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Preparation for European Hydrogen and Fuel Cell Demonstration Projects on Hydrogen for Transport

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Outline

1. Aim of the project and project partners
2. Project tasks (an quick overview)
3. Criteria for high potential locations
4. Early markets and the stakeholder perspective

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Aim of the project

The aim of the HyLights project is to faciliate industry and the European Commission by preparing for the next phase of large scale demonstration projects for hydrogen in transport.

Different tasks in the project:

- Development of a monitoring assessment framework.
- Drawing conclusions on policy support measures and legal issues.
- **Defining potential early markets**.
- Region assessment:
  - Commitment of different regions.
  - **Criteria for location assessment**.
- Establishing a ‘project family’: H2moves.eu

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Project partners

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Criteria for high potential locations

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Why criteria?

Where to start a demonstration project…

here?

or…

here?

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Why criteria?

And which to choose now…

here?

or…

here?

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Criteria for high potential locations

Starting points

- Criteria are needed to define objectively those locations that could contribute most to the development of the technology.
- Based on the criteria a tool will be developed that could be applied to define the most optimal location for a demonstration project.
- The tool will facilitate the comparison between different locations but could also be used as guideline (e.g. for project developers) to check whether a single location complies with the criteria.
- The outcome of this task will be just a tool and not the selection (procedure) of high potential locations itself.

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Which criteria are relevant?

- The location should foster the demonstration project.
- What is important for a demonstration project?

1. Technological learning (improving vehicle technology, infrastructure, legal and organisational aspects).
2. Creating first (subsidised) markets which could function as first nuclei for further expansion of the technology across Europe.
3. Creating visibility and exposure which creates momentum, is agenda setting, and could raise awareness and public perception.

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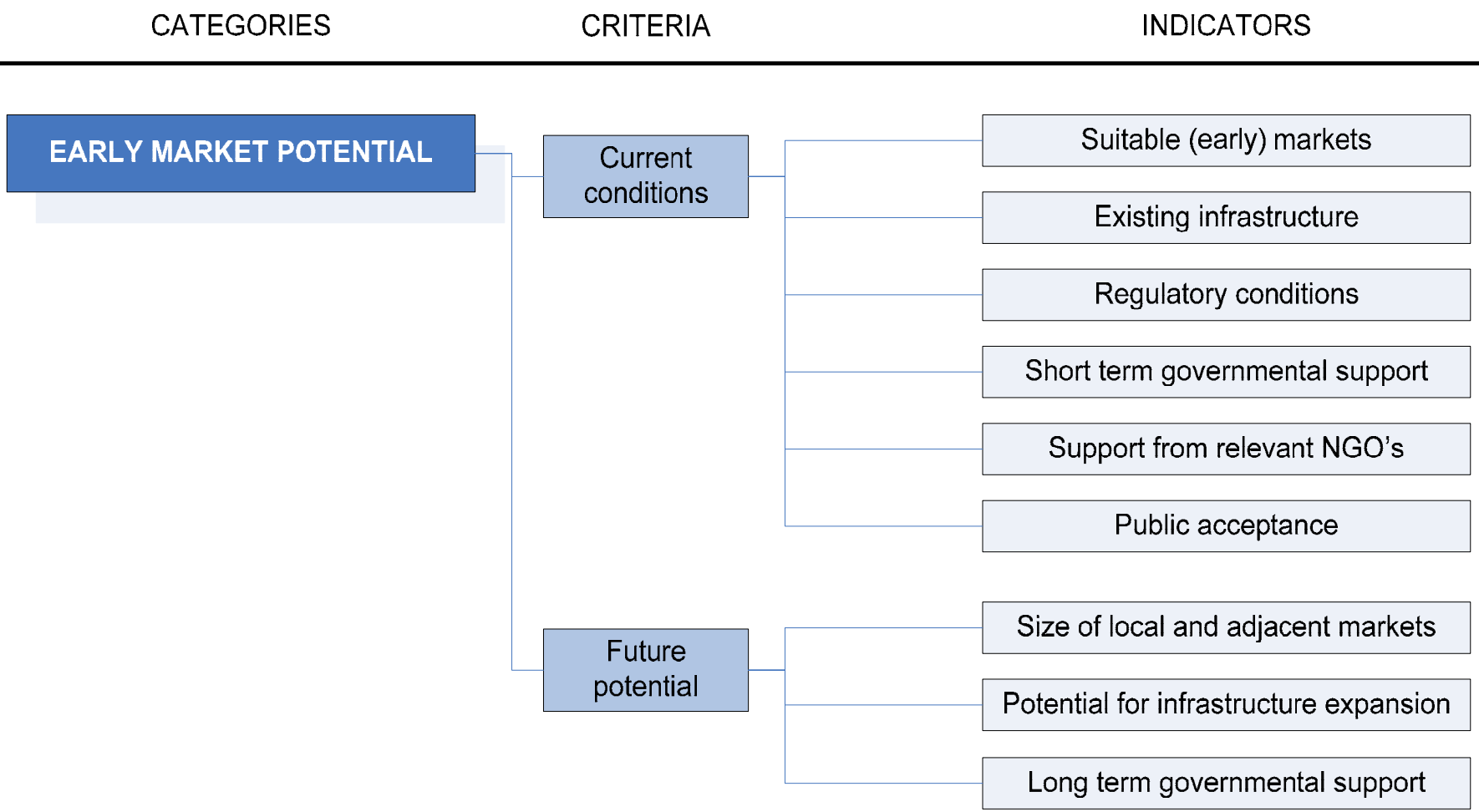
Criteria – Early market potential



