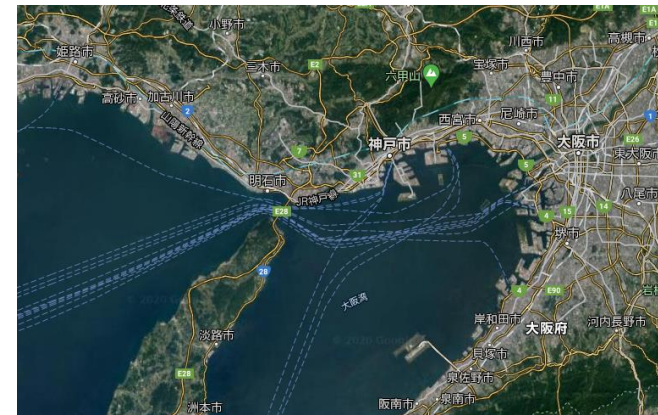


May. 17. 2021

[Overview]

Kobe/Kansai Hydrogen Utilization Council The Study Report (2020)

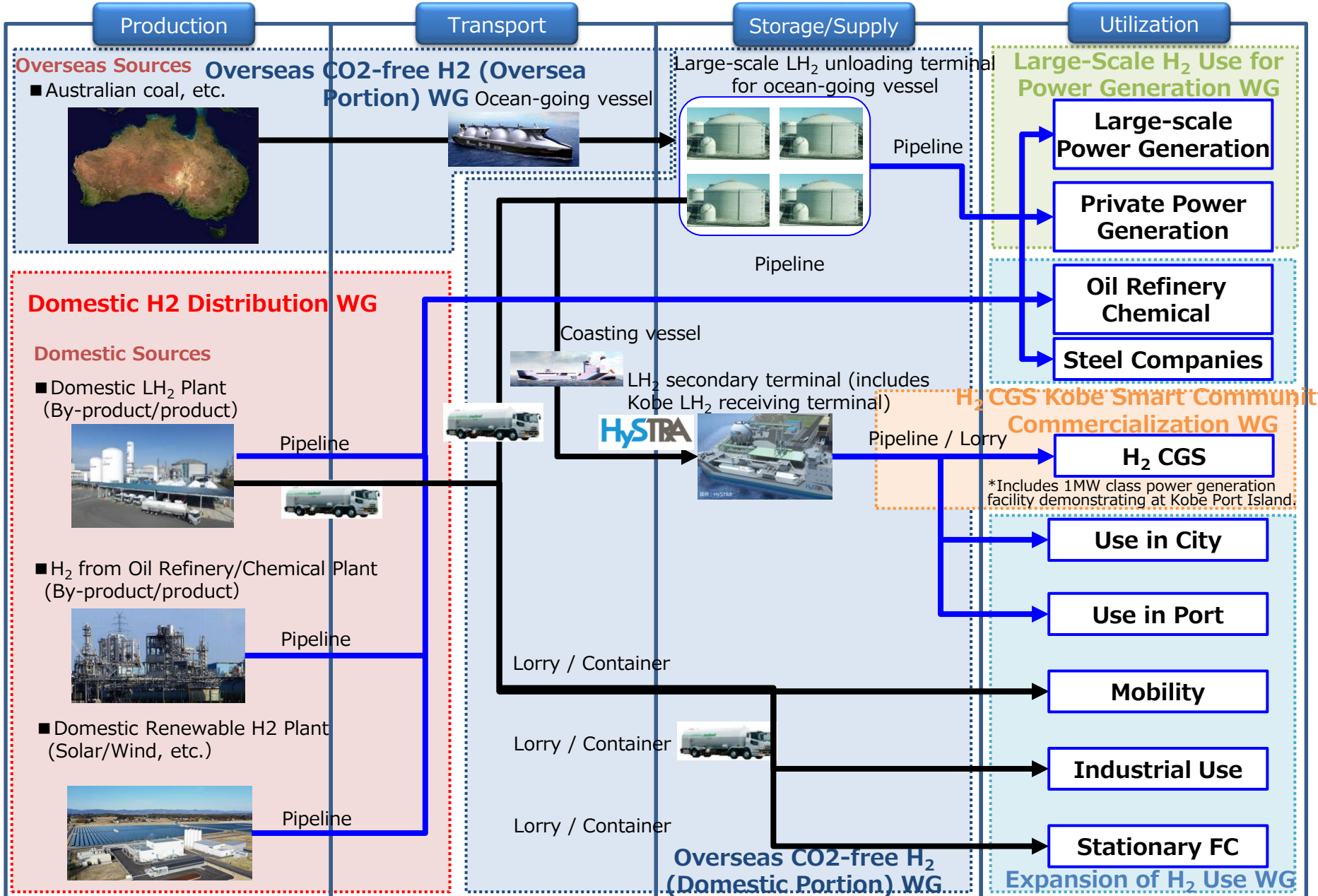
-Organize a Future Vision for a Hydrogen Society and
Quantifying Supply and Demand-



