

An isometric illustration of a hydrogen infrastructure network. It features a central blue and white building with 'H2' on its side, connected by a network of blue pipes to various industrial and residential buildings. Wind turbines are scattered across the landscape, and solar panels are arranged in a grid. A large ship is docked at a pier, and a train is visible at the bottom. The background is a deep blue gradient.

Clean Hydrogen
Partnership

Securing offtake – Approach and key elements

Hydrogen Valley Facility

2025

Roland
Berger

The H2V Facility delivers dedicated support to hydrogen practitioners via PDA services, the H2V Knowledge Centre and the H2V Platform

The Hydrogen Valleys Facility

h2v.eu

Dedicated support via the **Hydrogen Valleys Facility** by



1



Project Development Assistance

Provision of dedicated Project Development Assistance (PDA) for Hydrogen Valleys projects towards Final Investment Decision

2



H2V Knowledge Centre

Sharing & dissemination of knowledge and provision of capacity building for the broader hydrogen community

3

H2V Platform



Maintenance & extension of the Hydrogen Valley Platform to enhance its positioning as the global one-stop-shop for hydrogen flagship projects

Delivery
partners

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worley

Inycom

Aspirational target

2030

50

Hydrogen Valleys
operational/under
construction

within the EU



This document is part of the H2V Knowledge Centre that offers hydrogen practitioners knowledge material in written and interactive formats

The H2V Knowledge Centre



Structure and scope of the H2V Knowledge Centre

Self-service Knowledge Material

Commercial



Technical



Regulatory



Valley governance



- Knowledge material specifically developed as part of the H2V Facility project
- Links and information to other third-party resources and material

Interactive Formats

- Webinars with content experts (Roland Berger, Worley and external speakers)
- Project Development Assistance experience sessions with Hydrogen Valley practitioners

Target audience



Hydrogen Valleys



Project developers



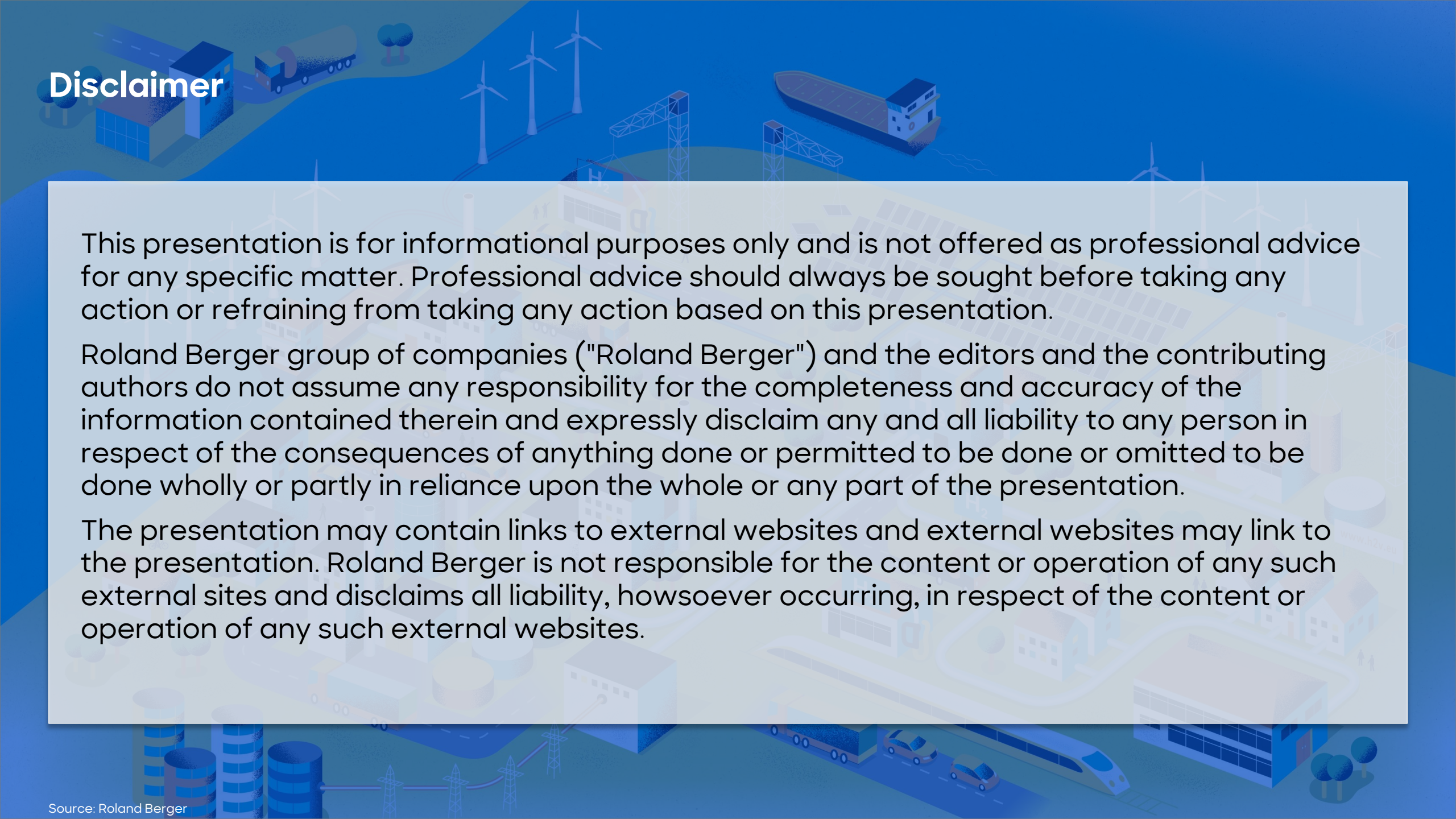
National, regional and local authorities



