

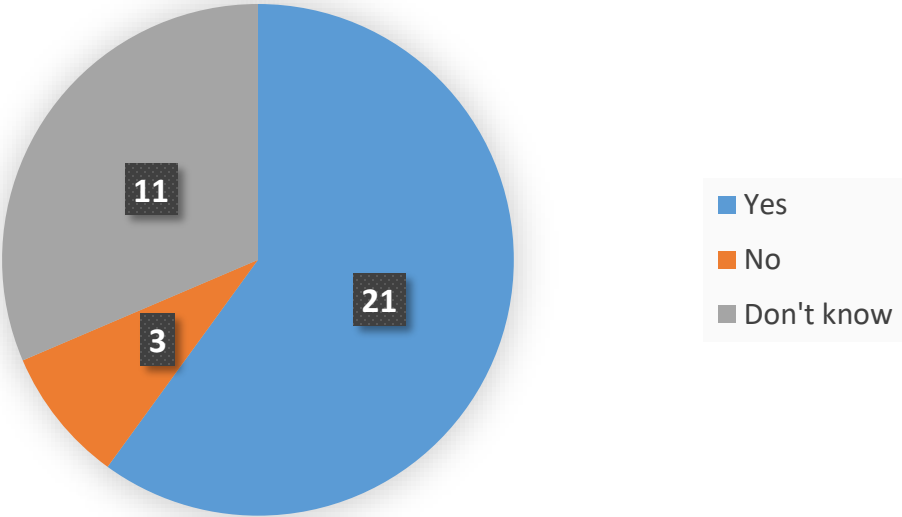


# Hydrogen Europe

***DG CLIMA survey results and discussion***

- **25 questions** (selection criteria, milestones, PDA, information sharing)
- **35 responses** received
- Following slides contain only **selected answers** and **key messages**
- Individual responses to be sent to DG CLIMA for follow-up
- Format of the discussion
  - Presentation of key messages or issues
  - Response from DG CLIMA
  - Discussion

**Q1: Will the existing monitoring, reporting, verification (MRV) requirements under the EU Emission Trading System (ETS) be applicable to innovative plants in your sector?**



*Selected comment from the responders:*

What if the project in question concerns part industry (**schemes apply**), power generation (**scheme does not apply universally** – i.e. biomass), and transport (**scheme currently not applied**) - we firmly believe that ALL sectors (residential, industry, public/commercial, transport) should be covered by maybe the MRV (how to solve?), but definitely the ETS (especially commercial transport is a sore thorn in this respect)

Q2

If the monitoring, reporting, verification (MRV) requirements under the EU Emission Trading System (ETS) are not applicable, **what further guidance needs to be prepared for a fair evaluation of the GHG emission reduction potentials of different projects in your sector?**

- *Calculation method needed, which focus on the GHG emissions of the final products*
- *When considering the ratio price/GHG emission reduction, it is important that not only short-term measures with low CO2 savings and low costs are considered, but that the focus is on long-term measures with high CO2 savings, even if higher costs initially occur there*
- *Transition to and combination of existing with upcoming technologies and processes.*