Special Notes

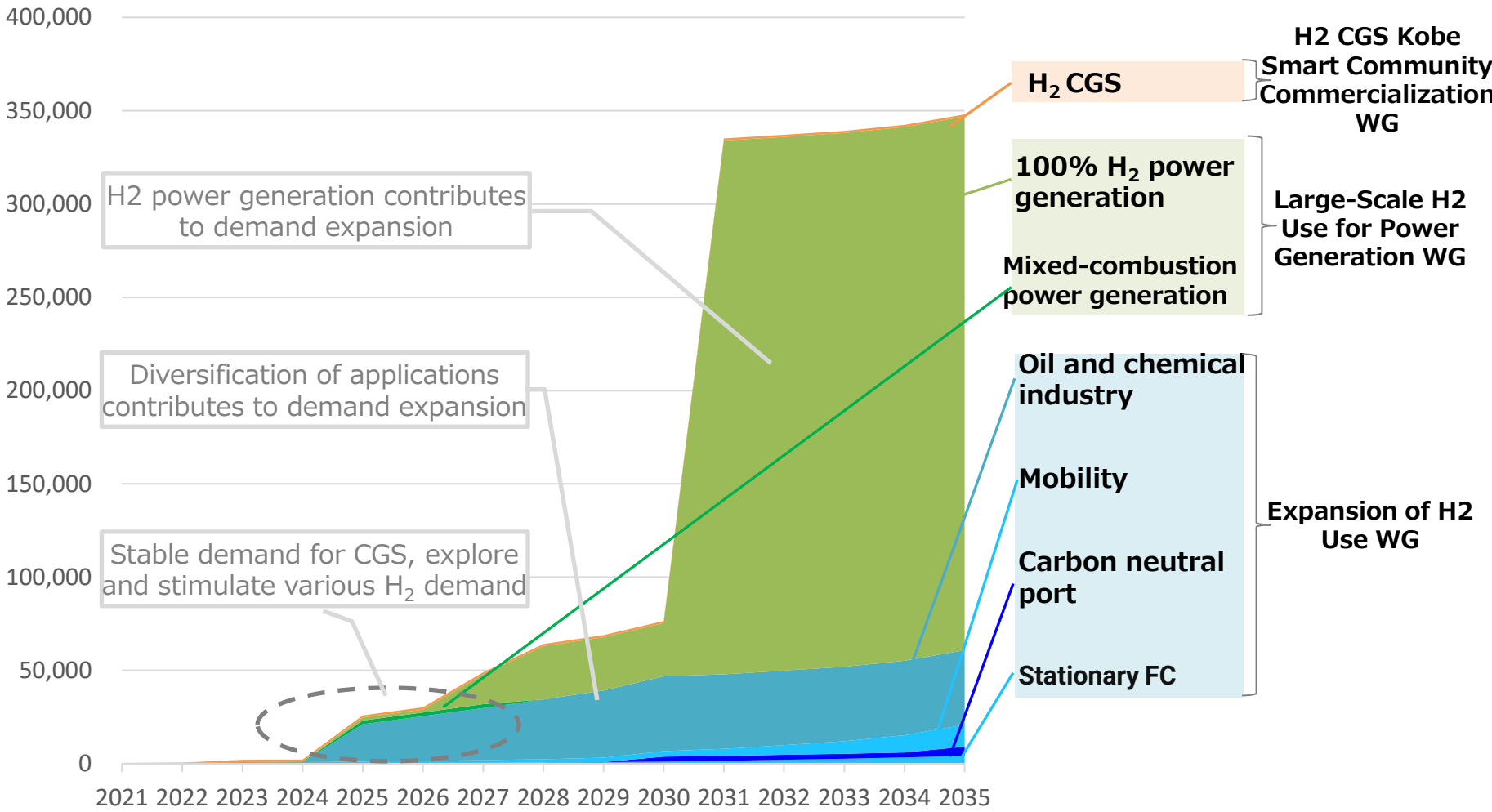
- Information handled within this document is the estimated value of the 2020 fiscal year of this Council
 - ✓ Estimated value was calculated by setting various preconditions based on published literature, and is not a committed value.
- Information handled within this document may change in future detailed studies.
- The Council will continue to collaborate with related parties and aim to realize and optimize the contents of the study.

