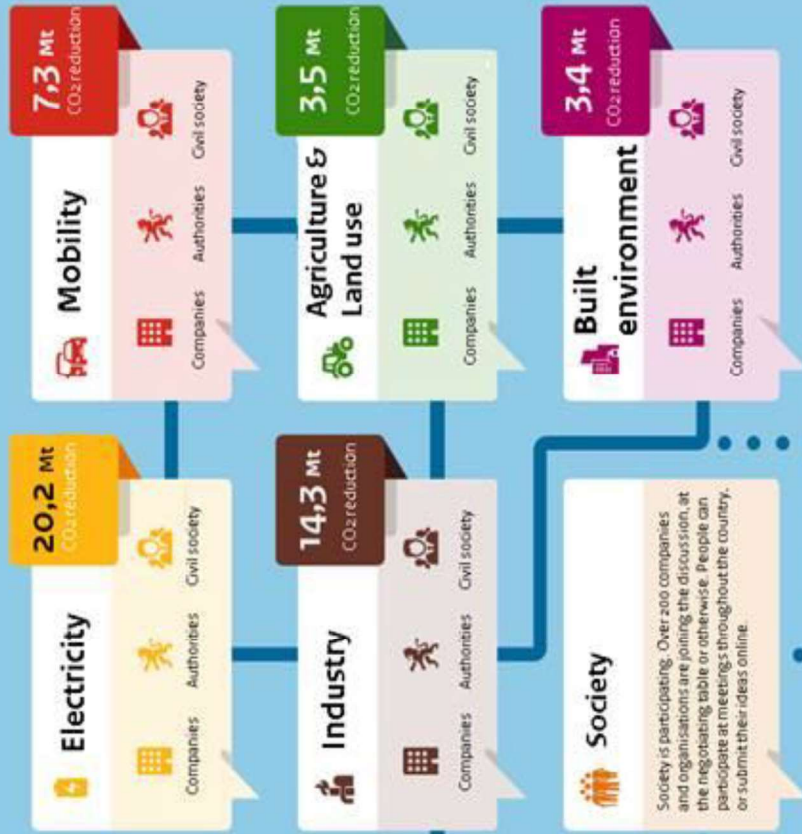
Over 100 stakeholders are reducing the CO₂ emissions of the Netherlands by 49% compared to 1990 levels through the

Climate Agreement

Klimaat-beraad

Reduction target is **48,7 Mt CO₂**

Civil society
Companies
Authorities



PLANNING

SUMMER '18



Industry and the Dutch Climate Agreement

- Goal: 14,3 Mt CO₂ reduction in 2030, Climate neutrality in 2050
- Vision: *We envisage the Netherlands to be a country with a thriving, circular and globally leading manufacturing industry, in line with the EU long-term strategy for climate neutrality in 2050.*
- Leading principles:
 - CO₂ reduction goals – single target
 - Competitiveness of the industry in a low-carbon economy
 - Development of technological pathways
 - Cost-effective and technology neutral - inclusion of all relevant CO₂ reducing technologies: hydrogen, biomass, CCU, CCS, chemical recycling, circular
 - Cooperation within the EU, across borders, with stakeholders, countries and industries

Range of instruments- carrots and sticks:

- Innovation programs, pilots and demonstration, role-out
- CO₂ levy, regulations and obligations
- Support for infrastructure

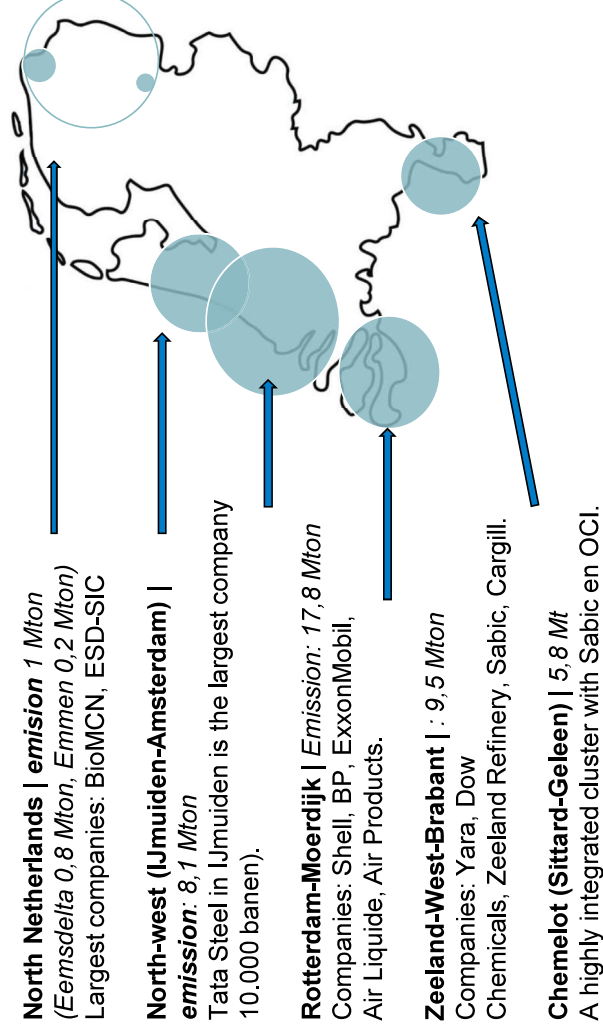


CO₂ reduction goals for the Dutch industry

12 companies emits 62% of the industrial CO₂-emission

1. Tata (11%)
2. Shell (10%)
3. Yara (7%)
4. Dow Chemicals (5%)
5. Sabic (5%)
6. ExxonMobil (5%)
7. BP (4%)
8. Air Liquide (4%)
9. OCI (3%)
10. Total (3%)
11. Nouryon (2%)
12. Air Products (2%)

Highly concentrated in regional clusters
Strong dependency within the clusters





LESSONS SO FAR

- National Climate target 49% CO₂ reduction is technically feasible, however, at 1 billion euro a year in 2030
- Innovation is crucial to reduce the cost of investments
- Industry is part of the solution
- Climate neutrality brings economic opportunities, but also LPF concerns



