



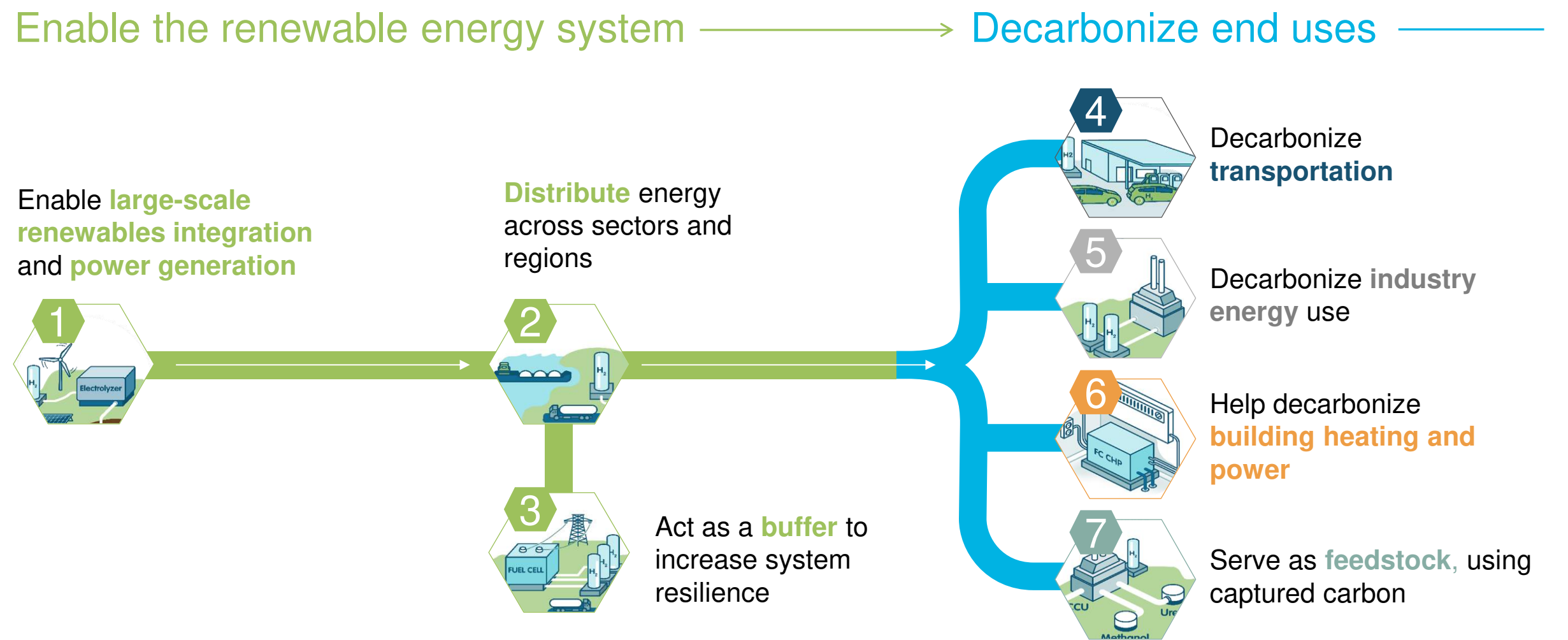
# Roadmap towards a hydrogen economy

## Market perspective

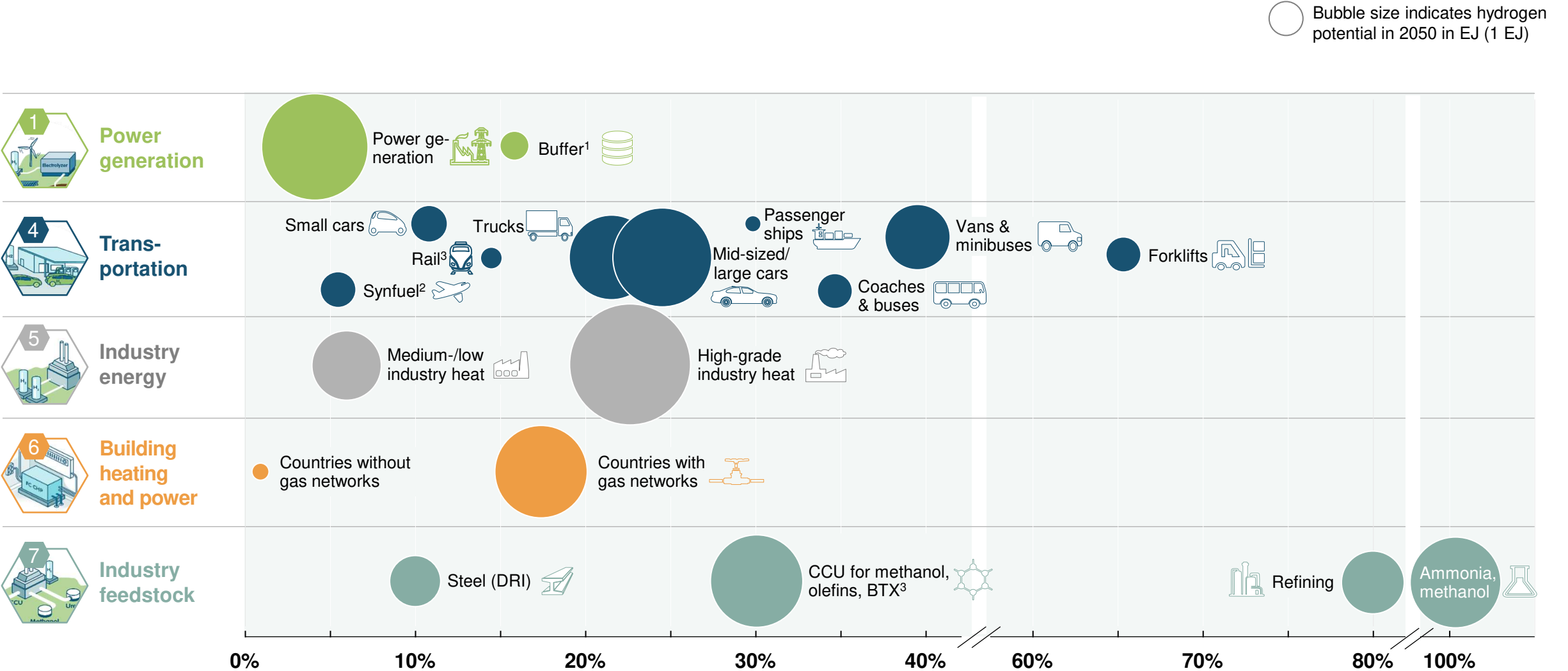
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HYDROGEN COUNCIL | SEPTEMBER 2017

# There are seven roles for hydrogen in the energy transition



# Hydrogen has significant potential across all applications



1 Percent of total annual growth in hydrogen and variable renewable power demand  
2 For aviation and freight ships  
3 Trains and tramways  
3 Percent of total methanol, olefin, BTX production using olefins and captured carbon