Investors



Other hydrogen practitioners



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This document aims to support Hydrogen Valley developers in developing an offtake strategy that ultimately secures offtake

Key objectives and content of this document

Key objectives



Key content

- A Offtake planning and key pillars of offtake strategy**
Description of offtake activities along project maturation process and key elements of an offtake strategy
- B “What to play” – Hydrogen market fundamentals**
Analysis of demand and willingness to pay, and market developments
- C “Where to play” – Offtake pool and selection strategy**
Development of an offtake hunting scheme and a shortlist
- D “How to play” – Key principles of offtake agreements**
Overview of key commercial principles and bankability requirements
- E “How to win” – Operational strategy and execution plan**
Elaboration of offtake approaches and activities and team development

Contents

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A thorough offtake strategy is one of the key fundamentals to successfully bring a Hydrogen Valley project towards Final Investment Decision

Relevance of securing offtake for Hydrogen Valley developers

Dependencies and limited standards make offtake development challenging for **Hydrogen Valleys** ... 

- 1 Developing sufficient offtake:** Identifying enough committed offtakers and jointly developing commercially viable solutions is essential for FID
- 2 Coordination along the value chain:** Dependency between suppliers and offtakers requires close alignment, increasing required time
- 3 Complex negotiations:** Limited standards and complexity make offtake agreement negotiations time consuming, potentially delaying FID

... **a thorough offtake strategy** enables securing of offtake agreements in due time

-  **Reliable offtake partnerships** through well organized roadmap
-  **Increased clarity** on commercial process and requirements
-  **FID readiness** through well structured and wholistic approach to develop offtake agreements

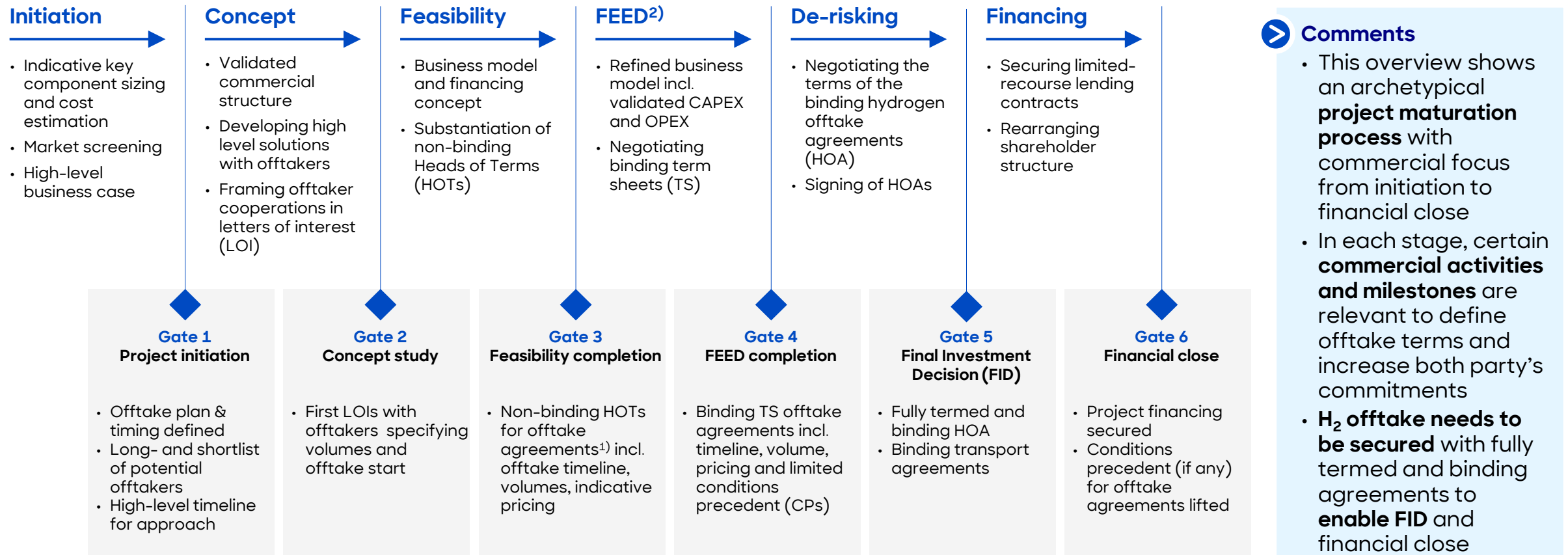
An isometric illustration of a clean hydrogen ecosystem. It features a central hydrogen production facility with a large solar panel array and a building labeled 'H2'. A network of blue pipes distributes hydrogen to various sectors: industrial buildings, a residential neighborhood with houses, a parking lot with cars, and a train. Wind turbines are scattered across the landscape, and a large cargo ship is docked at a port. A sign in the bottom right corner displays the website 'www.h2v.eu'.