Q3

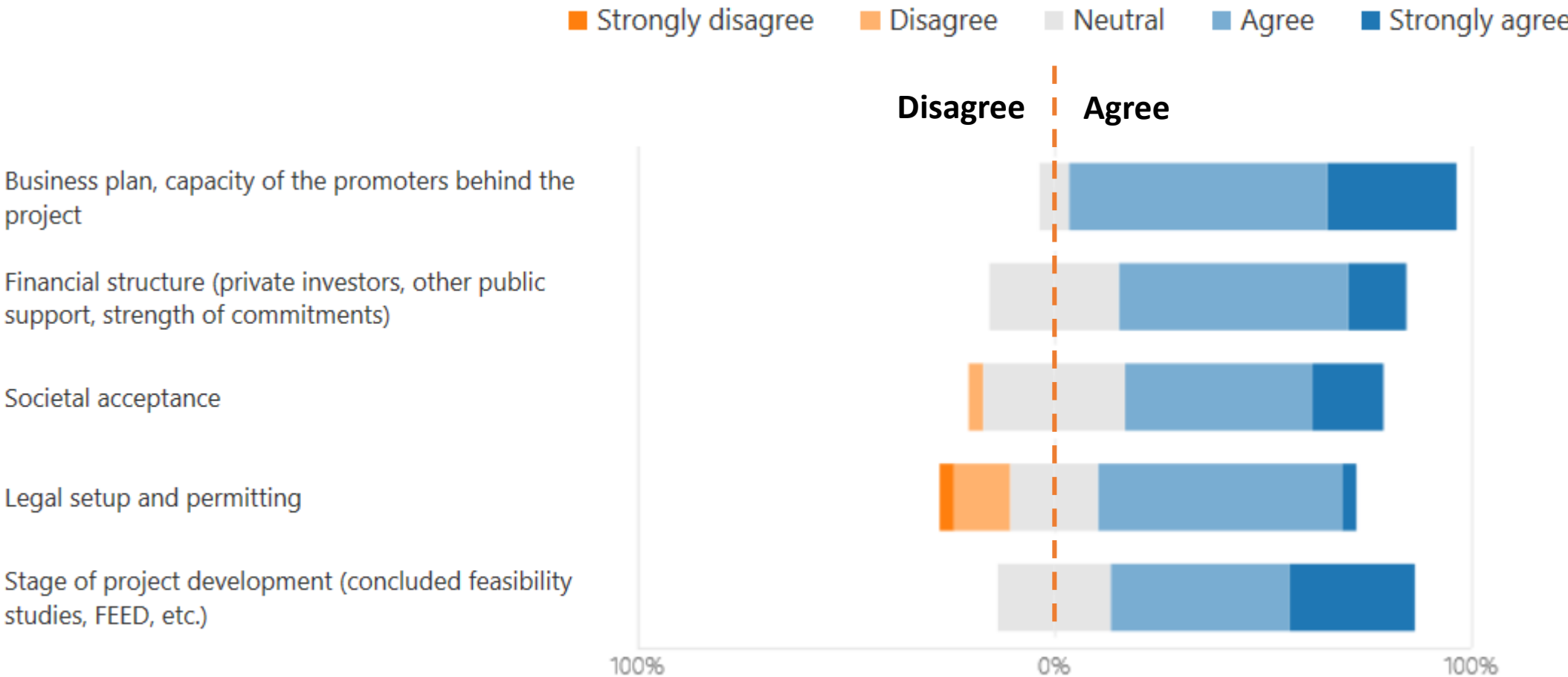
Which **role** do you see **for life-cycle assessment (LCA)** in calculating and verifying the GHG emission avoidance potential? What are the critical points that need to be considered when undertaking an LCA for projects in your sector?

- *LCA will play a decisive, central and key role!*
- *Considering LCA in the hydrogen sector, considering the different dimensions hydrogen is involved in the EU energy system, this should be carefully considered in the logic of 1. substitution, 2. assessment vs. alternative options.*
- *Correct and fair accounting of the GHG content of the electricity used in our water electrolysis process*
- *LCA should be based on existing EU legislation (e.g. the sustainability criteria for recycled carbon fuels and bioenergy in REDII).*
- *Guarantees of origin should be considered in the LCA analysis.*
- *Other critical points:*
  - *LCA from the well to wheel*
  - *consideration of disposal options*
  - *assessment of critical raw materials regarding availability, ecological and social aspects*