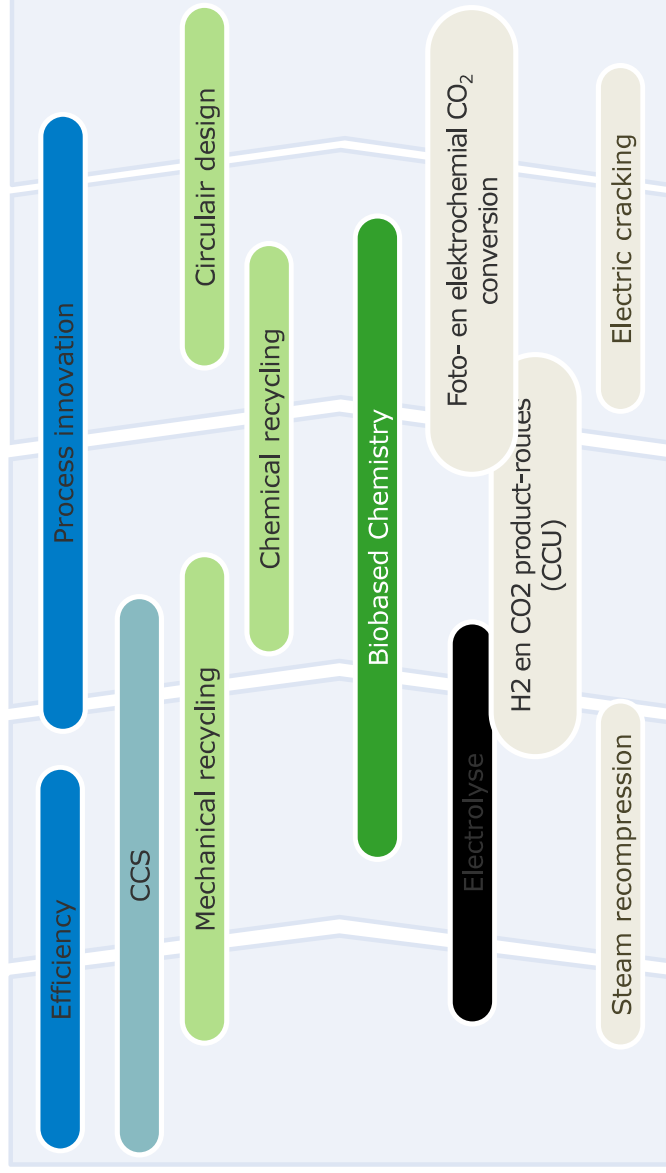
INNOVATION FOR COST REDUCTION

ROLL OUT
TRL: market ready

SCALE UP
TRL 7-8

PILOTS & DEMO
TRL 5-6

RESEARCH
Fundamental/applied
research



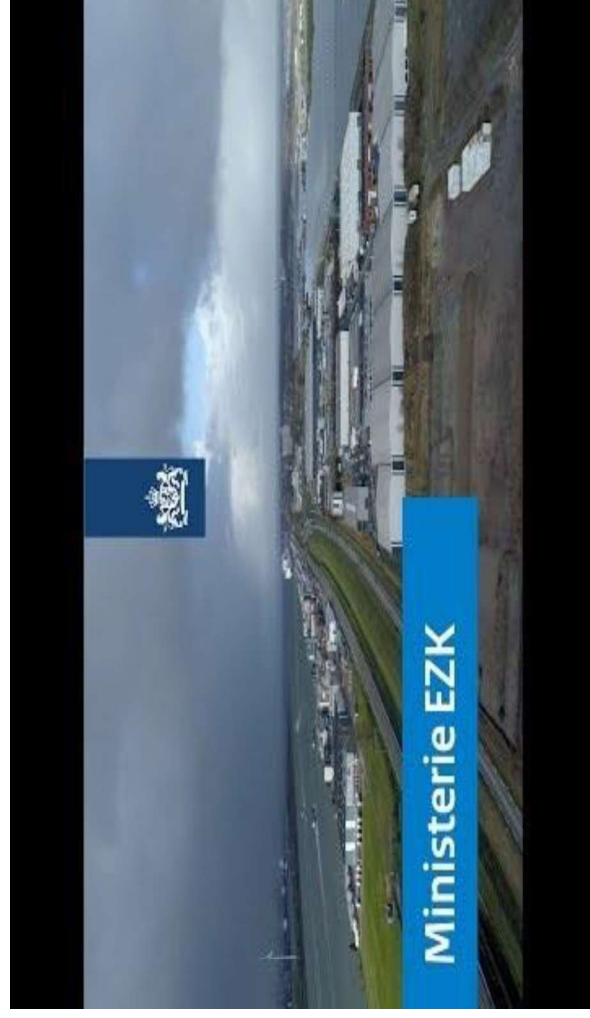
- Short term: available technologies
- Long term: innovation
- Knowledge gaps
- Public-private partnerships

NOW

8



Mission Oriented Integrated Knowledge & Innovation Agenda



Innovation roadmaps (industry and energy) for 2030 and 2050 developed with stakeholders, finalised in September 2019



Innovation objectives Energy



Cost reduction electricity with focus wind on sea

- Automization of operations & Maintenance
- Improvement of materials



Spatial and ecological integration of energy production and distribution

- Bird and bat detection
- Noise reduction of sinking piles wind on sea



Storage: Hydrogen and advanced electrochemical conversions

- Conversions for up-scaling and cost reduction
- Reduction demand for rare materials



Climate agreement: financial support - overall

Indicative “subsidies - exploitation” by 2030 will be:

- Renewable electricity € 200 million
- Renewable heat and green gas € 135 million
- Renewable heat (small scale) € 100 million
- Advanced renewable fuels for transport € 200 million
cumulatively towards 2030
- CO2-reduction industry € 550 million

- Source: Parliament letter regarding broadening the SDE+ to the SDE++ - 26 April 2019



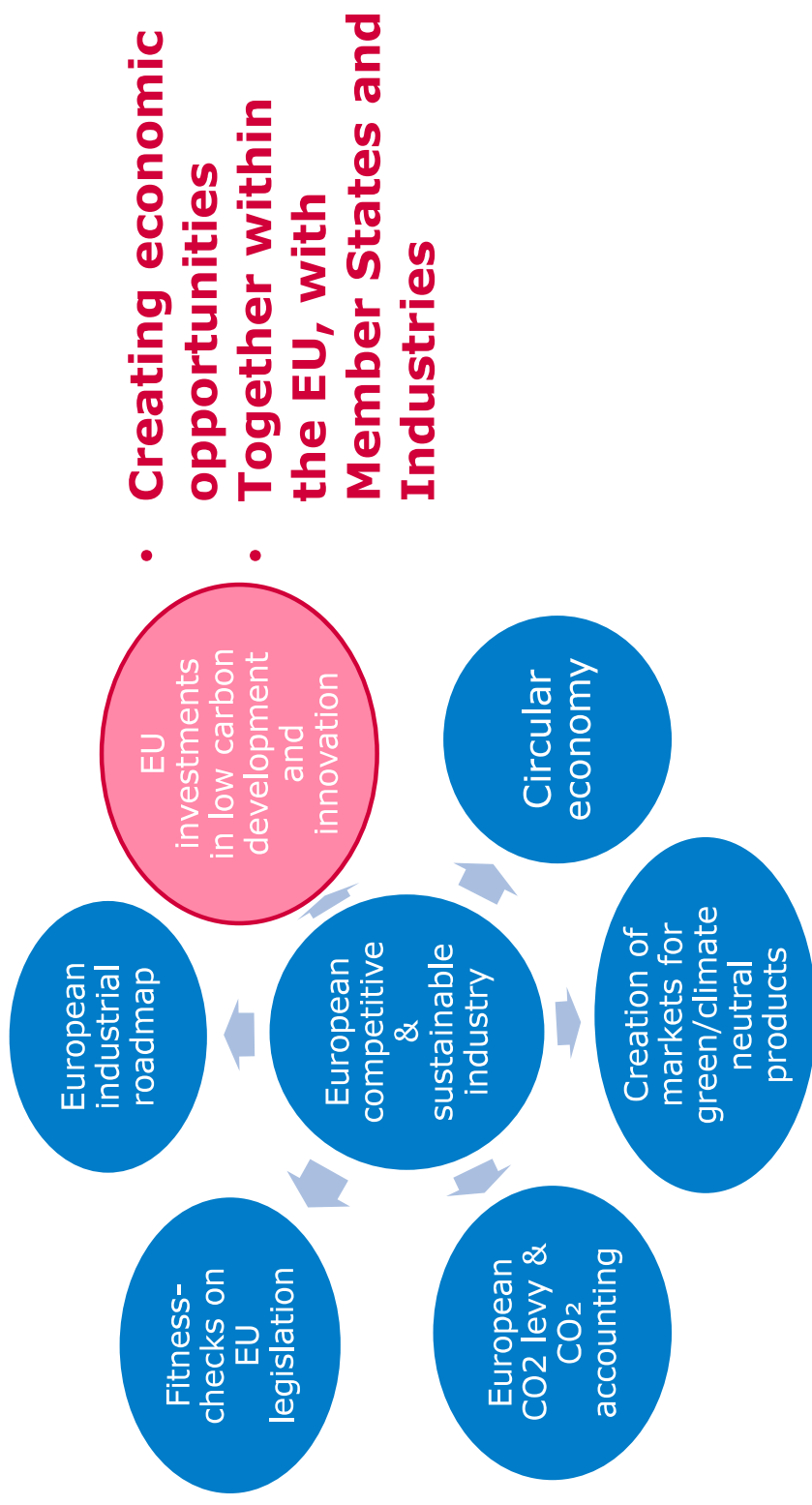
Climate agreement: financial support - demonstration and scale-up phase

Indicative "subsidies - exploitation" by 2020 will be:

- CO2-reduction industry € 60 million
- Energy (flexibility/ hydrogen) € 35 million
- Regular innovation budget
- Demonstration (DEI+) € 34 million