A. Offtake planning and key pillars of offtake strategy

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Along the project timeline, H₂ offtake should be planned already in the project initiation stage, further developed, and secured before Final Investment Decision

Archetypical project timeline until financial close with focus on offtake milestones



Key archetypical milestones regarding offtake

1) Potentially as attachment to existing LOI to reduce number of documents; 2) Front-end engineering and design study

An offtake strategy outlines the key elements on the "what to play", "where to play", "how to play" and "how to win"

Objectives and purpose of an offtake strategy

Key element	Activities	Outcome
1 Market ("what to play")	• Analysis and estimation of the expected market situation, incl. hydrogen volumes and willingness to pay regarding hydrogen	▶ Volumes and willingness to pay of relevant end segments for H ₂ /NH ₃ offtake
2 Offtake pool ("where to play")	• Identification of key end segments and offtakers to be prioritized by business development activities	▶ "Hunting Scheme" combining key markets and regions to focus and prioritized offtaker shortlist
3 Key guiding principles ("how to play")	• Derivation of key general and contractual guiding principles for offtake negotiations • Definition of key negotiation levers for offtake negotiations	▶ Key general and contractual principles of offtake agreement structure and negotiation levers for negotiations with offtakers
4 Target operating model ("how to win")	• Outline of offtaker engagement for private deals, tenders and hybrid options • Definition of a governance model and execution timeline	▶ Target operating model for offtaker engagement and execution plan
▶ Establishment of a systematic strategy to secure binding offtake agreements that maximizes the commercial value for shareholders, mitigates market risks and ultimately enables project financing		

The key elements of an offtake strategy consist of market fundamentals, offtake selection, agreements and a target operational model

Key elements of an offtake strategy

1 "What to play"	2 "Where to play"	3 "How to play"	4 "How to win"	
H₂ & derivatives market fundament. H₂ & derivatives addressable market Willingness to Pay for hydrogen Hydrogen volumes	Offtake pool and selection strategy Offtake focus end uses and sectors Offtaker shortlisting based on selection and prioritization criteria Shortlisted offtakers (Top-10 or Top-20 list)	Key principles of offtake agreements General principles on target portfolio, product & volume, timing and delivery Contractual principles on financing, tenor and other Other potential negotiation levers	Operational strategy / TOM Business development approach (private sector, public sector, hybrid approaches) Sales funnel approach (offtaker identification, converting LOIs into binding offtake and bankability checks)	Execution plan and roadmap Governance model & team set-up Meetings and monitoring Timeline

An isometric illustration of a hydrogen economy. It features a network of blue pipes connecting various industrial and residential buildings. Wind turbines are scattered across the landscape, and solar panels are installed on a flat roof. A large ship is docked at a pier, and a truck is shown transporting a container labeled 'H2'. A sign with the website 'www.h2v.eu' is visible near a residential area. The overall color scheme is dominated by blue and green tones.

B. "What to play" – H2 & derivatives market fundamentals

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In the "What to play", Hydrogen Valley project developers should assess the expected demand volume and willingness to pay for hydrogen at a given time

The "what to play" – Market demand and willingness to pay for H₂

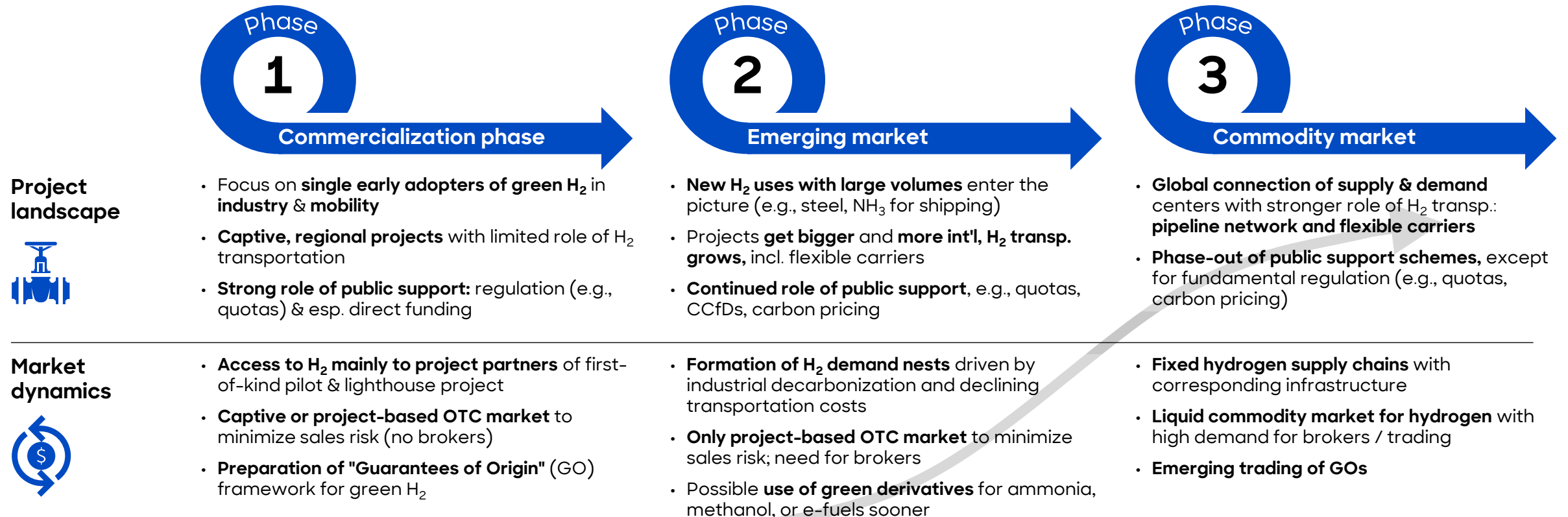
	H ₂ demand volume	H ₂ willingness to pay
Description	Hydrogen (or derivatives) volume that is requested by market participants (i.e., potential offtakers) in a given region at a given time	Maximum price that hydrogen offtakers in a given sector at a given time are willing to pay for hydrogen (or its derivatives)
Approach	• Estimation of the regional hydrogen demand in a given year or timeframe incl. splits per – Product types (H₂ and derivatives) – End use segments • Assessment of key underlying demand drivers – Regulated/"compliance" demand – Voluntary demand	• Estimation of fuel costs for conventional fuel and any additional costs/payments offtakers need to pay • Assessment of key underlying drivers for the willingness to pay – CO₂ costs – Penalty payments – Subsidies
Potential sources	External market reports Policy / regulatory targets Official company announcements Discussions with offtakers Expert insights	