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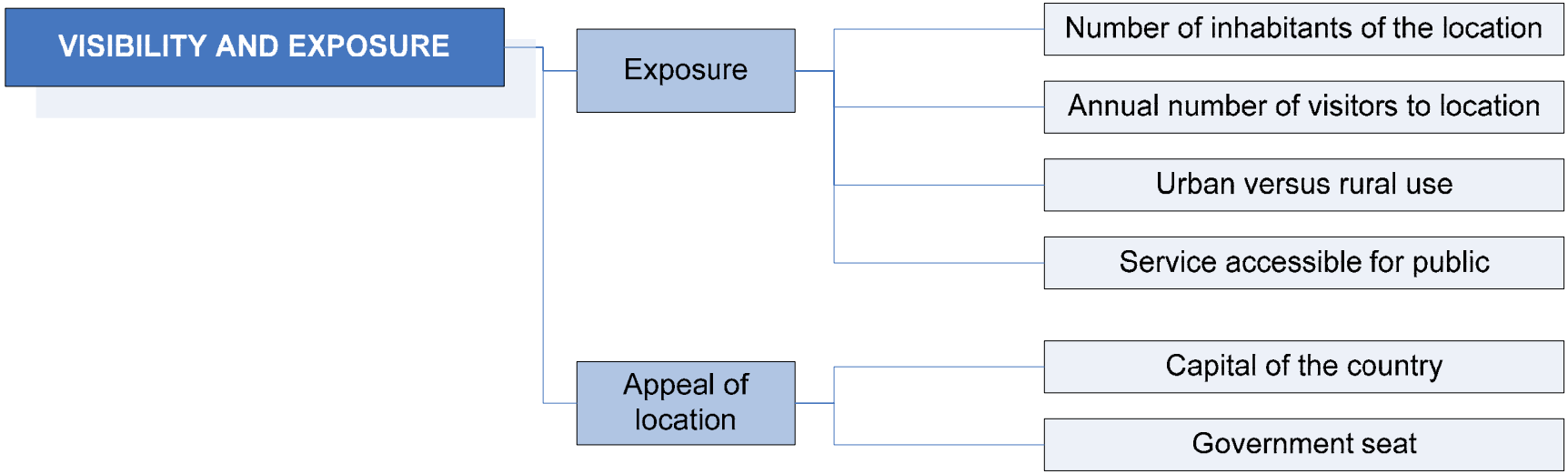
Criteria – Visibility and exposure