EU policy level

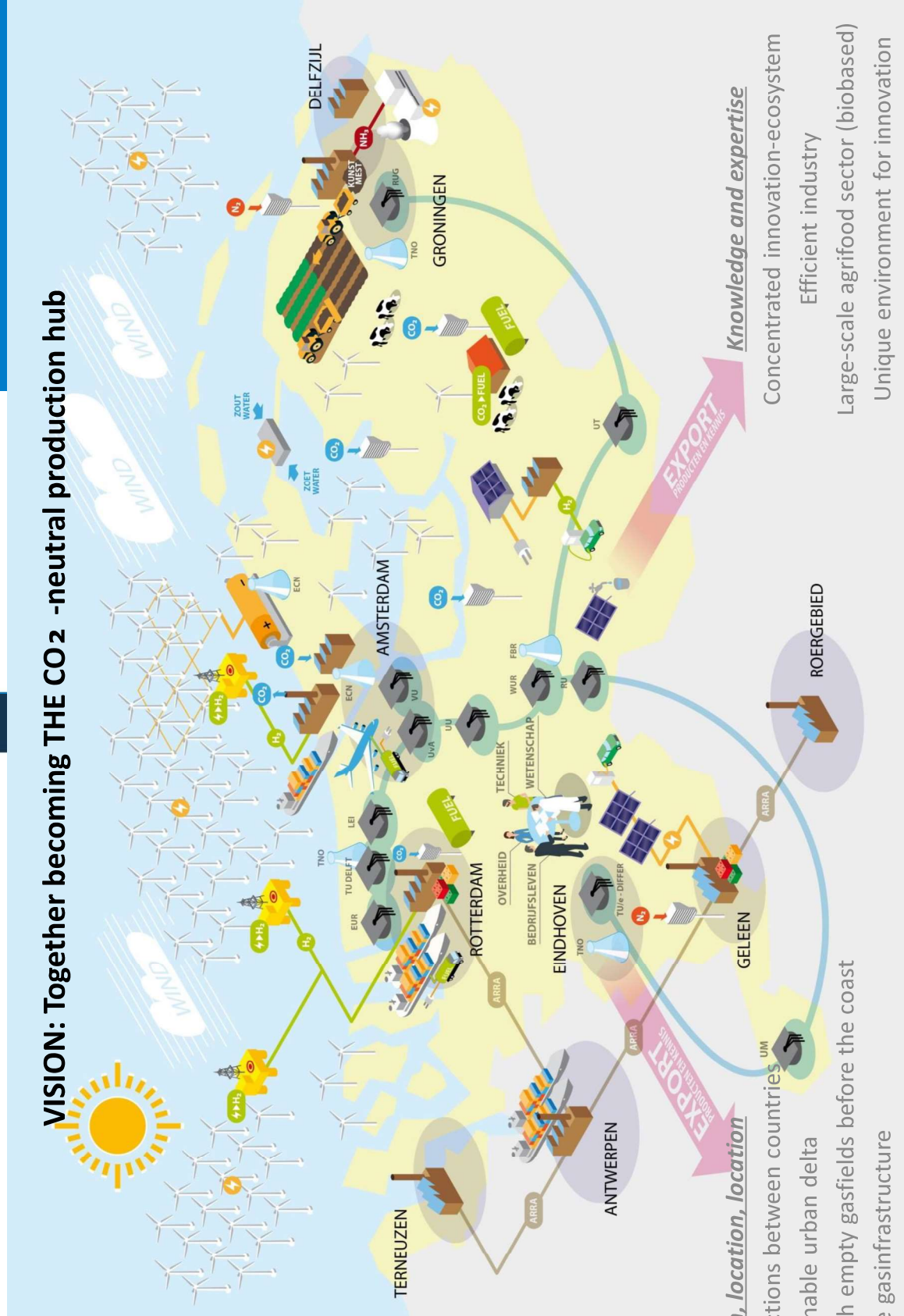




Innovation Fund - opportunities

- A match between national subsidies and the EU innovation fund
- Time schedule of project decisions and matching with different subsidies
- State aid rules in line with CO₂ reducing investments, for instance on CCU

VISION: Together becoming THE CO₂ -neutral production hub



location, location, location

- Great connections between countries
- sustainable urban delta
- Shallow, windy sea, with empty gasfields before the coast
- Unique gasinfrastructure
- circular hotspot

Knowledge and expertise

- Concentrated innovation-ecosystem
- Efficient industry
- Large-scale agrifood sector (biobased)
- Unique environment for innovation



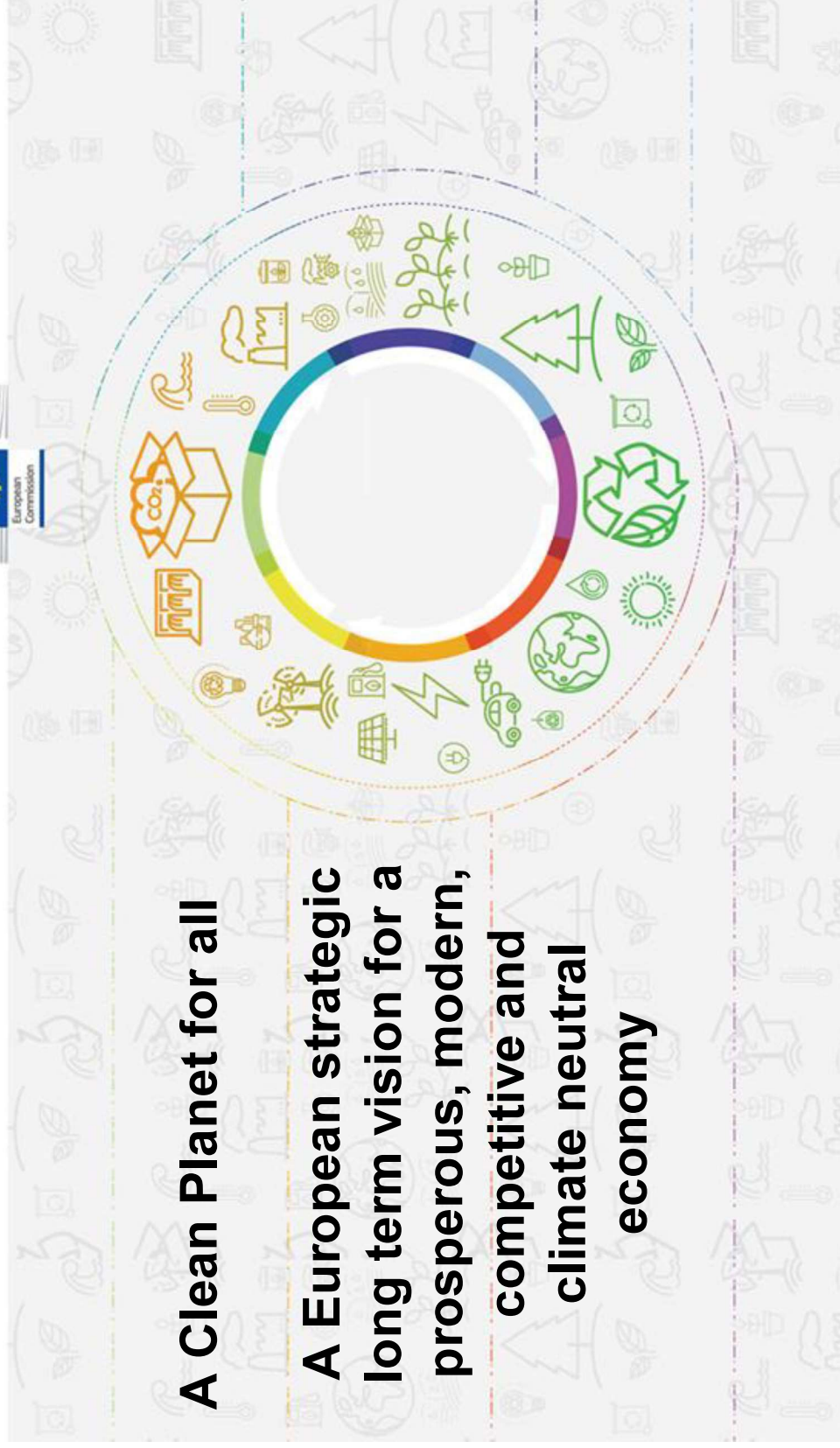
- Thank you
- Questions?