 **Comments**

- The assessment of the demand volume and the willingness to pay is important as it determines which quantity to which prices can be sold/brought to the market at a given point in time
- Hence, the estimation of the demand volume and the willingness to pay serves as a basis for offtake price and volume discussions

It is expected that within 10+ years, clean H₂ will become a globally traded commodity, with the upstream project development industry already maturing

H₂ market development phases



Development of low-/zero-carbon H₂ demand over time [indicative]

Hydrogen demand is driven by three key drivers: political and regulatory targets, voluntary commitments and expected cost increases

Key drivers of hydrogen demand

Political / Regulatory targets



- In multiple countries, regulators have defined **green H₂ consumption targets for certain sectors**, e.g., 42% green H₂ consumption in industry or 1.2% e-kerosene quota in aviation in 2030 in Europe as per the RED II/III regulations and per the ReFuelAviation Regulation
- Thus, **esp. in sectors with short-term regulatory targets, higher demand** than in unregulated sectors can be expected (also driven by announced penalty payments that increase the willingness-to-pay for green H₂)

Voluntary commitments



- Beyond regulatory obligations, **companies increasingly commit to voluntary targets** to decarbonize operations, production, etc.
- For instance, in the **aviation sector, airlines have announced SAF targets / commitments** to decarbonize their flights, driving green H₂ demand

Cost decrease of H₂-related technologies

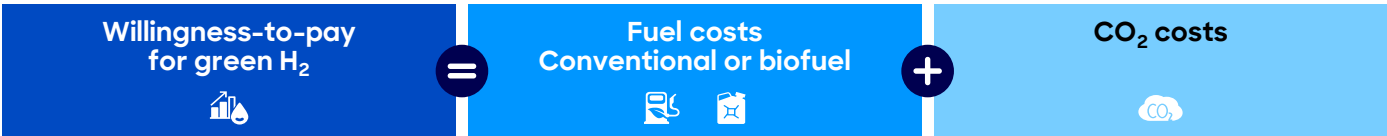


- Going forward, the **cost of H₂-related technologies** (e.g., electrolyzers) are **expected to decrease towards the end of this decade**, e.g., due to process automation, scaling effects, etc.
- In combination with regulatory pressure and voluntary commitments, this **increases competitiveness of clean H₂ solutions** in multiple sectors (e.g., steel, long-distance transport) and thus **drives demand**

The willingness to pay for green hydrogen can be estimated by the cost of alternative fuel, CO₂ cost and potential penalty and subsidy payments

Methodology for the estimation of the Willingness to pay for green hydrogen

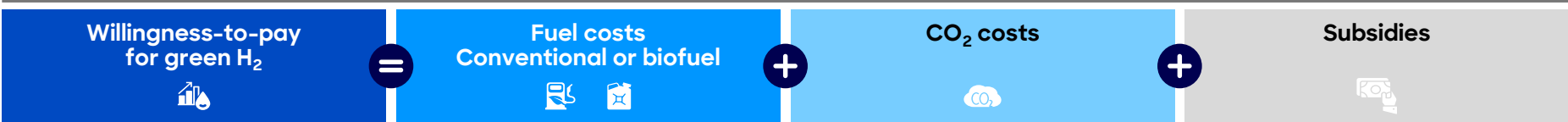
1 Driven by decarbonization (carbon pricing) regulation



2 Driven by H₂-specific & decarbonization (carbon pricing) regulation



3 Driven by H₂-specific subsidies & decarbonization (carbon pricing) regulation



- WtP for green H₂ is at least the **costs avoided** by the usage of green/clean H₂ **compared to alternatives**
- Green H₂ **substitutes conventional- or bio-fuel**
- Substitute **fuel type depends on the sector, price on year and region**
- Use of **green H₂ avoids CO₂ emissions** and thus related costs
- **CO₂ costs depend on the pricing scheme in place** and the CO₂ intensity of substituted fuel/prod. route
- **H₂-specific regulation requires / incentivizes demand sectors to use green H₂**
- **Penalty payments** are incurred if quota / target is not met
- **Subsidies** are granted for the use of green H₂ and corresponding technologies