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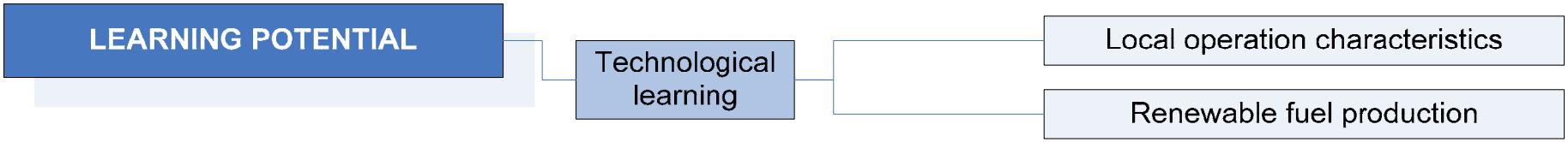
Criteria – Learning potential



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Example of tool

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2. VISIBILITY AND EXPOSURE

Criterion 2.1 - Exposure		
Indicator	*Description*	*Valuation*
Indicator 2.1.1 **Number of inhabitants of the location (city or region)**	The number of inhabitants gives an impression of how many people might be able to see or experience the new technology.	Number of inhabitants. > 1 million: ++ > 500.000, < 1 million: + < 500.000: 0
Indicator 2.1.2 **Annual number of visitors to location**	The number of visitors to a location (region/city) also gives an indication of the exposure level of the new technology.	Much visitors: ++ Average number of visitors: 0 [relevant number of visitors will be determined during validation]
Indicator 2.1.3 **Urban versus rural use**	The way hydrogen vehicles are used determines in some way the exposure. Application in urban areas has a larger exposure than application in rural areas.	Main application in urban areas: + Main application in rural areas: 0

Outcomes

Example of outcomes of READ*h*Y

Location	Early market potential	Visibility and exposure	Learning potential
A	Criteria 1: ++ Criteria 2: 0 Criteria 3: +	Criteria 1: ++ Criteria 2: 0	Criteria 1: ++
B	Criteria 1: ++ Criteria 2: 0 Criteria 3: +	Criteria 1: ++ Criteria 2: 0	Criteria 1: ++
C	Criteria 1: ++ Criteria 2: 0 Criteria 3: +	Criteria 1: ++ Criteria 2: 0	Criteria 1: ++

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Early markets and the stakeholder perspective