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A Clean Planet for all
A European strategic
long term vision for a
prosperous, modern,
competitive and
climate neutral
economy



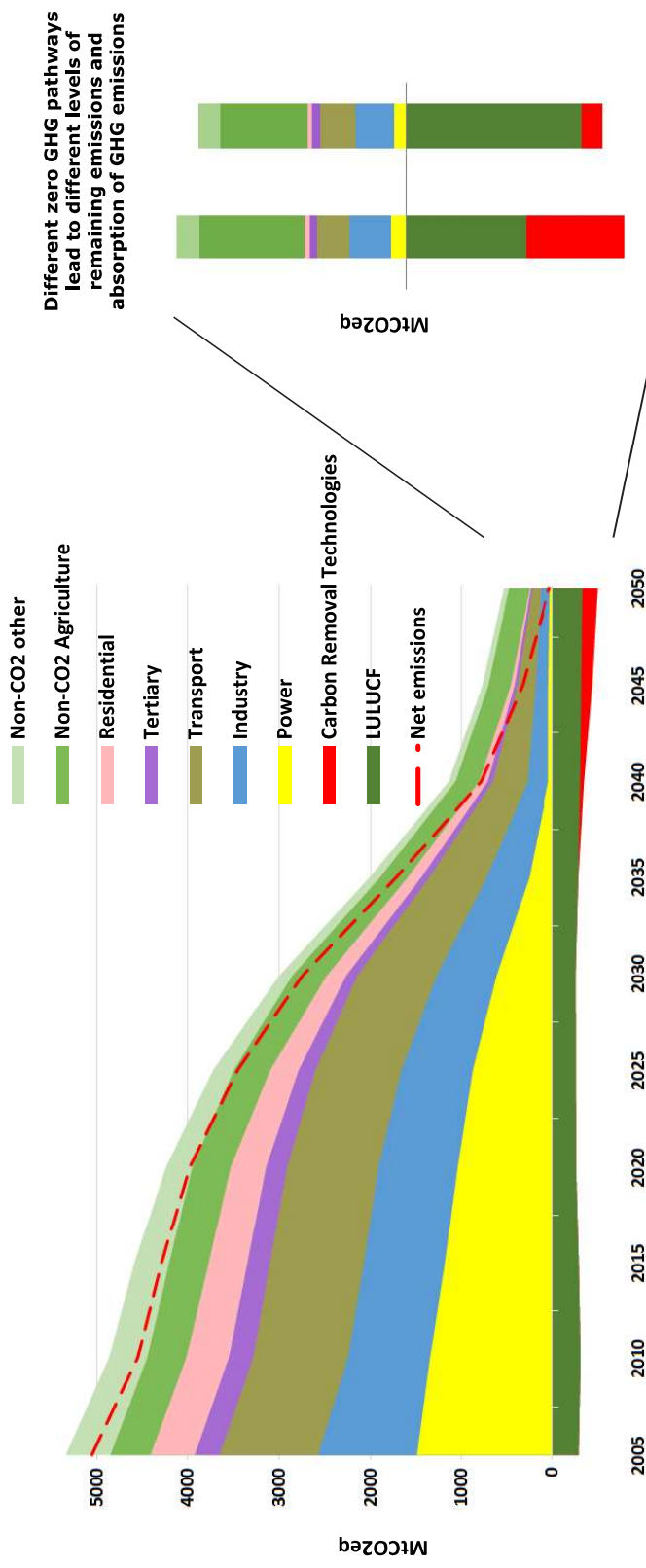
Building blocks for 2050

1. Energy efficiency
2. Deployments of renewables
3. Clean, safe & connected mobility
4. Competitive industry and circular economy
5. Infrastructure and inter-connections
6. Bio-economy and natural carbon sinks
7. Tackle remaining emissions with carbon capture and storage



Vision for a Clean Planet by 2050

Several pathways for a climate neutral Europe, challenging but feasible from technological, economic, environmental and social perspectives



Innovation Fund

Renewable
energy

Carbon Capture
Use and
Storage

**Driving low-carbon
technologies to the
market**

Energy-
intensive
industries

including substitute products

Energy storage



European
Commission

Key features of the Innovation Fund

Volume of at least
EUR 10 billion at
current carbon
prices

Support of up to
60% of additional
costs related to
innovative
technology

First call expected
for 2020 and
regular calls up to
2030

Financed from the
revenues of the EU
Emissions Trading
System

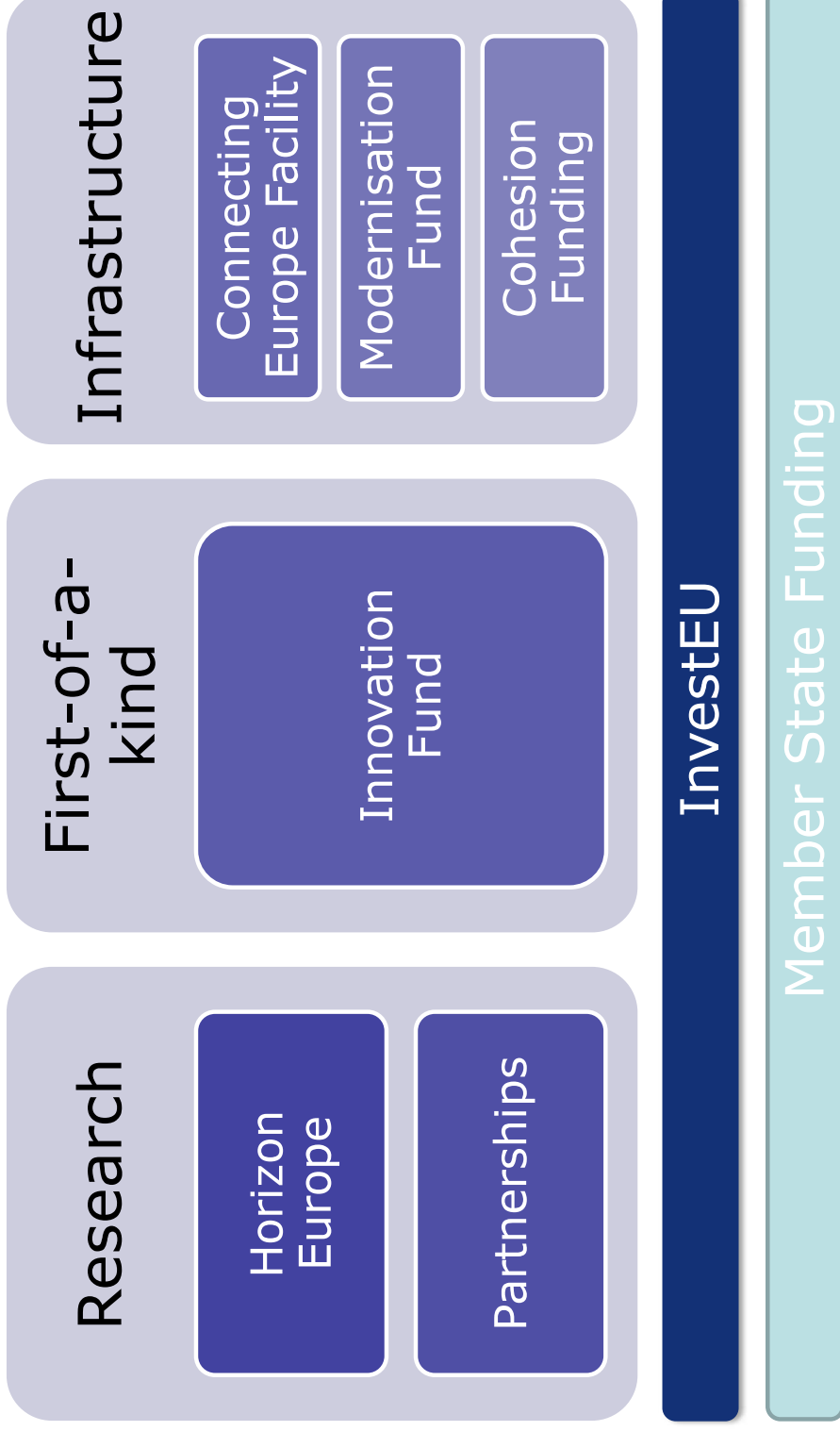
Support of
additional capital
and operating
costs (up to 10
years)