> Comments

- The willingness to pay (WtP) measures the maximum price the demand side would pay for green/clean H₂ before switching to alternatives, i.e., conventional fuel
- The maximum WtP for green H₂ considers
 - Fuel costs (e.g., natural gas, diesel or biofuels)
 - Costs for CO₂ emissions (through carbon pricing schemes)
 - Penalty payments and/or subsidies due to specific H₂ regulations in place

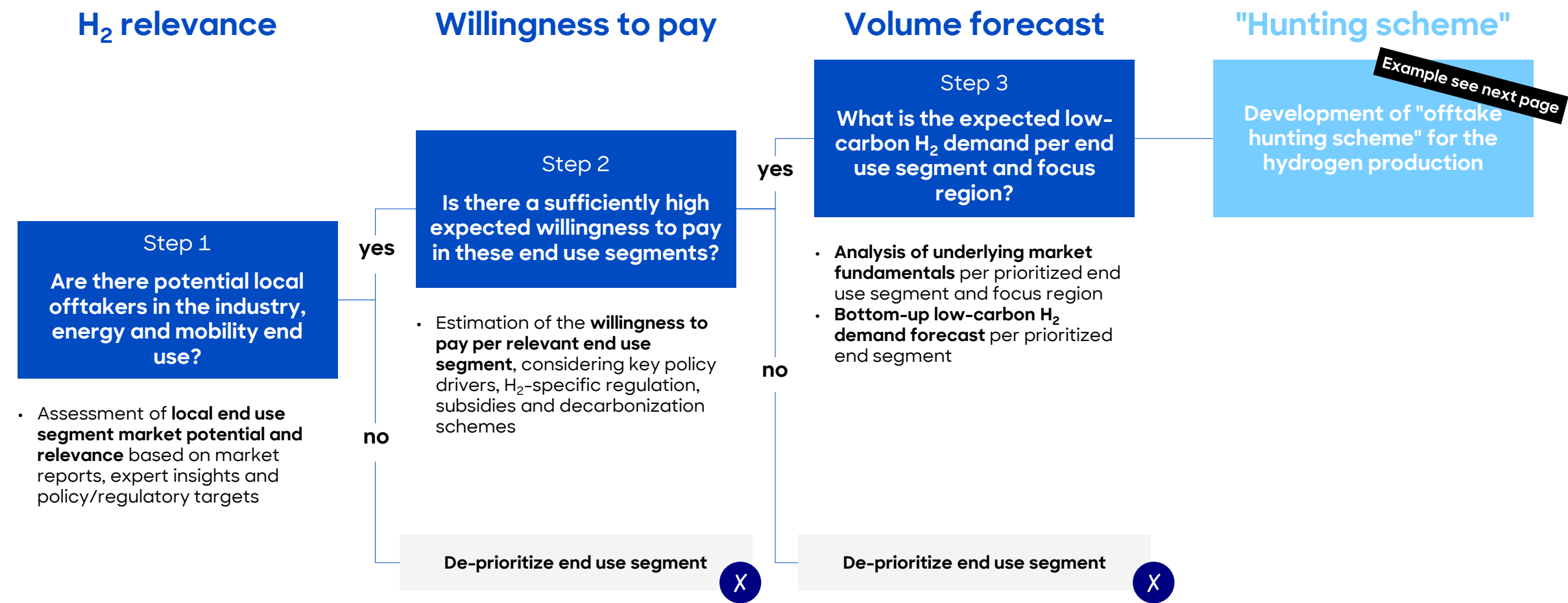
An isometric illustration of a clean hydrogen ecosystem. It features a central industrial area with a large blue building labeled 'H2', surrounded by various facilities including wind turbines, solar panels, storage tanks, and transport vehicles like trucks and a train. The scene is set against a blue background with stylized clouds and a body of water with a ship. The overall theme is sustainable energy and infrastructure.

C. "Where to play" – Offtake pool and selection strategy

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With three clear questions, an "offtake hunting scheme" with prioritised focus end uses and regions for hydrogen offtake can be developed

Development of the offtake hunting scheme



An offtake hunting scheme provides a comprehensive overview of prioritized end use segments, regions, market prices and volumes and potential offtakers

Example offtake hunting scheme

Prioritized end use segment		Addressable market share	Expected Willingness to Pay	Offtaker long-list
Industry	Steel 	XX-YY tonnes H ₂	XX-YY EUR	Companies X, Y, Z
	Refining 	<i>n/a (deprioritized)</i>		
	Fertilizer 	<i>n/a (deprioritized)</i>		
Mobility	Shipping 	<i>n/a (deprioritized)</i>		
	Road 	XX-YY tonnes H ₂	XX-YY EUR	Companies A, B, C
Ener-gy	Power gen. (co-firing) 	XX-YY tonnes H ₂	XX-YY EUR	Companies D, E, F
Other	Trader, public auctions etc. 	XX-YY tonnes H ₂ at XX-YY EUR		

> Comments

- This illustrative template can help hydrogen project developers to map their prioritized end use segments and regions with their expected addressable market shares and willingness to pay
- The addressable market share and the willingness to pay are the results of the market assessment (see "what to play" chapter)

In a next step, a short list based on the identified long-list of offtakers should be developed – Shortlisting criteria can support in the prioritization