Future Vision and Working Group



Potential Demand Volume

The total potential demand of each working group will reach 330,000 tonnes by 2031.



Potential Supply Cost

Comprehensive Study from Production to Supply.

	Production		Transportation			Storage/Supply		Supply Cost		
Overseas	Australian Coal LH ₂ *1	42.3 JPY/Nm ³	Primary Receiving Terminal	2.5~3.5 JPY/Nm ³	Coasting Vessel	5.4~13.0 JPY/Nm ³	Secondary Receiving Terminal	2.2~3.2 JPY/Nm ³	33.3~34.3 JPY/Nm ³	For power station
		Cost Reduction							40.9~50.5 JPY/Nm ³	For demand around secondary terminal (dose not include tertiary transport)
		30.8 JPY/Nm ³							Pipeline	0.2~3.3 JPY/Nm ³
				LH ₂ Lorry	2.6~4.6 JPY/Nm ³			37.0~40.2 JPY/Nm ³	For H2 CGS• port (cargo handling equipment, hinterland transport)• mobility• stationary FC	
Domestic	LH ₂ *2	90~145 JPY/Nm ³	Customer Receiving Facility	1.1~1.3 JPY/Nm ³	61.1~86.3 JPY/Nm ³					
		Cost Reduction				60~85 JPY/Nm ³				
	Compressed H ₂ *2	90~145 JPY/Nm ³				80~115 JPY/Nm ³	81.1~116.3 JPY/Nm ³			
	Renewable H ₂	120 JPY/Nm ³	Future Outlook			50 JPY/Nm ³	50~ JPY/Nm ³			
			Mainly via Pipeline							

※Each cost listed above estimated under different research methods (literature, market soundings, etc.), distances and conditions.

*1: Production cost (CIF) of Australian Coal LH₂ includes the cost of liquefaction, loading, and marine transportation.

*2: Estimate premise of the costs assumes a stable supply of a fixed quantity.

Quantification of Supply Chain: Economic Gap around 2030

- ✓ There will be a gap (approx. 73 billion JPY/a) between calorie equivalent cost of conventional fuel and the estimated hydrogen supply cost in the initial phase of commercialization of Kobe/Kansai regional H₂ supply chain around 2030.※
 - Calorie equivalent cost does not include R&D and demonstration cost for H₂ related infrastructure leading up to commercialization, and newly required H₂ related equipment cost.
- ✓ Kobe/Kansai regional H₂ supply chain to become independent and to fill the economic gap, it is required for supply side to make effort on reducing H₂ supply cost, and for demand side, to create new customers, and to evaluate and certify social impacts and values of energy transition of customers.
- ✓ Based on the council's estimated hydrogen demand, approx. 2.4 million ton-CO₂/a emissions can be reduced.

※Estimated based on the hydrogen demand in 2031, current assumption of calorie equivalent cost, and the supply cost around 2030.
Note a cost of some H₂ supply infrastructure such as H₂ station is not included in the supply cost around 2030.