## Q1 How can the degree of innovation in comparison to the state-of-the art be best evaluated?

- *Gap between KPIs of the innovative technology vs the SOA without forgetting impact on economy, job market and externalities. There are EU and international KPIs for the different technologies impacting on Costs (CAPEX, OPEX, TCOs), Carbon Emissions, Pollution, Lifetime (again OPEX and so TCOs).*
- *Or ... by more-than-usual degrees of achievement, for example: substantial decrease in emissions (by >80%)*
- *Or ... by comparison to BREF/BAT documents + market/sector analysis*
- *Or ... first units deployed in a given geography to serve new markets, especially to decarbonise them, structuration of new energy supply chain.*
- *For H2 pipeline infrastructure, the degree of innovation is closely linked with the percentage of H2 that is carried by the network. 100%-H2 pipelines arguably have the highest degree of innovation.*
- *Innovation should not be seen only thorough the applied technology but also include 'innovation' such as:*
  - *Specific way a proven technology is used*
  - *Broad cross-company / cross-sector collaboration*

**Q1** Which criteria should be used to evaluate project maturity?



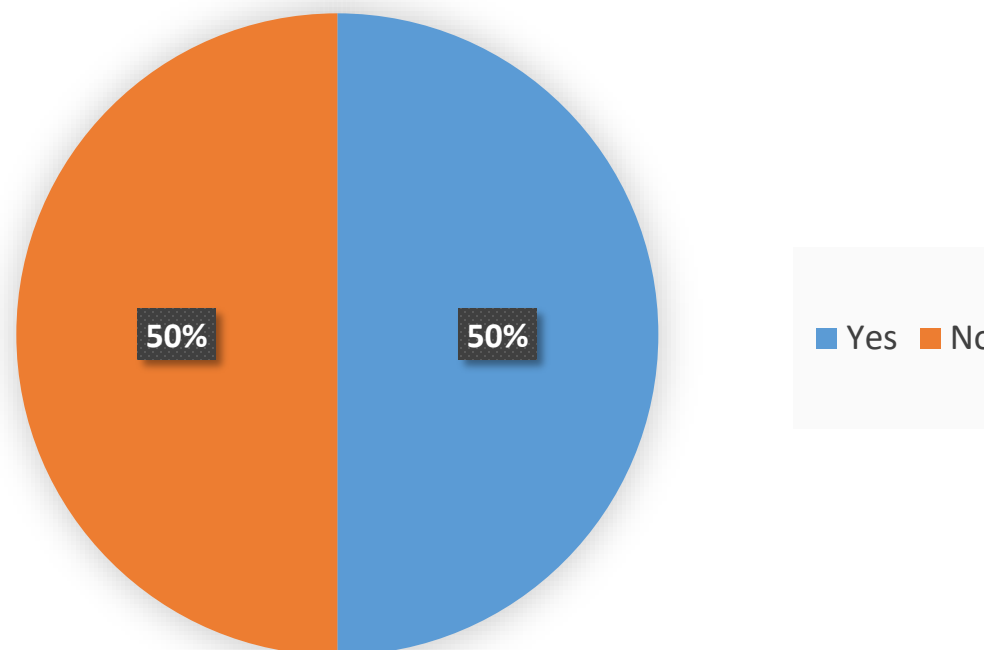
**Q2** What are the essential elements that need to be in place for a project to be able to reach financial close within 4 years?

- *Depends on type of project, the location, the scale & complexity and the associated risks.*
- *FEED*
- *TRL 7+*
- *Land (location) for the project secured (including suitable traffic connection, energy and media supply)*
- *Feasibility study completed*
- *Takeoff of all partners and agreements*
- *Investor support ( including strongly committed investors)*
- *Necessary regulatory framework in place*



**Q3** Should a completed feasibility study be made a condition for applying for the Innovation Fund?

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**Q4** What are the key risks and barriers to implementation, respectively pre-conditions for projects to go ahead?