Potential criteria for the shortlisting of offtakers

Dimension	Criteria	Description
Selection criteria 1	Offtake agreements with other H ₂ suppliers	(Publicly) known ongoing and/or planned other H ₂ offtake agreements of the respective offtaker that might coincide with planned offtake
	Existing equity investment in other H ₂ /NH ₃ projects	(Publicly) known ongoing and/or planned equity investments in H ₂ production projects
	Other	
Prioritization criteria 2	H ₂ volume demand in first year of operations	Expected realistic H ₂ offtake volume in first year of operations based on plant sizes and first discussions
	Openness to sourcing discussions	General sentiment of offtaker towards green products (e.g., via company strategy)
	Potential for equity stake/co-investment	Potential of offtaker to co-invest based on behavior in previous projects and first discussions
	Ease for business development	Ease for business development regarding binding offtake negotiations and establishment of client relationship
	Other	

> Comments

- The shortlisting of offtakers can take place based on selection and prioritization criteria
- Each identified offtaker can be assessed based on this set of criteria
- Offtakers that score high in this assessment, should be shortlisted

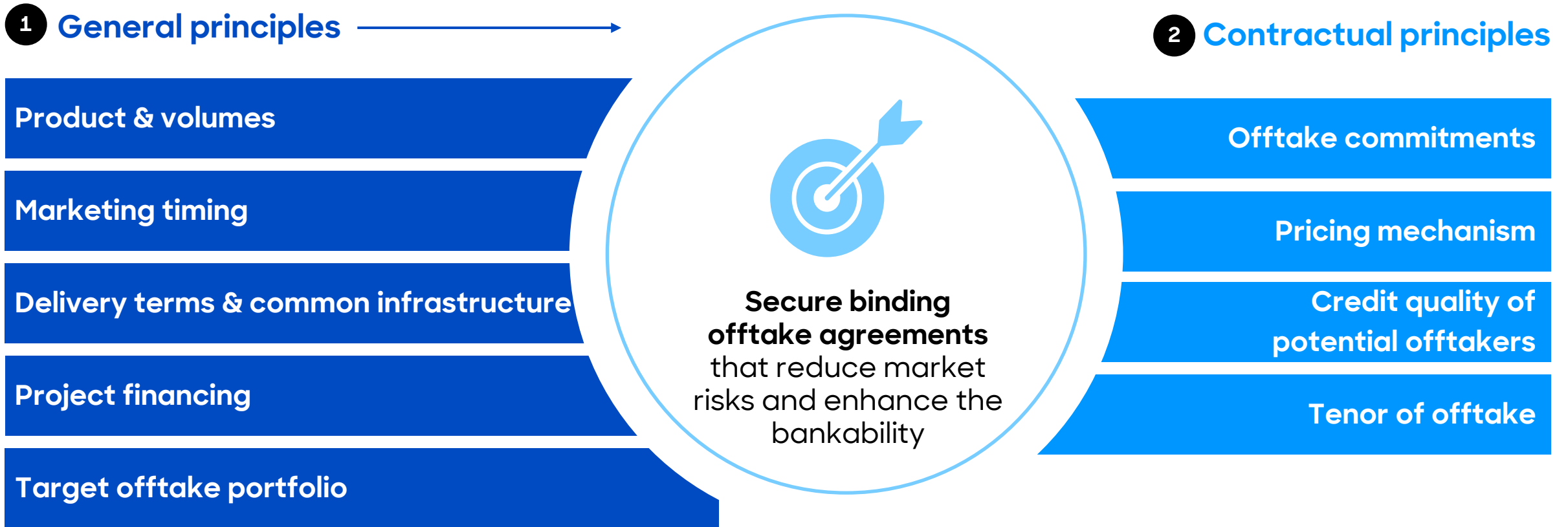
An isometric illustration of a clean hydrogen ecosystem. It features a network of blue pipes connecting various components: wind turbines, solar panels, industrial buildings, residential houses, and vehicles. Hydrogen storage tanks and a ship are also depicted. The scene is set against a blue background with a stylized white cloud in the top left. The text 'D. "How to play" – Key principles of offtake agreements' is overlaid in the center.

D. "How to play" – Key principles of offtake agreements

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The alignment on general and contractual principles enhances the H₂ project's bankability and facilitates non-recourse financing

Key principles of offtake agreements



General principles regarding product, volumes, timing, delivery, project financing and target offtake portfolio should be agreed that then apply for offtakers

General principles for shortlisted offtakers

Topic	General principle	Description
Product & volumes	Overarching target for offtake commitments	Targets regarding market risk (e.g., hedging or pass-through)
	Volumes	Volumes per offtake contract
	Other	Any other
Marketing timing	Target COD & start of delivery	Start of delivery of H ₂ production
Delivery terms & common infra.	Point of delivery	Point (incl. modalities) of delivery (e.g., until pipeline or other transport facility)
Project financing	Pre-/post financial close seller CP	Sales and Purchase Agreements incl. specification of period to fulfil seller CPs beyond target COD
	Equity for offtakers (if any)	Amount of equity stake and targets (in %) of shareholding and H ₂ offtake volume
Target offtake portfolio	Target offtake portfolio split	Split of offtake between anchor offtaker(s) (if any) and third parties, incl. back-up options

For each contractual principle, there is an option space that should be clearly defined and limited to identify acceptable lenders' requirements

Lenders' bankability requirements regarding offtake agreements (non-recourse project financing)