# Hydrogen benefits energy systems, environment and business



13%

of total energy demand  
in 2050

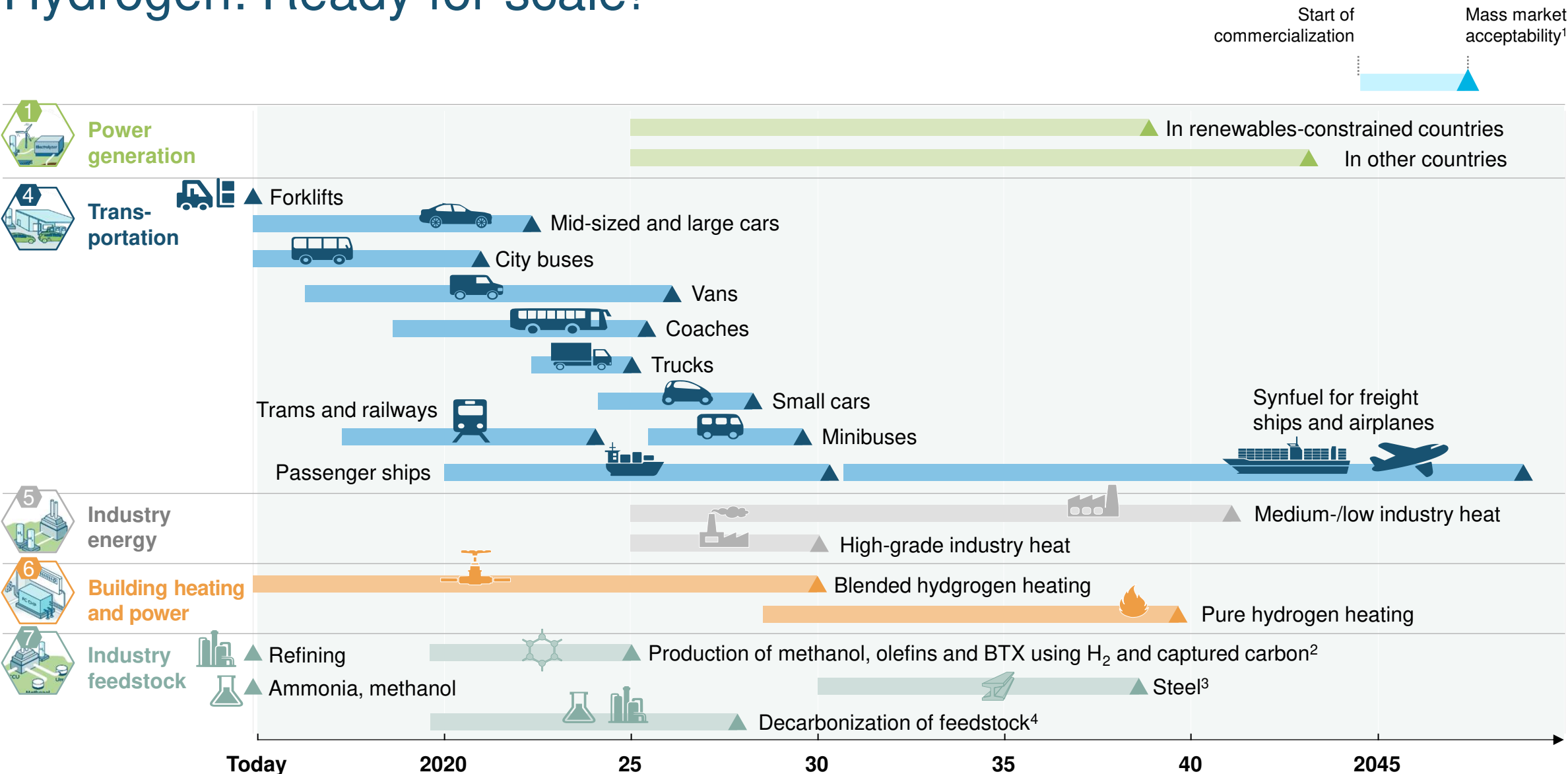
7.5 Gt

annual CO<sub>2</sub> abate-  
ment in 2050

USD  
4,000 bn

annual sales in 2050  
(hydrogen and  
applications)

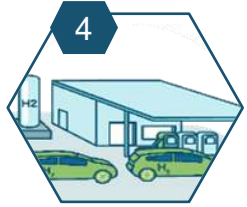
# Hydrogen: Ready for scale!



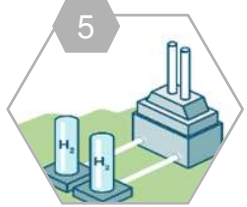
1 Mass market acceptability defined as sales >1% within segment in priority markets  
2 Market share refers to the amount of production that uses hydrogen and captured carbon to replace feedstock  
3 DRI with green H<sub>2</sub>, iron reduction in blast furnaces and other low-carbon steel making processes using H<sub>2</sub>  
4 Market share refers to the amount of feedstock that is produced from low-carbon sources  
SOURCE: Hydrogen Council McKinsey & Company 5



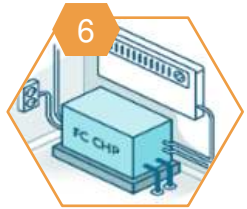
# Important milestones can be reached already in 2030



- **10-15 million** fuel-cell **vehicles** on the road, including private cars, taxis, vans and light commercial vehicles