- *Availability of renewable energy*
- *Underdeveloped market for green hydrogen, suitable demand must be created through the implementation of incentive mechanisms e.g. RED II*
- *Electricity costs are one of the main cost drivers and a reform of the current system of taxes, levies and allocation is necessary.*
- *Uncertainty of the market and business in the future. Hydrogen business is a long-term theme and it highly depends on the global, national energy policies and regulations*
- *Permits & authorizations procedures*
- *Non-harmonization local, regional and national regulations*
- *High costs and time needed to develop first-of-a-kind solutions*
- *REACH Regulation for LOHC applications*

## Q1

Should projects indicate their potential market and at what level (European/global), or should this be determined by market statistics? If the latter, what are the most reliable sources for your sector?

- *Mostly ‘YES’:*
  - *projects should know their markets and underpin their claims by market statistics*
  - *source of statistics would preferably be EUROSTAT but in some sectors this might not be detailed enough*
- *... but*
  - *Disagreement about whether to use European or global potential*
  - *Statistics alone might not be sufficient as there may be more than one dimension to evaluate the impact properly, for example:*
    - *the capacity potential to manufacture the solutions (cars, buses, trains, ships, ...)*
    - *the capacity of the sector to change the existing vehicles (depending of course on several further parameters as the specific unit cost, etc...)*

### Q1

Are there any specific issues that sector projects may face with the application of the definition of relevant cost from the Regulation?

- *Definition of relevant cost not clear/not specified!*
- *No clear criteria of how accurate the cost should be when applying for Innovation Fund and how much gap between the proposed cost and actual cost is acceptable by the funding body.*
- *Only a CAPEX based “delta-funding” compared to existing highly CO2 emitting processes seems from today’s perspective not to be feasible. In addition, specifically for investments in large scale equipment limitations for absolute funding per partner can become a road blocker.*
- *ETS Innovation fund should not reinvent the wheel but use existing cost calculation methods such as H2020.*
- *If the relevant cost defined from the Regulation does not reflect real market, the project won’t run.*
- *How to account for changes in technologies over 10 years?*

Q2

Are the conventional production costs easy to estimate with confidence? If not, can price of conventional product be used as a comparator ?

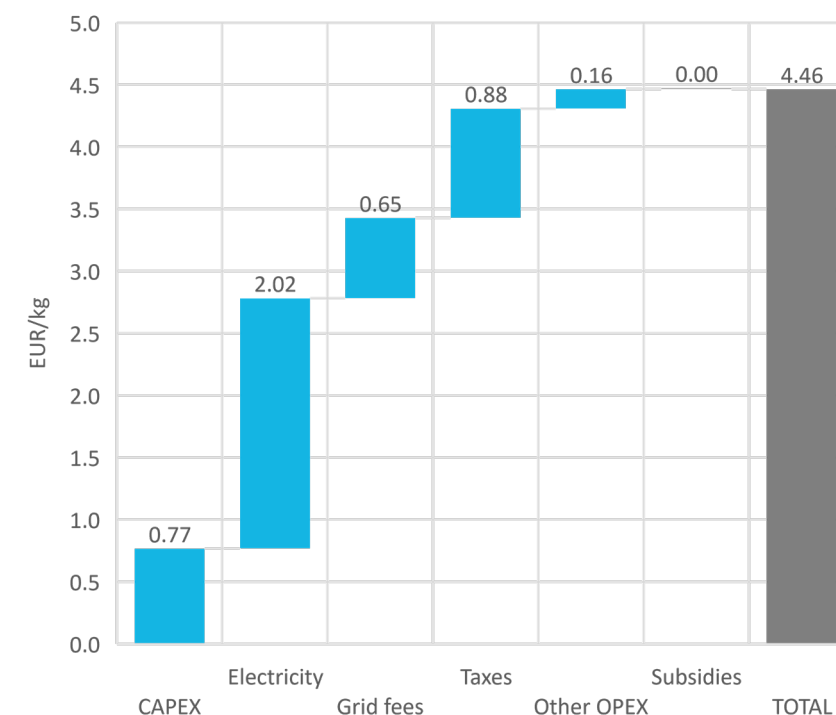
*For the most part: “YES” - For H<sub>2</sub>, conventional product can be defined as hydrogen produced by SMR, but:*