Comprehensive
selection criteria
and project
development
assistance



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Innovation Fund complementarities

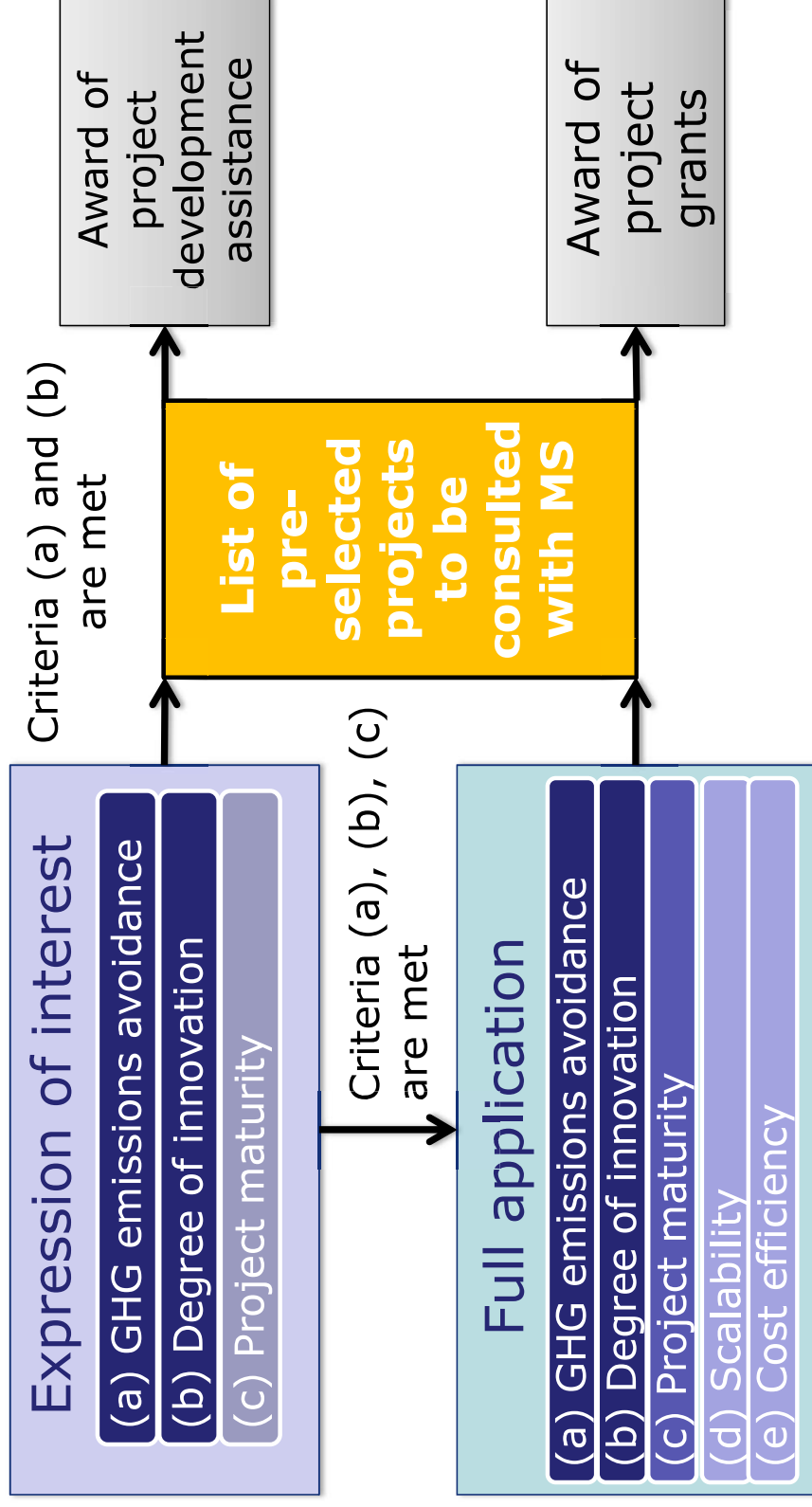


Technology and business

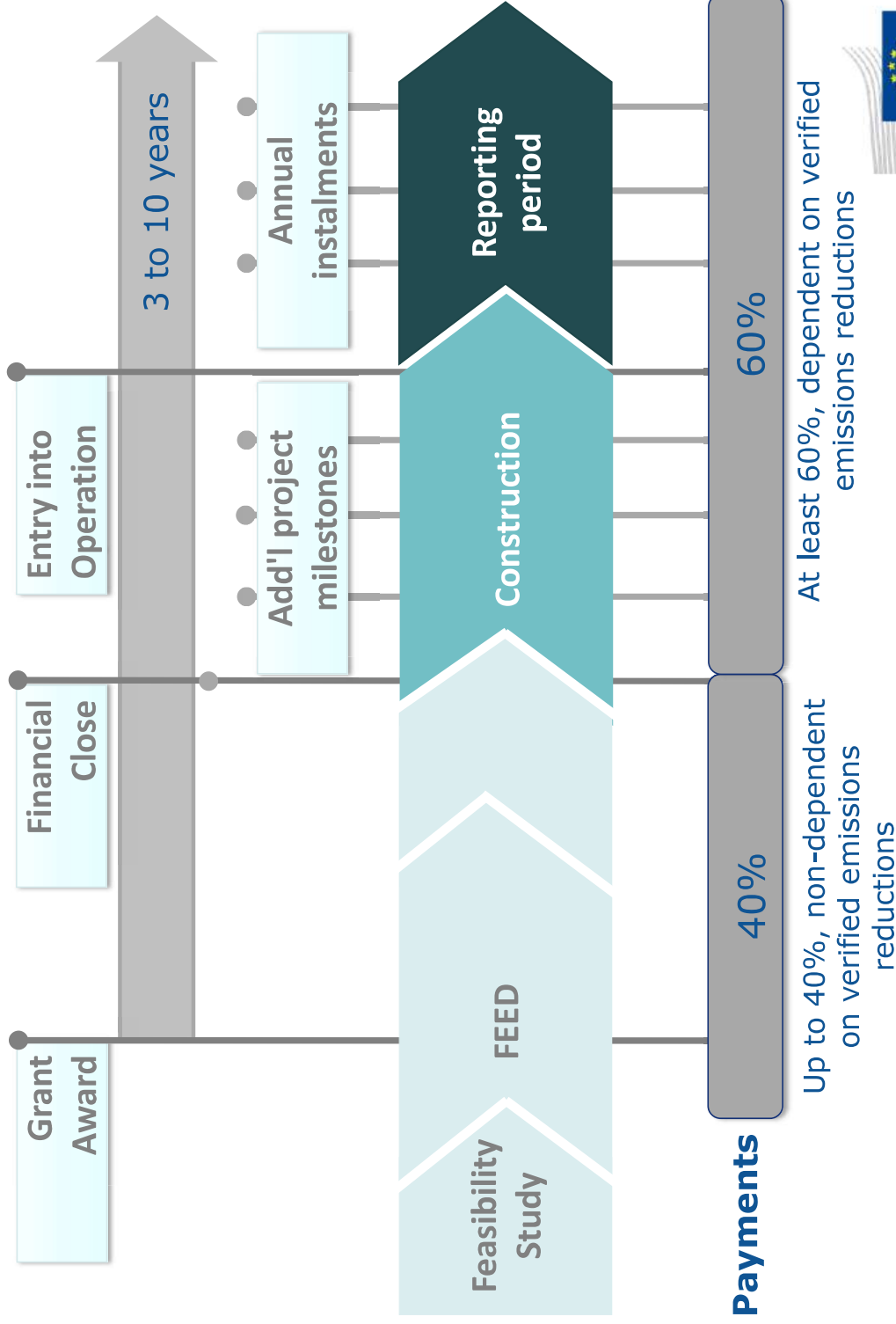


Selection criteria

Two-stage selection process



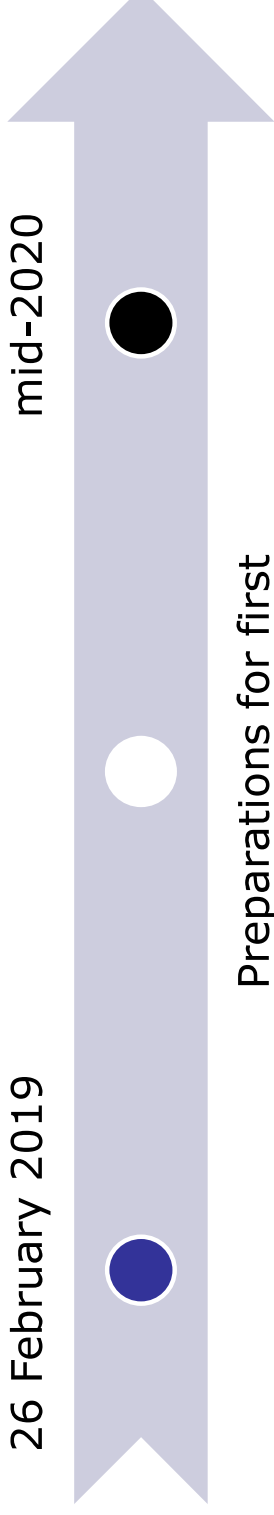
Support across project life-cycle



Timeline – Innovation Fund

Adoption Delegated
Regulation
26 February 2019

First call for
proposals
mid-2020



Preparations for first
call

Industry workshops

*Public consultation
on conditions for first
call*



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How to match project design and Innovation Fund (IF) support

Complexity and synergies

of activities and partners
e.g. CCUS or sector coupling

Target IF support to certain activities?

Synergies with other funding
e.g. for infrastructure

Timing

Can project be split in several stages?

IF support to be provided over several calls?

Additional costs and risks

What are the major costs and risks?

IF support for capital and/or operating costs?
(construction vs operation)

To which extent should risks (e.g. carbon price) be covered?



How to best select projects?

What are "best practice" examples?

- e.g. ARPA-E programme by US DoE
- Other EU programmes

Selection criteria

- How to calculate emissions avoidance?
- How to assess degree of innovation and market potential?
- Which level of proof for technical, regulatory and financial feasibility and readiness?
- Cost efficiency based on NER300 experience

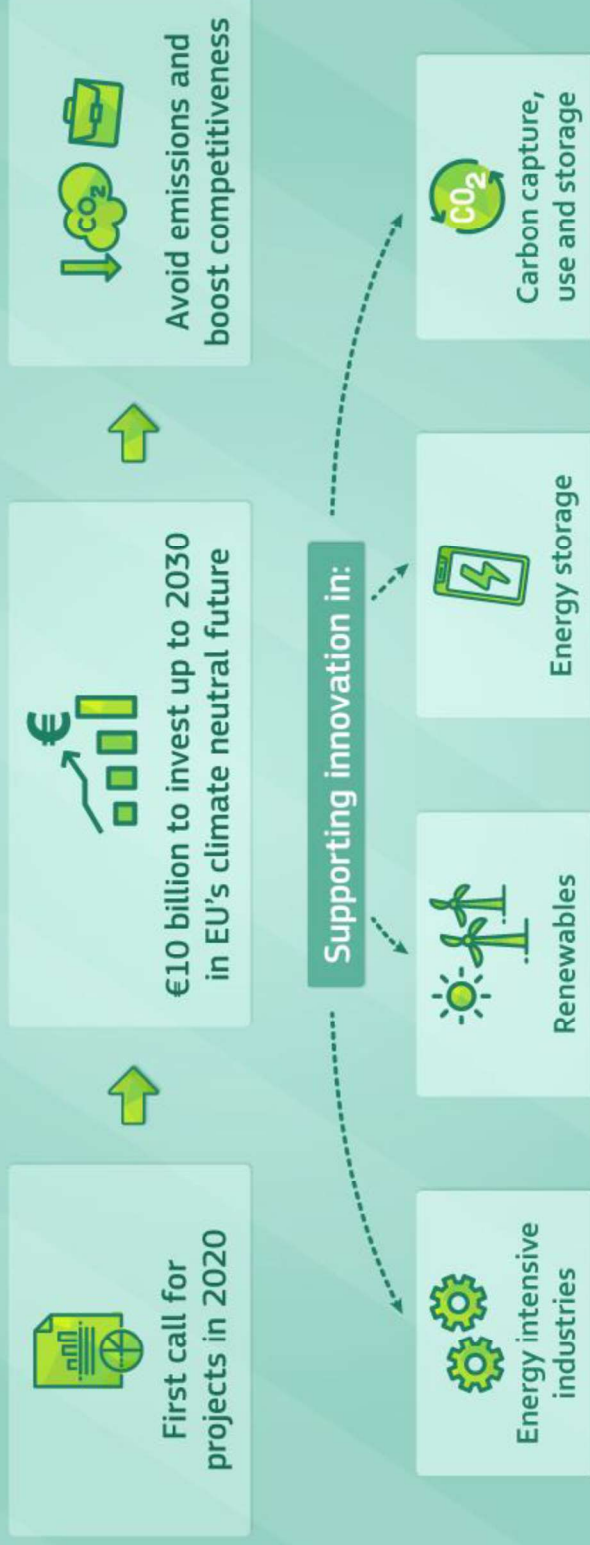
Selection process

- Which level of proof for expression of interest?
- Which level of proof for full assessment?



INNOVATION FUND