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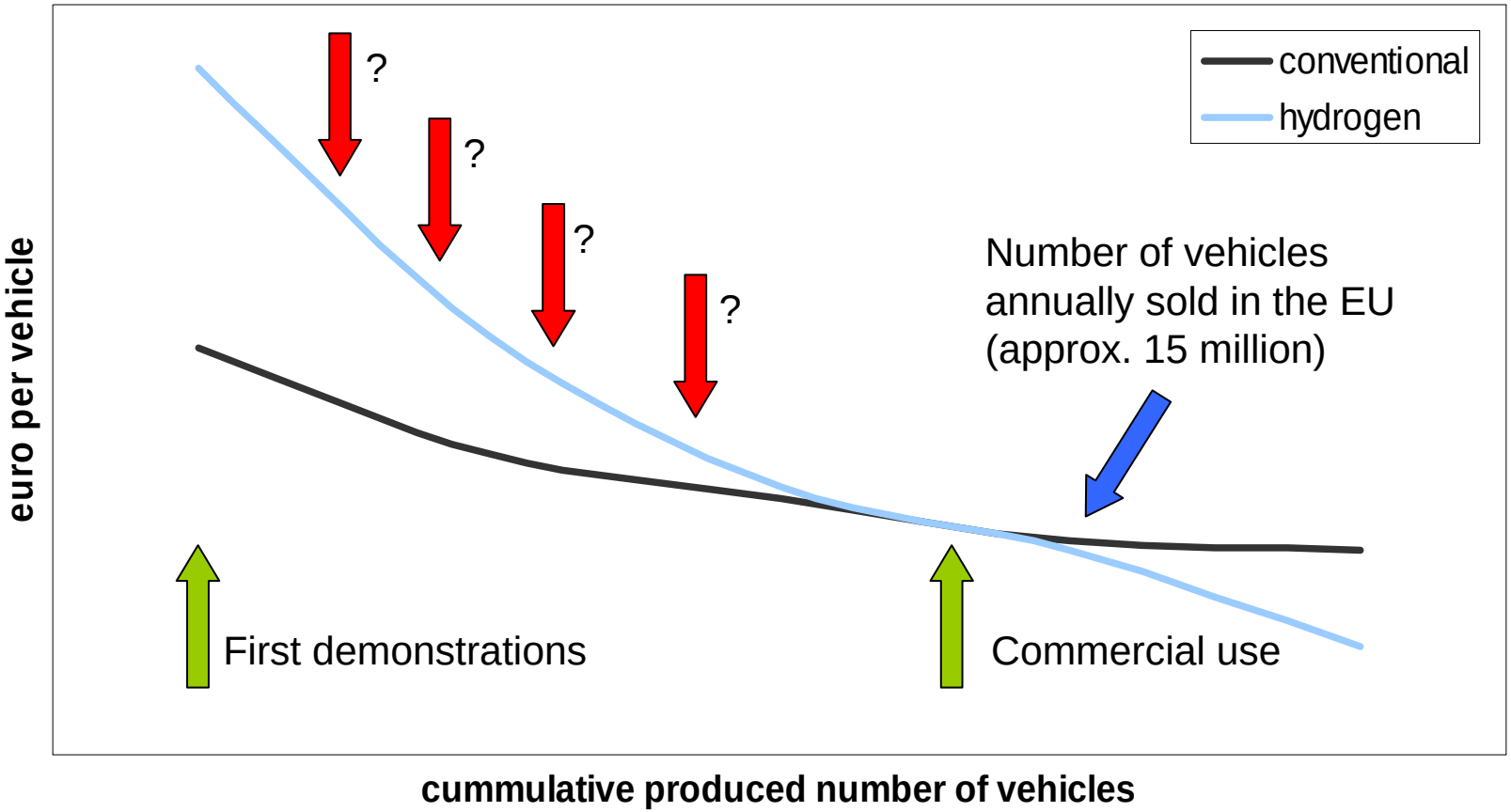
Early markets