- *Most of that is captive production and is not reported – must be estimated*
- *Alternative is to use the price of conventional product (sales price of hydrogen produced by SMR) as a comparator – but this includes profit margin and taxes which can vary greatly from country to country*
- *Price of conventional product is today biased by the lack of pricing for emissions and externalities*
- *Production costs should be shared at EU level. Common / coherent references should be adopted to ensure a level playing field*

## Q3 What are the key variable factors determining the financial gap?

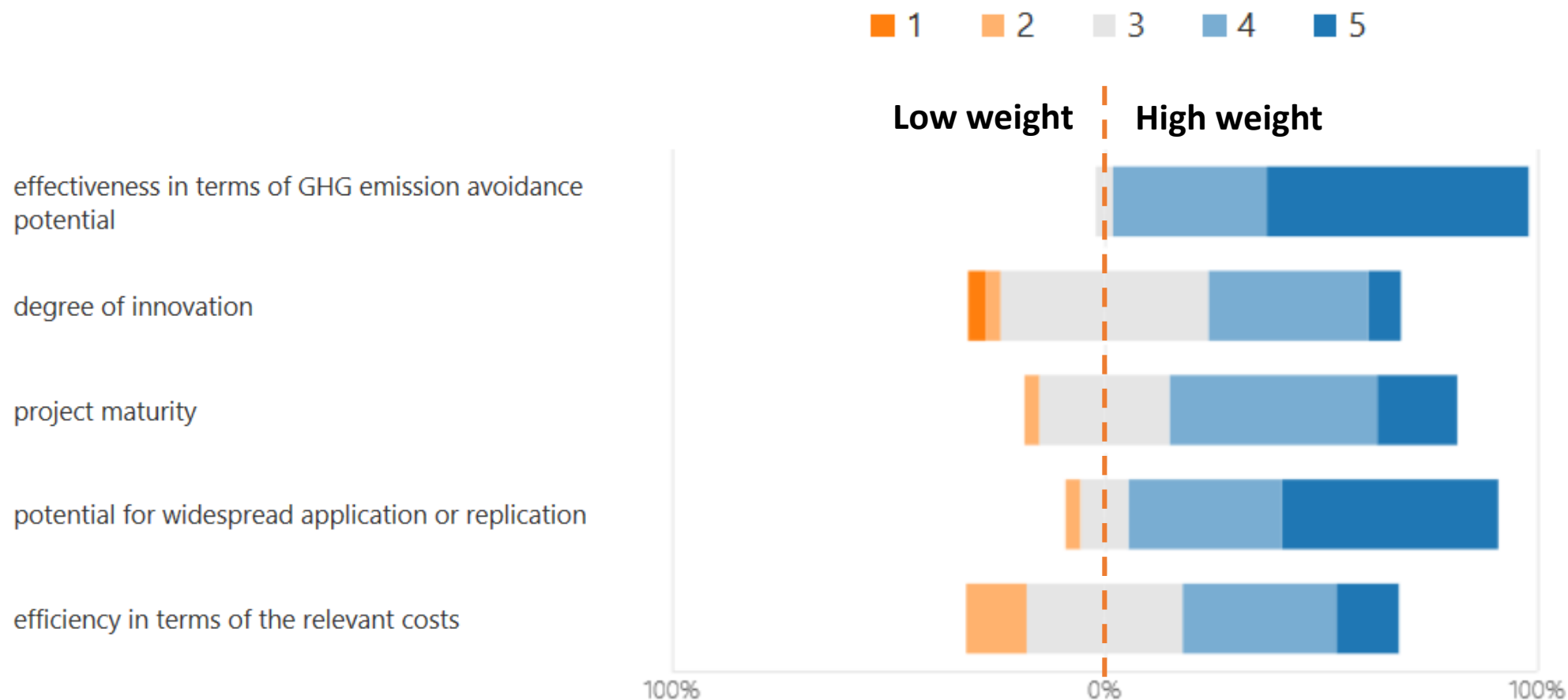
- *Gap between electricity price and natural gas price, having in mind that:*
  - *Electricity price depends on the regulation and incentive schemes (e.g. FIT).*
  - *Fossil fuels or conventional processes in the market today are effectively subsidized by the lack of external costings*
- *CAPEX... but keeping in mind that if comparing to SMR (see previous question), conventional production is mostly done in fully amortized installations*
- *CO2 price*
- *Hydrogen transportation costs*
- *Green hydrogen price premium*
- *Stability of policy and regulatory frameworks*