Driving clean innovative technologies towards the market



Funded by: EU Emissions Trading System

https://ec.europa.eu/clima/policies/innovation-fund_en
#InnovationFund



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Commission



SUMMARISING PRESENTATION

Annita Westenbroek

Remko Ybema

OBSERVATIONS FROM THE CASES

Many project phases from exploration to implementation

A diversity of cost elements

- CAPEX, OPEX, stranded assets, (start-up)risks, system integration (operational risks!)

Planning and timing – flexibility required

- supply / turn-around / permits / building / subsidy

All projects face many uncertainties

- Availability infrastructure, distribution and height CO₂-credits, societal perception, valorization products and side products, subsidy approval, legal framework, guarantees

Dependencies

- Chain partners, infrastructure, tariff structures, emission reduction assessment, regulations, locked-in effects

SOME REMAINING QUESTIONS TO DG CLIMA (1)

Scale up versus innovation

- Scale-up is crucial for growing to maturity and cost-effectiveness
- How does DG Clima innovation value scale-up projects?

CAPEX vs. OPEX vs. Loans

- How will subsidy be distributed over Capex and operational costs
- Are loans also possible?

SOME REMAINING QUESTIONS TO DG CLIMA (2)

Scalability vs. location-specific

- How important is scalability - some innovations can only be applied at a limited number of locations

SME vs. Multinationals

- Is it possible for SME to join — is there a minimum size of projects?
- Who should be the applicant?

Regional spread vs. Quality of the projects

- Is it possible for companies in the Netherlands to have a larger share of the IF resources assuming they have a strong portfolio of projects?