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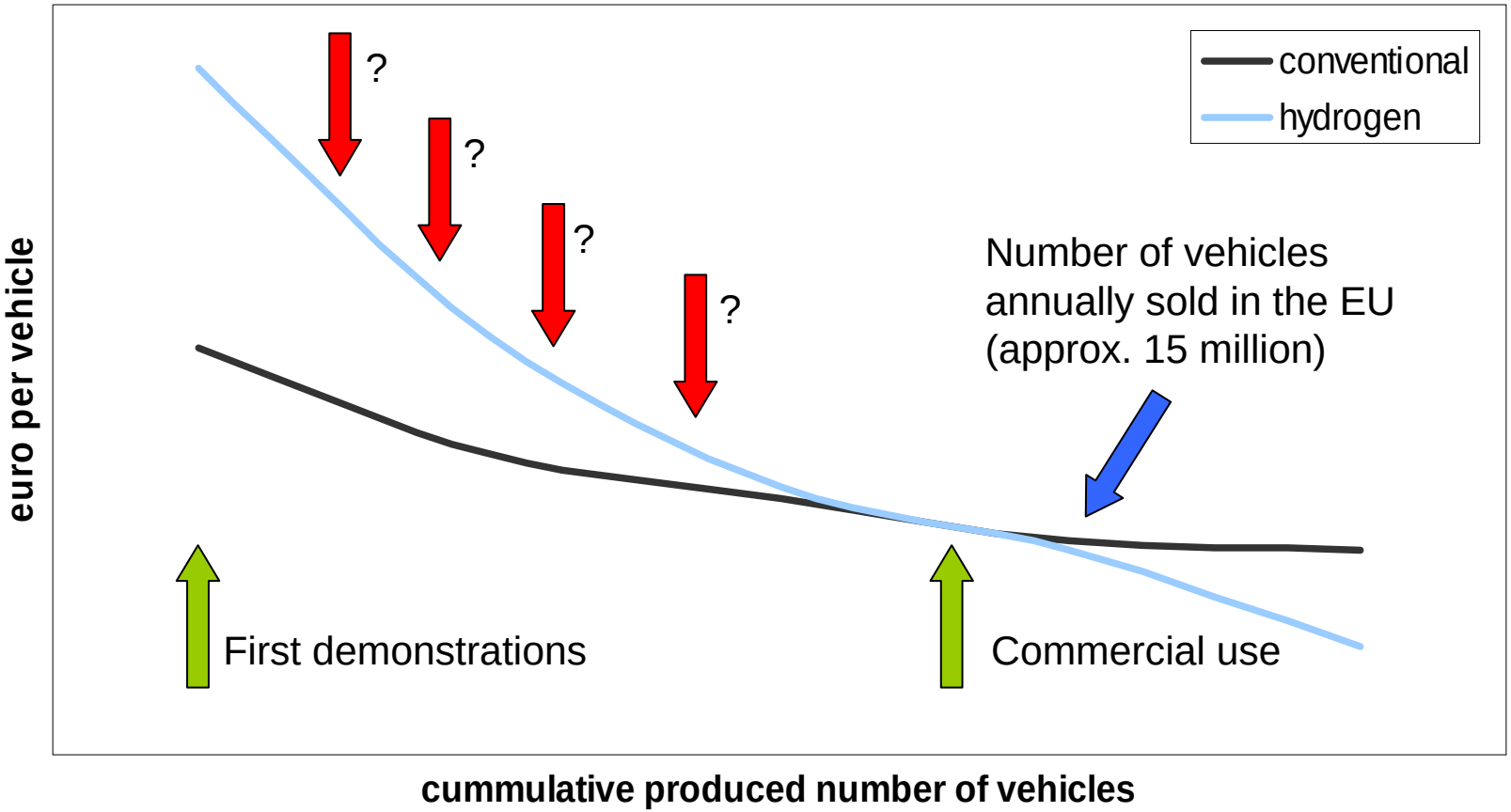
Early markets



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How to define early markets?

HyLights will perform an early market assessment.
This will be done by:

- Technological analysis
- Analysis of organisational issues

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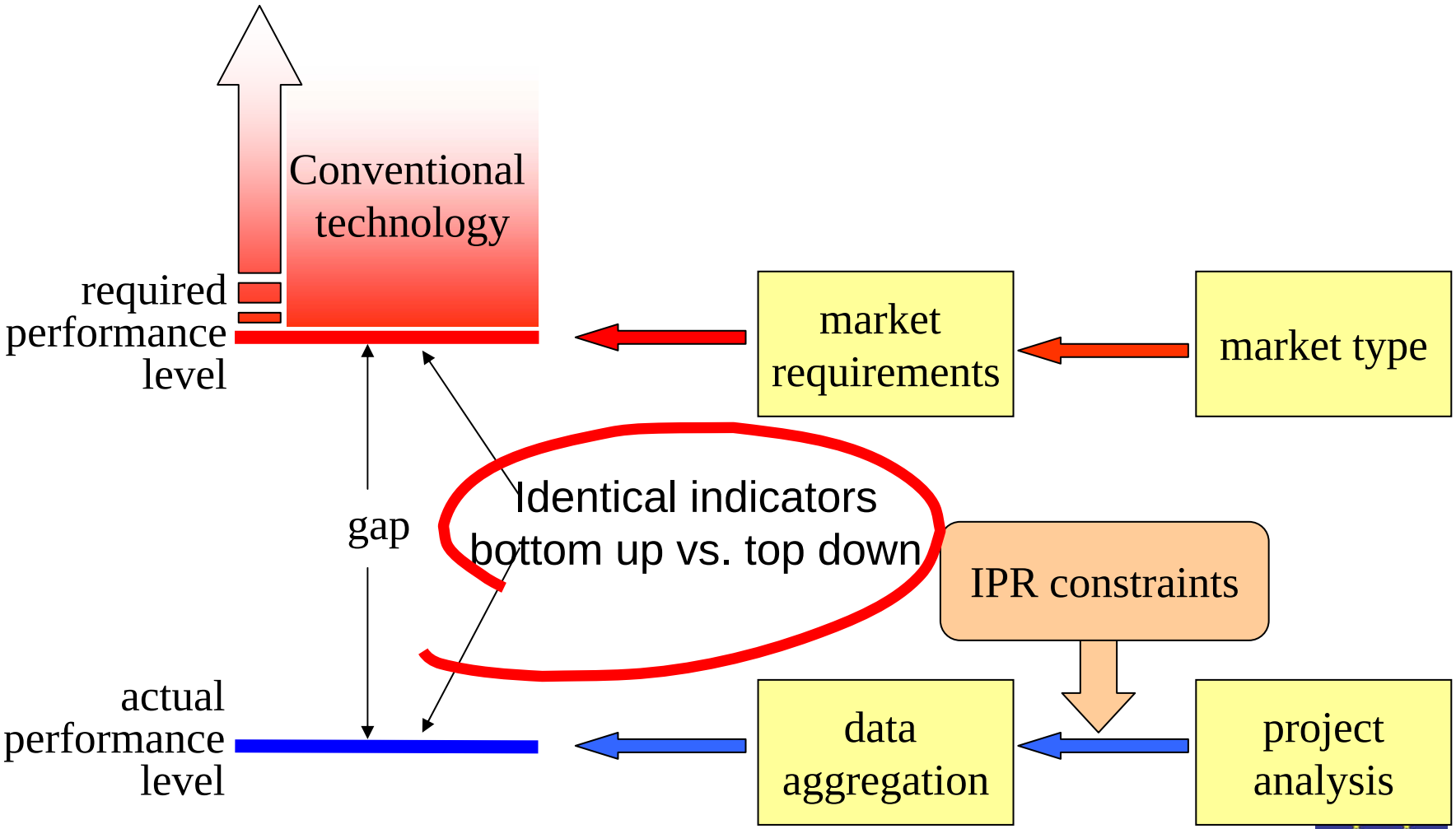
Technological analysis



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Identical indicators

- To describe the performance key performance indicators (KPI's) are developed.

- Four different lists of KPI's are drawn up describing the key issues of the technology from the perspective of the end-user.
  - Passenger cars
  - Vans
  - Buses
  - Hydrogen infrastructure

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Key performance indicators

Vehicles

Maximum Speed	km/h
Driving range	km/tank
Vehicle costs	euro
Efficiency	km / kg H2
Number of passengers	#
Load	kg + m3
Annual maintenance costs	euro
Refuelling rate	kg H2 / min
Accelleration (0-100 km/h)	s
Availability	%

Infrastructure

Annual maintenance costs	euro
Refuelling rate	kg H2 / min
H2 fuel cost	euro/kg
Availability	%
Consecutive refuellings	#

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Defining the gap

In order to define the gap, we will describe
(all in terms of the KPI's):

- The current state of technology
  - Assessment of past and ongoing demonstration projects.