Grid electricity electrolytic hydrogen production costs breakdown



CAPEX: 800 EUR/kW, 4,000 operating hours per year, 64% system efficiency, Belgium wholesale electricity prices in 2018, taxes and networks costs based on Eurostat

## Q1 What weights, if any, should be applied to different selection criteria?



**Q1** What is the expected time to financial close and entry into operation for innovative projects in your sector?

- *Highly dependent on project,*
  - *permit period*
  - *contracts with off-takers and CAPEX suppliers*
  - *duration of tendering procedures*
  - *other*
- *Minimum: 6 to 10 months*
- *Maximum: 24 to 48 months*



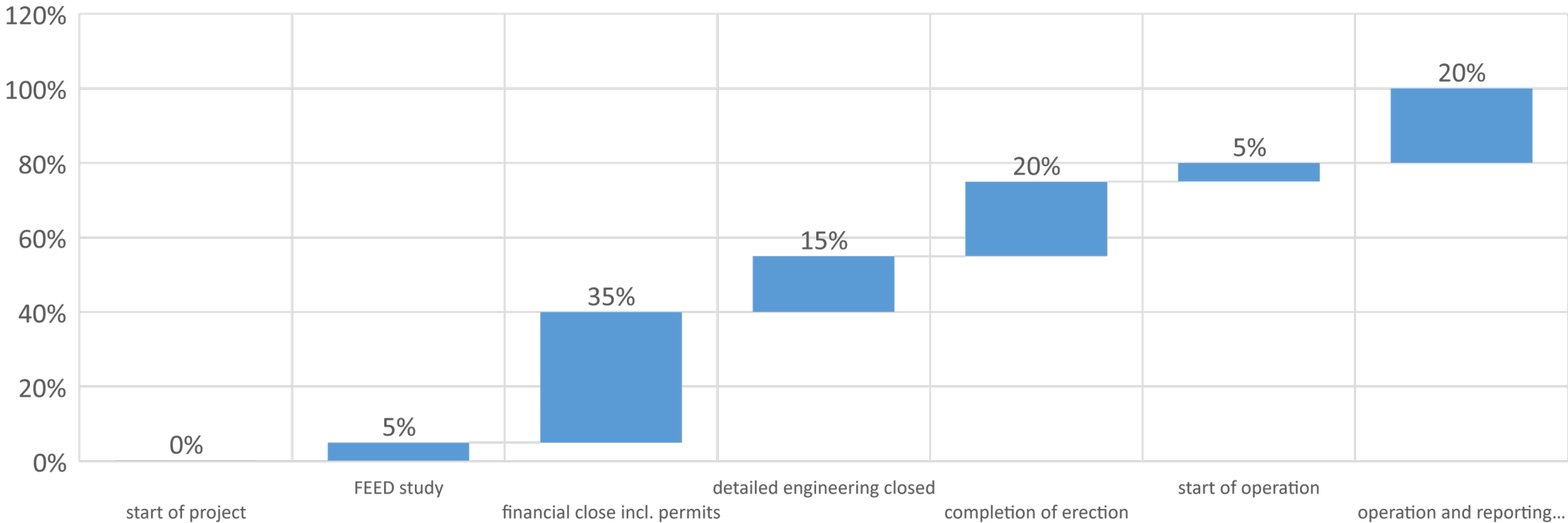
**Q2** What are the key milestones before financial close, e.g. feasibility or FEED study, permitting, State-Aid approval, etc. and before full entry into operation, e.g. how long are the construction, testing and commissioning periods?

