

Hydrogen Technology Readiness Level

Supply Sector	Sub-Sector	Technology Grouping	Technology	Sub-Technology	Component	Technology Readiness Level
Energy Transformation	Biofuels	Production	Biomethane	Anaerobic digestion and catalytic methanation with hydrogen		Commercial operation in relevant environment
Energy Transformation	Biofuels	Production	Double-cropping (sequential cropping)	Gasification and Fischer-Tropsch with hydrogen enhancement		Large Prototype
Energy Transformation	Hydrogen	Production		Biomass/waste gasification	CCUS	Pre-Commercial Demonstration
Energy Transformation	Hydrogen	Production		Chemical looping		Concepts needs validation
Energy Transformation	Hydrogen	Production		Coal gasification	CCUS	Large Prototype
Energy Transformation	Hydrogen	Production		Electrolysis	Seawater electrolysis	Concepts needs validation
Energy Transformation	Hydrogen	Production		Electrolysis	Solid oxide electrolyser cell	Pre-Commercial Demonstration
Energy Transformation	Hydrogen	Production		Electrolysis	Polymer electrolyte membrane	First of a kind commercial
Energy Transformation	Hydrogen	Production		Electrolysis	Alkaline	Commercial operation in relevant environment
Energy Transformation	Hydrogen	Production		Methane pyrolysis		First of a kind commercial
Energy Transformation	Hydrogen	Production		Natural gas autothermal reforming	CCUS	Integration Needed at Scale
Energy Transformation	Hydrogen	Production		Natural gas autothermal reforming with gas heated reformed	CCUS	Pre-Commercial Demonstration
Energy Transformation	Hydrogen	Production		Nuclear/solar	Thermochemical water splitting	Concepts needs validation
Energy Transformation	Hydrogen	Production		Steam methane reforming	CCUS	Integration Needed at Scale
Energy Transformation	Hydrogen	Storage		Depleted oil & gas field, aquifer		Concepts needs validation
Energy Transformation	Hydrogen	Storage		Salt cavern storage		Integration Needed at Scale
Energy Transformation	Hydrogen	Storage		Storage tanks		Proof of Stability Reached
Energy Transformation	Hydrogen	Transport		Hydrogen blending in natural gas network		Pre-Commercial Demonstration
Energy Transformation	Hydrogen	Transport		Liquid hydrogen tanker		First of a kind commercial
Energy Transformation	Hydrogen	Transport		Liquid organic-hydrogen carrier tanker		Large Prototype
Energy Transformation	Hydrogen	Transport		Pipeline		Proof of Stability Reached
Energy Transformation	Power	Generation	Ammonia	Cracking into hydrogen for gas turbine		Large Prototype
Energy Transformation	Power	Generation	Hydrogen	High-temperature fuel cell		First of a kind commercial
Energy Transformation	Power	Generation	Hydrogen	Hybrid fuel cell-gas turbine system		Full prototype at scale
Energy Transformation	Power	Generation	Hydrogen	Hydrogen gas-fired turbine		First of a kind commercial
Supply CCUS	Hydrogen	Generation	Production	Biomass/waste gasification		Pre-Commercial Demonstration
Supply CCUS	Hydrogen	Generation	Production	Natural gas autothermal reforming		Integration Needed at Scale
Supply CCUS	Hydrogen	Generation	Production	Natural gas autothermal reforming with gas heated reformed		Pre-Commercial Demonstration
Supply CCUS	Hydrogen	Generation	Production	Steam methane reforming		Integration Needed at Scale