Topic	Principle	Option space																	
Offtake commitments	Contract type	Take-or-pay contract		Take-or-cancel contract		Take-and-pay contract		Requirement contract			Consignment contract			Merchant offtake contract					
	Volume flexibility mechanisms	Fixed offtake commitment		Price adjustment for vol. change		Volume swing clause		Force majeure volume adjustment			Cumulative vol. adjustment			Vol. adjustment without penalty					
		Annual (or more frequent) review		Notification period for adjustments		Market-based adjustment													
Pricing mechanism	Type & share of pricing mechanism	Fixed pricing		Index-based fixed pricing		Index-based pricing		Index-based sliding scale pricing			Sliding scale pricing			Tiered pricing					
		Variable pricing																	
Credit quality of potential offtaker	Creditworthiness threshold	AAA	AA+	AA	AA-	A+	A	BBB+	BBB	BBB-	BB+	BB	BB-	B+	B	B-	CCC+	CCC-	SD/D
	Creditworthiness guarantees	Direct sovereign guarantees		Payment guarantees		Partial credit guarantees		Performance guarantee		ECA guarantees			Government concessions		Political risk insurance				
Tenor of offtake	Contract length	Offtake tenor > loan tenor		Matching offtake and loan tenors		Offtake tenor w/ flexible terms acc. to loan terms change			Renewable offtake tenor based on market conditions			Offtake tenor < loan tenor							

- The volume secured with maximum de-risked contract options (incl. take-or-pay, fixed volumes, fixed price, full loan tenor) must correspond to a cash flow that guarantees acceptable DSCR for lenders
- Once this is achieved, the remaining volumes can be secured via "riskier" contract models, as debt service is already de-risked



An isometric illustration of a clean hydrogen ecosystem. It features a network of blue pipes connecting various components: wind turbines on a hill, solar panels, industrial buildings with smokestacks, residential houses, and a train. Several trucks and cars are shown, some with 'H2' labels, indicating hydrogen refueling or transport. A large ship is docked at a pier. The scene is set against a dark blue background with a stylized white cloud in the top left. The text 'E. "How to win" - Operational strategy and execution plan' is overlaid in the center.

E. "How to win" - Operational strategy and execution plan

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Offtake can be secured via private sector deals, potentially enabled by public funding, or via private/public tenders by offtakers

Approaches for offtake development

Approach	Private sector deals ("Push")	Private sector deals, enabled by public funding ("Hybrid")	Private/public tenders ("Pull")
Description	- Commercial agreement between Hydrogen Valley project company and offtaker Proactive business development by Hydrogen Valley project company required to close deals	- Government funding calls providing subsidies for H₂ and derivatives deliveries to bridge the gap between production cost and offtakers' willingness to pay - As many fundings target offtakers, producers need to partner-up with potential offtakers, conditional upon funding	- Competitive tender processes for specific volumes, delivery periods and locations, launched by private sector offtakers Government (or government-backed agency) can act as central counterparty and offtaker, closing deals with suppliers via competitive tenders
Examples	- RWE – Total Energies (03.2025) - Lhyfe – H2 Mobility (09.2024)	- European Hydrogen Bank - Carbon contracts for difference (CCfD)	- H2 Global - Salzgitter AG, ThyssenKrupp AG

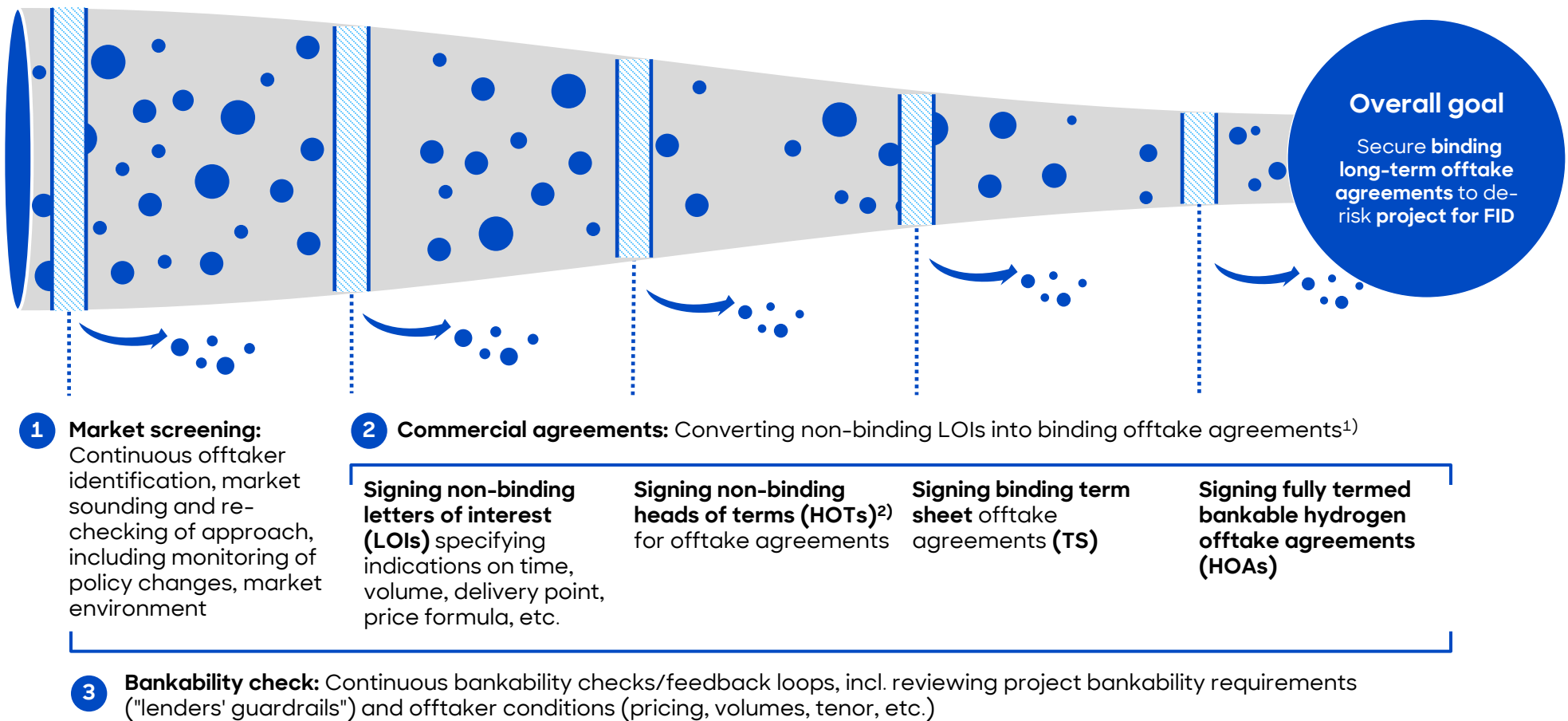
Within **Hydrogen Valleys**, **private sector deals** and **private sector deals enabled by public funding** are the most common approaches for offtake development