One example:

- feasibility study M0
- detailed planning M2 to M8
- permitting outlook M8/9
- financial closure M12
- requisition of components M13 to M18
- construction M13 to M36, including up to 12 months delivery time for components
- commissioning M37
- test operation M37 to M42
- full operation from M43

**Q3** How should the grant be optimally disbursed over the project life cycle? To what milestones can/should disbursements be linked?

One example:



## Q1 Will PDA be useful for projects in the sector? If yes, what types of assistance?

*For the most part: “YES” (16 YES vs 2 NO), but:*

- *The exact meaning of "project development assistance (PDA)" is unclear.*
- *Is Design phase considered part of PDA? If so then support can be:*
  - *Financial to support FEED*
  - *Studies considering they can be quite elaborate for industrial projects*
- *Is Feasibility study part of PDA?*
  - *Financial support for covering part of the feasibility studies*
- *Is commercial development part of PDA:*
  - *Support in getting financing from EIB*
  - *Support in stakeholder management with regard to regional and national administrations & governments*
  - *Indicative support for long term funding to help develop commercial offering*

Q2

Should there be maximum amounts for different types of PDA and what would these levels be, taking into account that PDA support will count towards the 60% maximum support by the Innovation Fund?

No clear consensus:

- YES:
  - *around 25%*
  - *this is an ancillary support and should be very limited in scope*
  - *FEED should be supported in a major way*
  - *PDA funding should not be limited*
- NO:
  - *No PDA necessary.*

**Q3** 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?

- YES:
  - *The results publicly funded study should be made available to the public*
  - *This has to be decided project specific.*
  - *The studies done with PDA should be accessible to the European Commission but not for the rest of the actors.*
  - *If public money is spent, a certain information to the public - not every detail - but the main aspects should be made public*
  - *yes, at least the motivation of the outcome and the process of decision-making*
- NO (several answers without explanation)

## Q4 Should FEED be financed by PDA or only after successful application for an Innovation Fund award?

Mostly 'YES', but...

- Optional, projects that demonstrate maturity due to the existence of a FEED should be ranked higher than projects that require public money to perform a FEED