SOME REMAINING QUESTIONS TO DG CLIMA (3)

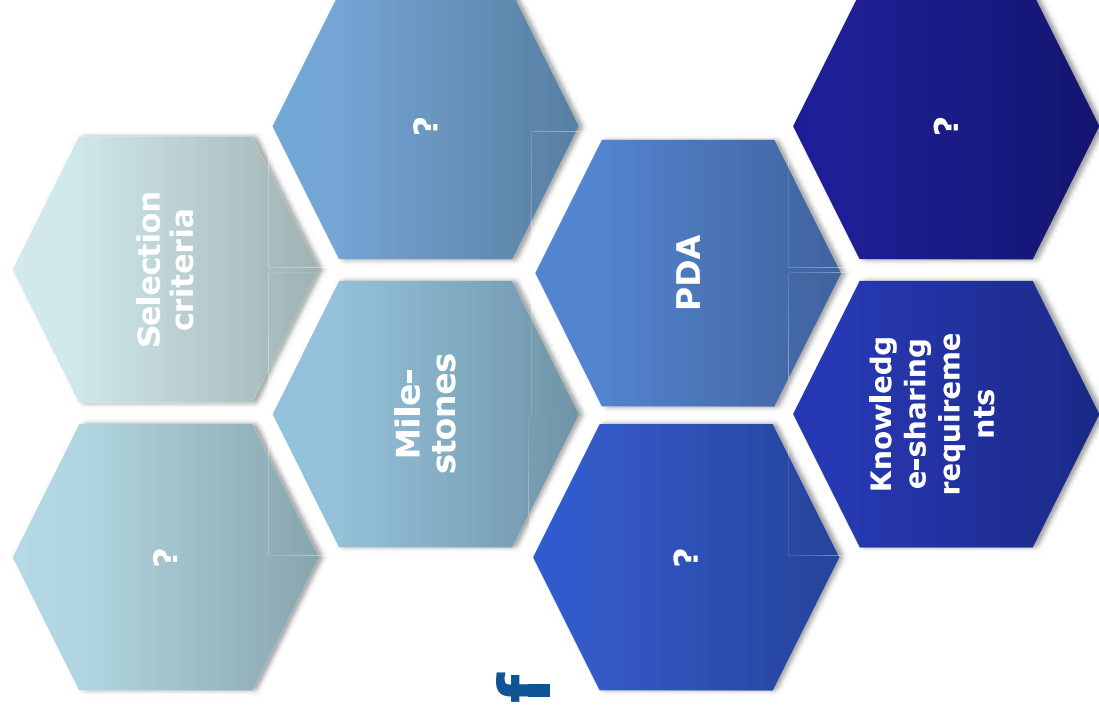
Knowledge sharing vs. confidentiality, IP and competitiveness

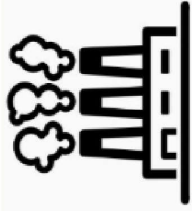
- How much of the knowledge and IP needs to be shared?

Combining of funding

- How could IF be combined with other fundings, and to which amount / percentage?
- Which rules apply for combination of funding?

Innovation Fund Essential elements of 1st call of proposals





Selection criterion: effectiveness of GHG avoidance potential

- *Will the existing MRV requirements be applicable to innovative plants in your sector?*
- *If not, what further guidance needs to be prepared for a fair evaluation of the GHG emission reduction potentials of different projects in your sector?*
- *Which role do you see for life-cycle assessment (LCA) in calculating and verifying the GHG emission avoidance potential?*
- *What are the critical points that need to be considered when undertaking an LCA for projects in your sector?*



JUDGE THE EFFECTIVENESS OF THE OVERALL GHG AVOIDANCE OVER THE FULL VALUE CHAIN (SCOPE 1,2,3)

- GHG emission avoidance by the innovation due the use of more sustainable raw materials (supply chain) or due to more efficient operation at customers should also be taken into account.
- also when a part of the GHG emissions avoidance in the chain is out of the scope of ETS
- Avoid carbon leakage (to other industries / countries / parts of the chain)

ROLE FOR LIFE CYCLE ANALYSIS

A good tool to get the real CO₂-effect over the whole value chain (Scope 1, 2, 3), combi with

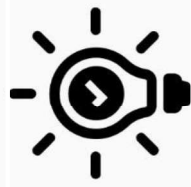
- Life Cycle Cost Mgt Analysis (LCC).
- Value Chain Assessment

In certain areas so technical and academic that is difficult to understand and apply

Don't compromise the other LCA impact categories (e.g. water use or resource depletion).

Ensure that

- CO₂ effects biobased and circularity are well assessed
- Products from green hydrogen and CCU are CO₂ neutral - when (certified) green electricity is used
- Technologies are compared at the same degree of maturity



Selection criterion: Degree of innovation

- *How can the degree of innovation in comparison to the state-of-the-art be best evaluated considering that innovation may relate to a specific technology, processes or their combination, products and services?*



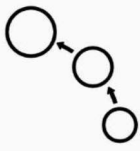
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INNOVATIVENESS

Determined by: First of a kind

- this specific technology in this specific sector
- or a step change unit cost through a different fabrication method, supply chain method or other innovative solution.

Variations on a specific technology can still be innovative and are needed to exploit the full potential of the innovation in a shorter time



Selection criterion: Project maturity

- *Which criteria should be used to evaluate project maturity?*
- **Technical: scope and depth of preparatory studies, soundness and viability of implementation plans, validation at previous TRL (pilot testing)...**
- **Financial: business plan, financial standing of the project proponent(s), the level of commitment of other (private) investors, the revenue streams,...**
- **Permitting, environmental and societal acceptance**
- *What essential elements should be in place?*
- **concluded feasibility studies, FEED, or other?**



PROJECT DEVELOPMENT PHASES

- Feasibility studies performed before subsidy application (internal studies)
- FEED is performed after subsidy approval, before actual construction starts

Don't require (end-of)-FEED deliverables for the subsidy application – to avoid unnecessary delays

- planning a project may depend on the timing of a turn-around!

PERMITS

Permits obligatory when starting construction.

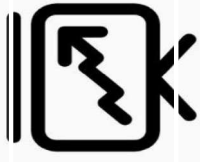
Don't require permits for the subsidy application

Include a 'stakeholder involvement paragraph' with

- information on potential hurdles in societal acceptance, and how they will be addressed.
- security of the relevant regional infrastructure for the required utilities.
- Letters of Intent of the permitting authority

KEY RISKS

- Supporting infrastructure (e.g. sustainable electricity, steam, hydrogen)
- external cost developments (e.g. CO₂ prices, difference between natural gas and electricity),
- CO₂ accounting issues (in value chain initiatives like steel2chemicals)
- support of national policies and local governments.
- Guarantees needed for loans



Selection criterion: wide-spread application

- *Should projects indicate their potential market (volume and expected price developments) and cost reduction potentials? At national, European or global level?*
- *Or should this be determined by market statistics and studies? What are the most reliable sources for your sector?*



DATA ON MARKET POTENTIAL

- of the demonstrated innovative concept (e.g. in how many plants globally can this be applied)
- or of the(new) product produced when a technology produces a unique or new product
- Don't only require market statistics (as these reflect current situation and not the future)
- Require a reliable prediction of the opportunities for new materials and products



Selection criterion: cost efficiency

- *Are there any specific issues that sector projects may face with the application of the definition of relevant cost from the Regulation?*
- *Are the conventional production costs easy to estimate with confidence? If not, can price of conventional product be used as a comparator?*
- *What are the key variable factors determining the financial gap?*
- *What are the financial risks and how best they can be evaluated?*



RELEVANT COSTS

The risk related costs

- Costs associated with the ramping up of the plant
- Downtime of the total process due to delay or malfunctioning of a new technology
- Product rejection due to lower quality caused by the new process
- Additional modifications of technologies, processes and products

Stranded assets / total costs

- A completely new process needs to be build next to the existing process to ensure continuity of the production (without additional market volume). In this case no financial comparison with an existing process can be made. And total costs is the only option.

In some cases total costs over the total value chain should be taken into account

- Production + application

COMPARISON WITH CONVENTIONAL SITUATION

Make comparison at the same size!

- Only possible for industrial plants, not for demo's (as conventional alternative is not available).

When implementing new technology in existing plant, then make a delta cost/benefit analysis

- this is different from estimating the cost of the conventional process

In some cases the reference costs are difficult to estimate.