The offtaker list can be matured by establishing a sales funnel with market screening, advancing commercial agreements and bankability checks

Prioritization and sales funnel for the selection of suitable players for offtake

Longlist of offtakers in all focus regions and prioritized segments



1) In private/public tender approach, the selection process could be slightly different due to tender process usually driven by offtakers; 2) Potentially as attachment to a LOI

To establish private sector offtake agreements, the following key activities for market screening, commercial agreements and bankability can be performed

Key offtake activities for private sector offtake agreements

Category	Activity	Description	Deliverable
Market screening 1	Market sounding	Conducting continuous market sounding with hunting scheme (incl. policy monitoring, tender announcements, market developments)	Market understanding ¹⁾
	Offtaker longlist and shortlist	Listing all potential offtakers and shortlisting according to pre-defined criteria to continuously generate new leads	Long-, shortlist
	Quarterly offtake review	Reviewing of lead status vs. DG milestones, regulatory changes, new tenders or other developments and strategy recalibration if required	Quarterly review doc., adj. offtake strategy
Commercial agreements 2	Drafting standard commercial documents	Preparing standards for non-disclosure agreement (NDA), letter of interest (LOI), heads of terms (HOT), term sheet (TS), hydrogen offtake agreement (HOA)	Standard commercial documents
	Initial offtaker discussions	Approaching and discussing opportunity with shortlisted offtakers	NDA, LOI
	Negotiation of key terms	Discussing and negotiating key terms with offtakers, starting with customized standard; conducting counterparty compliance check before TS signature	HOT, TS
	Negotiation of remaining terms	Negotiating remaining terms and full agreement based on customized TS and HOA standard	HOA
Bankability check 3	Relationship management	Ongoing relationship management including regular communication, proactive reaction to issues and concerns	-
	Financing requirements	Discussing bankability requirements with lenders	Bankability criteria list
	Team alignment on bankability	Aligning closely to ensure bankability criteria, potentially adjusting documents	Bankable agreements

1) Including key offtake segments, projected H₂ demand and supply, offtaker WTP, public policies

Private and public tenders require partially different activities, more related to tender requirements with a focus on bid preparation and HOA negotiation

Key offtake activities for private/public tenders

Category	Activity	Description	Deliverable
Market screening 1	Market sounding	Conducting continuous market sounding with hunting scheme (incl. policy monitoring, tender announcements, market developments)	Market understanding ¹⁾
	Tender longlist and shortlist	Listing all tenders and shortlisting them according to pre-defined criteria	Long-, shortlist
	Quarterly offtake review	Reviewing of lead status vs. DG milestones, regulatory changes, new tenders or other developments and strategy recalibration if required	Quarterly review doc., adj. offtake strategy
Commercial agreements 2	Participation decision	Deciding on participation in shortlisted private/public sector tenders	Mandate for bid preparation
	Bid preparation	Preparing customized technical and financial proposal and further bidding documents as required; conducting counterparty compliance check	Tender bid
	Bid submission decision	Approving final technical and financial proposal and deciding on bid submission	Submitted bid
	Signing of offtake agreement	Finalization and signing of HOA with tenderer, including binding pricing and offtake conditions, depending mainly on tender requirements.	HOA
	Relationship management	Ongoing relationship management including regular communication, proactive reaction to issues and concerns	-
Bankability 3	Financing requirements	Discussing bankability requirements with lenders	Bankability criteria list

1) Including key offtake segments, projected H₂ demand and supply, offtaker WTP, public policies

Based on an offtake plan during project initiation, offtake activities focus on maturing offtake agreements until FID with the aim to reach their bankability

Milestones and timeline for offtake activities