- The minimal required performance level by the potential end-users.
  - Conducting interviews with potential eary market users of the technology.

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First interviews

- Interviews conducted so far with:
  - Netherlands: ministry of environment (2 divisions), ministry of transport, province of Noord-Holland, province of Friesland, city of Amsterdam, city of Arnhem, city of Nijmegen (2 divisions), city of Leeuwarden, GVB Amsterdam (public bus service Amsterdam), Connexxion (public transport), Greenwheels (car sharing company), TNT, Green Planet (multi-fuel filling station).
  - Germany: Berlin Verkerhsbetriebe (bus company of Berlin), DHL, federal procurement office, NRW State Chancellery, NRW ministry of the interior, NRW ministry of finance, Rheinbahn Dusseldorf.
  - UK: DHL UK, City of London, MET Police, BP UK, Royal Mail, DWP, Arriva, GCDA.

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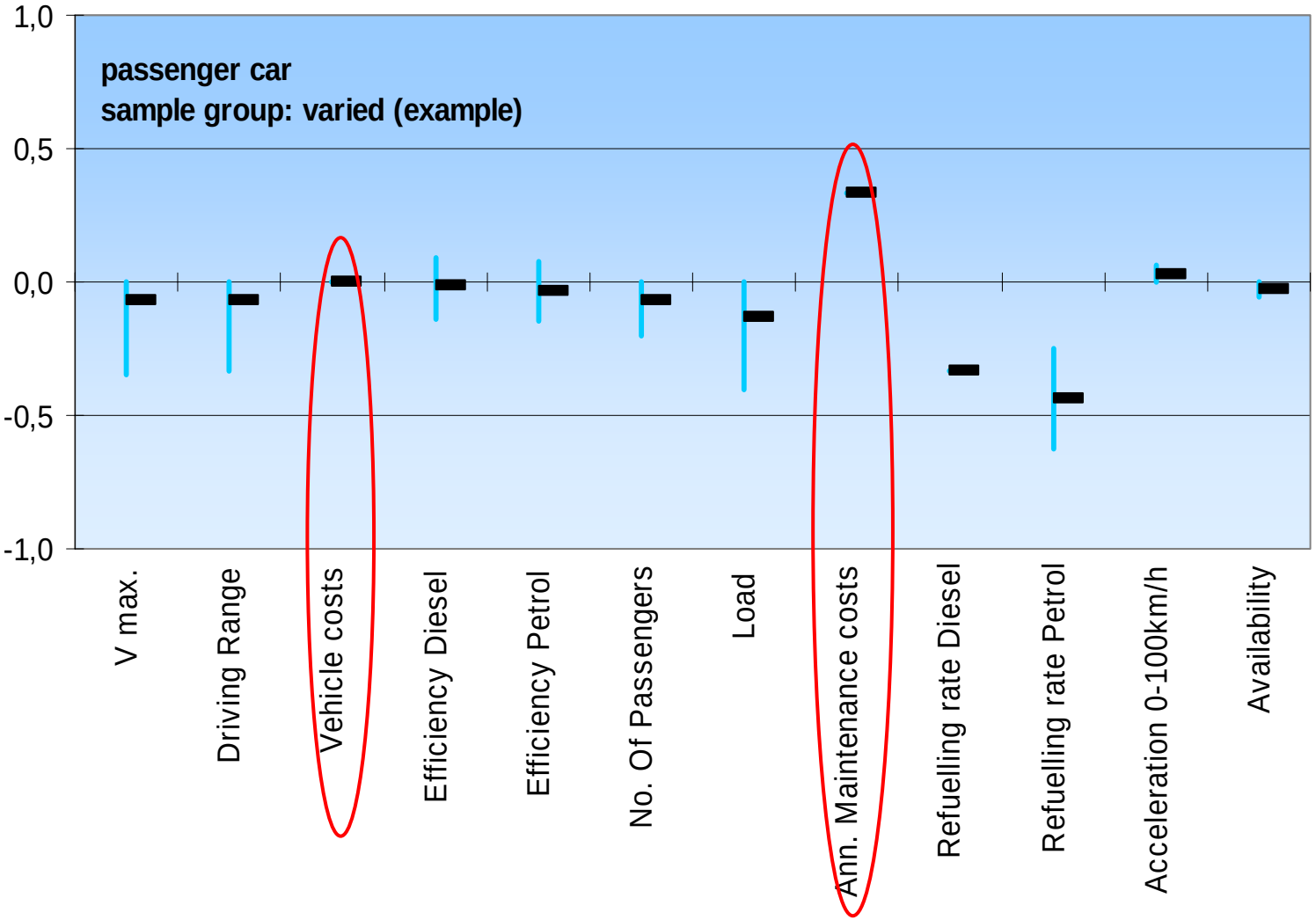
Impression of outcomes