- E.g. grey hydrogen is often a byproduct and therefore does not have specific production costs
- Sometimes conventional costs are known, though not public

THE FINANCIAL GAP

The gap between the total additional costs compared to ‘doing nothing’

This includes costs due to

- downtime, product rejection, economy of scale, energy integration, co-product valorization, etc.
- permits, piping, infrastructure, etc.
- Electricity price, market price green hydrogen, certification / regulation

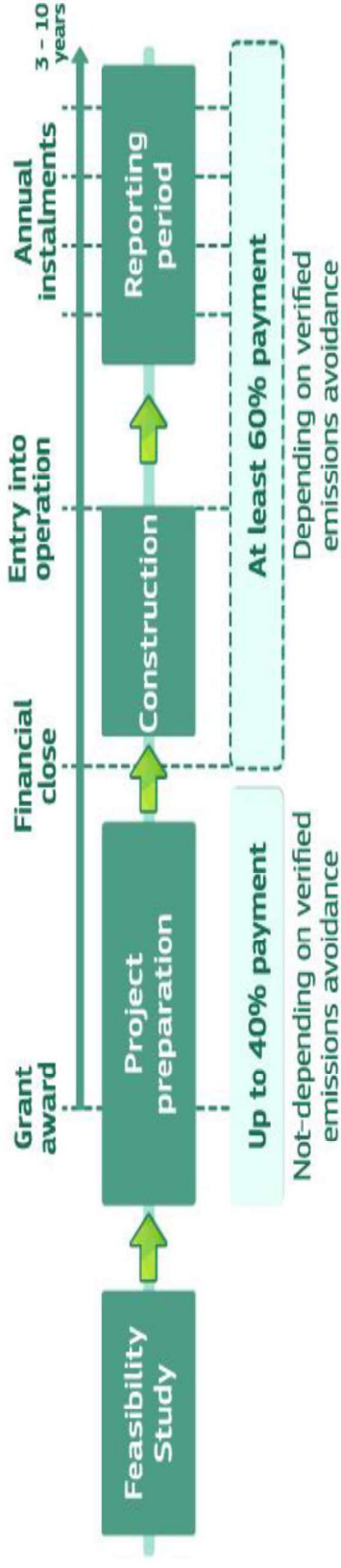
Total costs of a new installation when the old installation is not dismantled.

THE SELECTION CRITERIA

1. The potential GHG avoidance (30): how much GHG reduction could potentially be achieved when fully optimized and applied in the EU
2. Cost efficiency(30) - including expectations about the steepness of the cost reduction curve
3. Project maturity (20)
4. Scalability (10)
5. Degree of innovation (10)

Also consider the following relevant aspects:

- Employment effects / rural development
- Security of supply / less dependencies on third (unstable) countries outside the EU



- What is the expected **time to financial close and entry into operation** for innovative projects in your sector?
- What are the **key milestones** before financial close, e.g. feasibility or FEED study, permitting, State-Aid approval, etc. and before full entry into operation, e.g. how long are the construction, testing and commissioning periods?
- **How should the grant be optimally disbursed over the project life cycle?** To what milestones can/should disbursements be linked?



MILESTONES

Timeline + key milestones to financial close: depends per project

- NB: permitting procedures in the Netherlands are lengthy (may take several years)

Link disbursement to cash flow needs and an advance payment before construction starts

Project development assistance (PDA)

- *Will PDA be useful for projects in the sector? If yes, what types of assistance?*
- *Should there be maximum amounts for different types of PDA and what would these levels be?*
- *Should projects be required to publish the results of any studies done with PDA, if they decide not to apply for Innovation Fund full support or are discontinued?*
- *Should FEED be financed by PDA or only after successful application for an Innovation Fund award?*



PDA

Large companies will hire their own assistance

- Larger companies will anyhow perform FEED before a final investment decision within the company is made
- When PDA is reduced from the max 60% support of IF, companies will decide for a limited support

FEED as part of the PDA financing is helpful for SMEs and smaller projects

Don't publish results of PDA, also not when they don't apply for full IF support

Knowledge-sharing requirements

- *What type of technical, economic, project management, regulatory and permitting information should be shared?*
- *What types of **knowledge-sharing activities** should the implementing body organize and for the general public?*
- *What should be the **form of knowledge sharing tools** that would be useful for the market?*
- *How can **synergies** be obtained from linking to other programmes and networks?*



KNOWLEDGE SHARING (1)

- Share percentual savings, regulatory issues, technology on headlines
- Don't share specific data about the industry where the innovation is applied (data on production, energy consumption, etc.)
- IP should be arranged in such a way that the first-mover benefits from every next application

KNOWLEDGE SHARING (2)

Activities by the European Commission

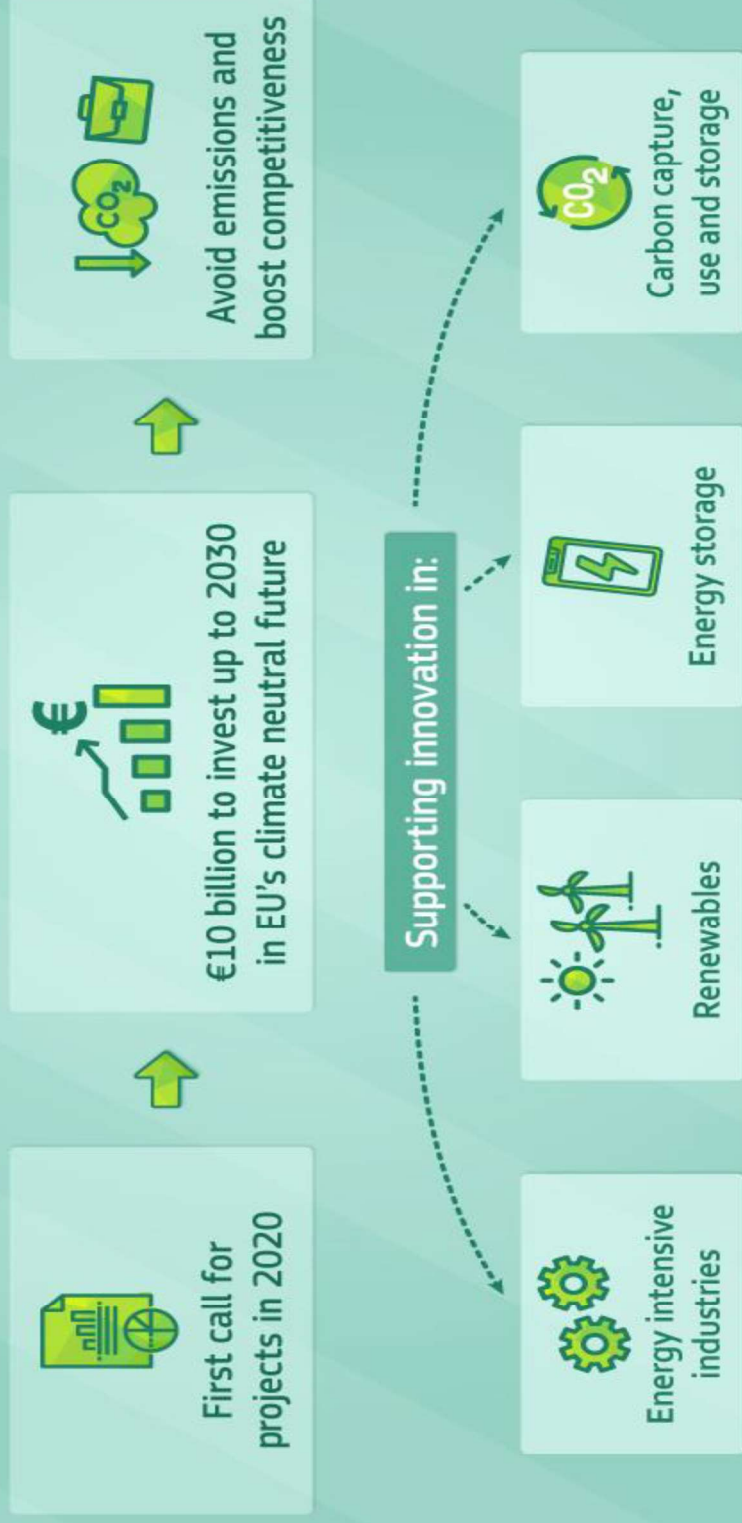
- Innovation Days / conferences
- Online platform

Activities by industry

- Presentation at conferences
- Press releases
- Webinars
- Marketing / sales via equipment suppliers

INNOVATION FUND

Driving clean innovative technologies towards the market



Funded by: EU Emissions Trading System

https://ec.europa.eu/clima/policies/innovation-fund_en
#InnovationFund



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