- **3.5 Mt** hydrogen used for **high-grade heat** in first large-scale projects



- **50 million households** connected to a network safely blending hydrogen and natural gas

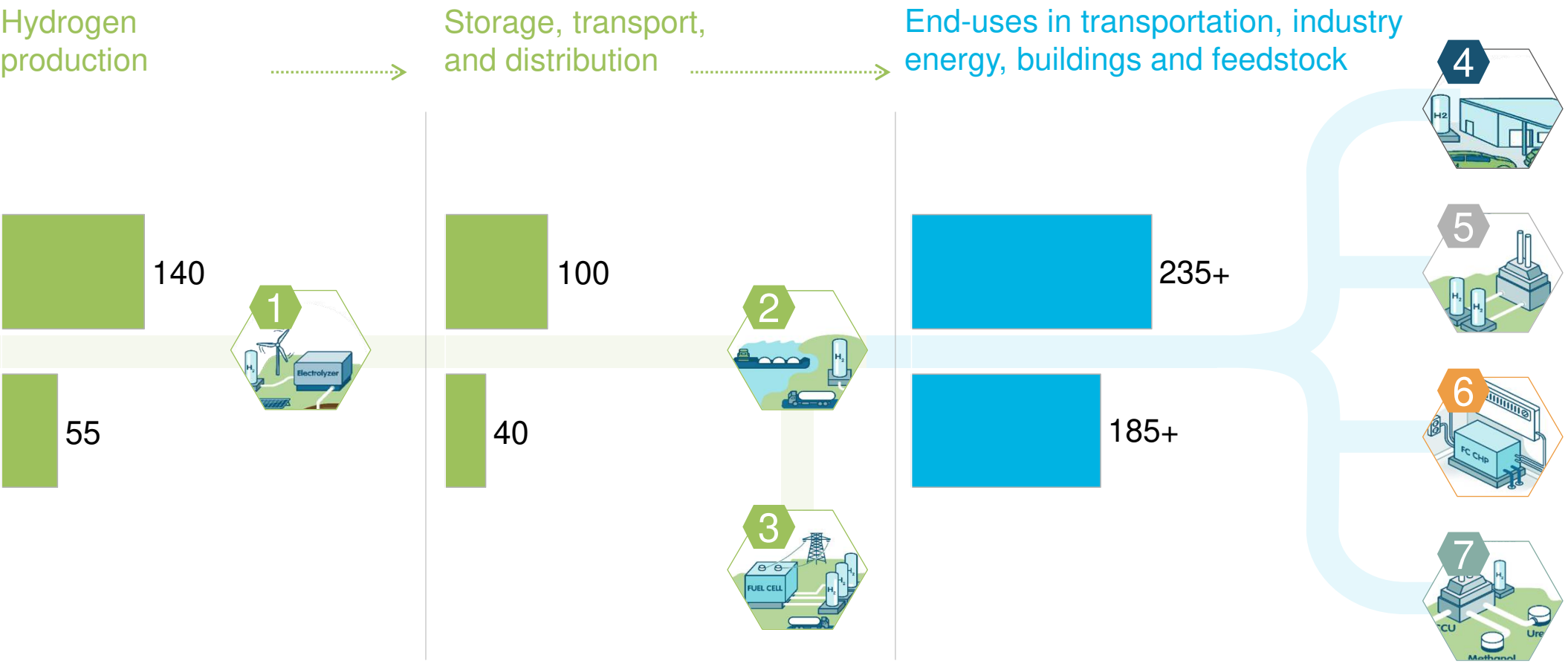


- **50 Mt CO<sub>2</sub>** converted to chemicals and intermediates such as **methanol** using hydrogen

# Investment opportunities amount to ~475 billion until 2030

USD billion<sup>1</sup>

Enable the renewable energy system → Decarbonize end uses



<sup>1</sup> Excluding existing feedstock uses

# Hydrogen Council members have started investing and deploying

Enable the renewable energy system —→ Decarbonize end uses

Hydrogen Council Steering members



Supporting members



Hydrogen Council Details and contacts at [hydrogencouncil.com](https://hydrogencouncil.com)