**Q5** Would you be interested in blending the ETS IF grant with a debt instrument - for example a loan from the EIB?

● Yes

17

● No

7



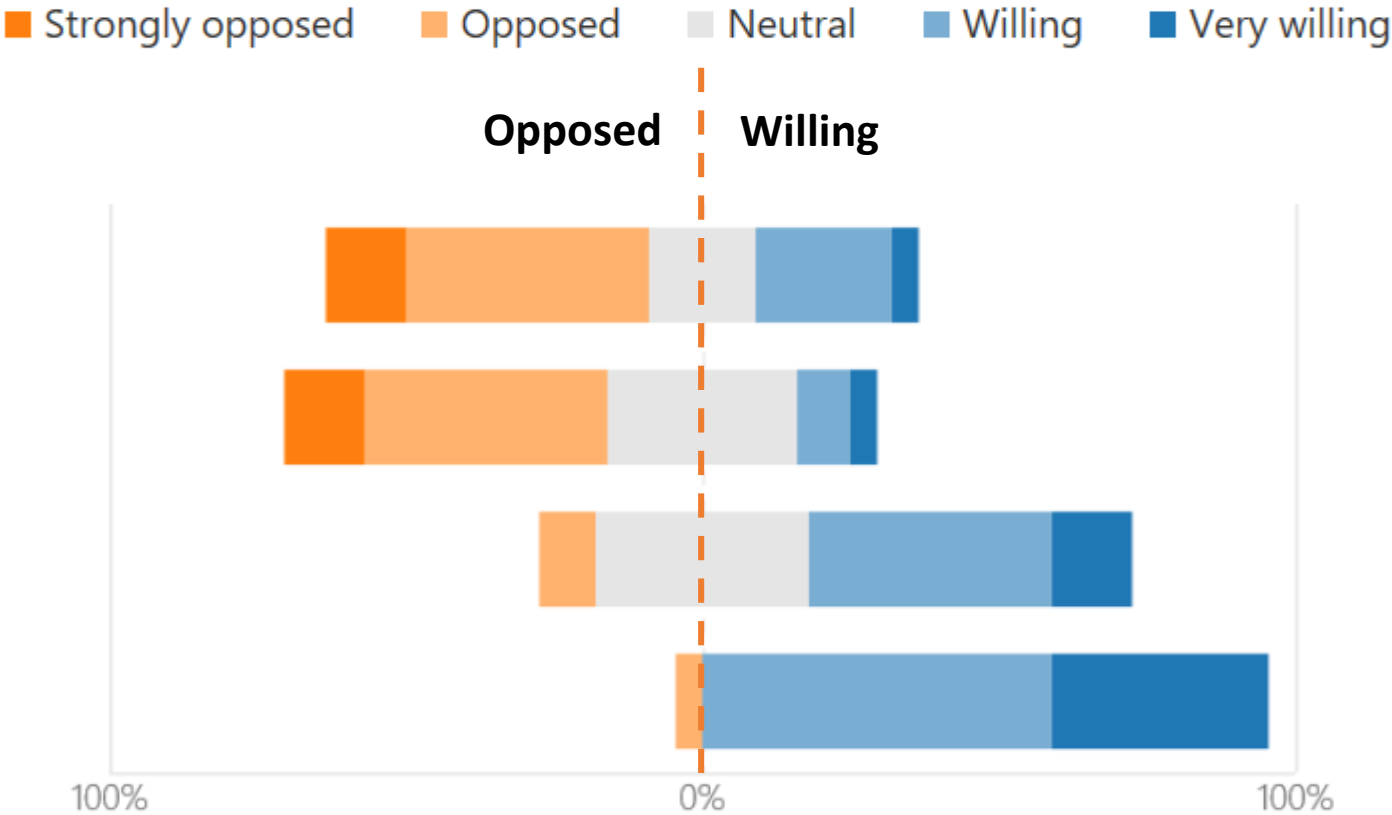
## Q1

What type of technical, economic, project management, regulatory and permitting information should be shared?

- Information which is common for hydrogen projects such as safety issue and regulatory barriers are information which can be shared and should be shared
- Impact to the climate change like GHG emission reduction rate
- permitting reports (they only share levels of emissions etc. and build benchmarks) and any limitations on operations
- quality standards for products
- Project management information
- Basic non-confidential information related to technical and economic issues would be shared (main suppliers, CAPEX, OPEX)
- Lessons learned



**Q2** How open would you be to share information with other projects about:



**Q3** What types of knowledge-sharing activities should the implementing body organize for projects benefiting from Innovation Fund (and other EU programmes) and for the general public?

- Public Workshops and Webinars
- Annual conference like FCHJU Review Day. Presenting at Mission Innovation will be very effective to let non-EU countries about our activities.
- Communication and public engagement such as visits to schools/high schools, science workshops for kids and general public, open days to visit the facilities/laboratories, etc.

## Q4 What should be the form of knowledge sharing tools that would be useful for the market?

- Dedicated ETS IF website (or sub website from the Commission)
- Webinar, movies, workshop at schools as a education
- Newsletters
- Public databases with registration requirement and traceability possibilities
- Online spreadsheet with key parameters: economic benchmark analysis
- Online step by step guide: info procedure on the process - key milestones with references
- Report: key technical findings
- An online platform for knowledge sharing would be useful not only for the hydrogen market, but also for the involvement of the general public. The h2tools platform from the DOE could be a good example on how to implement such a website: <https://h2tools.org>

# Thank you



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