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Organisational issues

- Regardless the technology, one could question whether organisations are willing and easily able to buy the new technologies?

- This is analysed by conducting in-depth interviews with governments, public transport authorities and commercial organisations.

- This work is still in progress, though some first impressions of the results….

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Some conclusions so far

state government Germany - NRW

1. *Opportunities:* Potential early markets are abundant.
2. *Drivers:* Hydrogen technologies should be able to contribute efficiently to national policy goals (emission reduction, noise reduction, improvement of security of energy supply) and show technological forerunner position.
3. *Barriers:* Availability and practicability of hydrogen vehicles combined with the uncertainty of the potential future role of hydrogen technologies are seen as big hurdles. There should be a reasonable price difference between hydrogen and conventional vehicles.
4. *Resources:* No specific funds available.
5. *Initiatives:* NRW government has testing natural gas drive technology with unsatisfying results. Hydrogen technology could not yet been deployed because of lack of products.
6. *Responsibilities:* Concerning the development of technologies that could contribute to a sustainable transportation sector a coherent vision and strategy of the European Commission is necessary. Further on, it needs to be adapted by the national government and brought further down to state level.
7. *Alternatives to attain goals:* Theoretically hydrogen technologies would contribute to policy goals of the German government such as the reduction of local emissions and security of supply. Hydrogen could also play a role in the forthcoming label introduction for low-emission cars and the subsequent restricted area access. Exemptions for hydrogen vehicles would be possible.
8. *Renewable H2:* Hydrogen technologies are mainly seen as a potential solution for curbing greenhouse gas emissions in the transportation sector, therefore hydrogen should be a climate neutral fuel in the end. Hydrogen produced from coal (e.g.) combined with carbon capture and storage, is seen as problematic.

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Some conclusions so far

national government Germany – Federal Procurement Office

1. *Opportunities:* The national procurement office is in charge for the procurement of most federal vehicles (e.g. Federal police), therefore potential early markets are abundant.
2. *Drivers:* Hydrogen technologies could contribute efficiently to national policy goals (emission reduction, noise reduction, improvement of security of energy supply) and show technological forerunner position. Nevertheless, procurement is based on current emission laws and the economic principles.
3. *Barriers:* The procurement office is bound to availability, practicality and emission laws and cannot start to introduce hydrogen technology unless it is comparable in terms of performance and cost with conventional vehicles. So far, the highest available emission norm is sufficient to fulfil the requirements.
4. *Resources:* Budgets for procurement of public transport are determined by the national government. There is no special budget for environmental friendly vehicles (to cover the additional costs), but needs to be allocated by the national government.
5. *Initiatives:* Experience with natural gas vehicles that suffered from poor user acceptance due to performance and infrastructure problems.
6. *Responsibilities:* The national government is hold responsible for funding and explicit choices.
7. *Alternatives to attain goals:* Alternatives for hydrogen are other available technologies such as natural gas and biofuel, but none of them could convincingly be deployed yet.
8. *Renewable H2:* No information..

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Some conclusions so far

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Thank you!

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