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GLOBAL PROGRAMME
HYDROGEN IN INDUSTRY

Skills development for the hydrogen value chain

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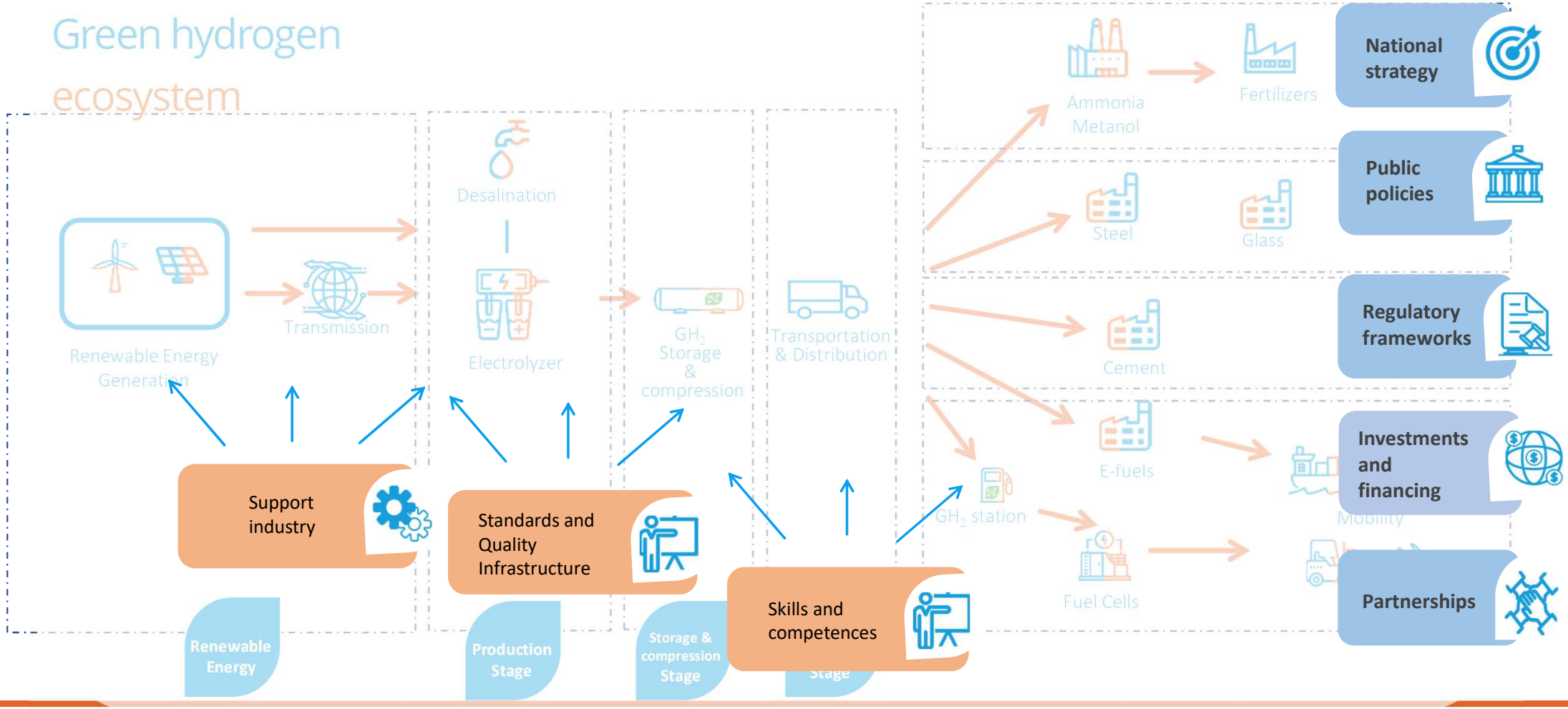
Green hydrogen ecosystem



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UNIDO's Global Programme for Hydrogen in Industry

UNIDO launched the Global Programme to support developing countries overcome identified barriers and to drive a **just hydrogen transition** that puts social and environmental responsibilities in focus.

WHAT ARE OUR KEY AREAS OF INTERVENTION?

- Policies
- Standards and Quality Infrastructure
- Finance & investment
- Skills
- Innovation
- Coordination

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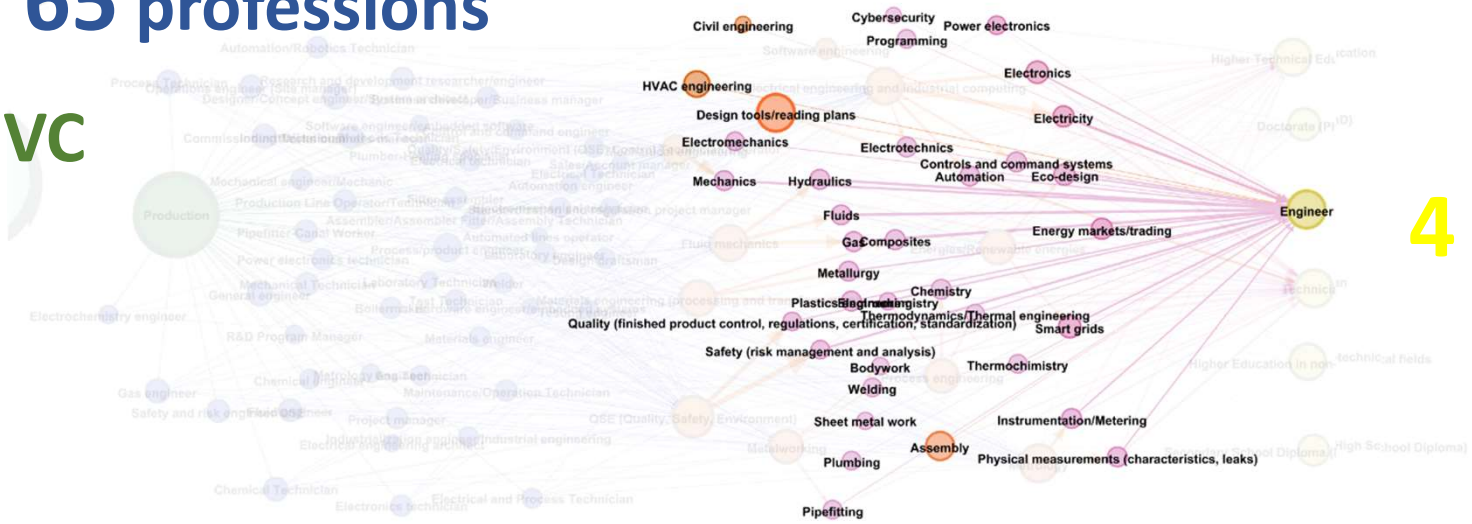
Skills Map

65 professions

72 Skills

4 links in VC



4 Levels

14 technical areas

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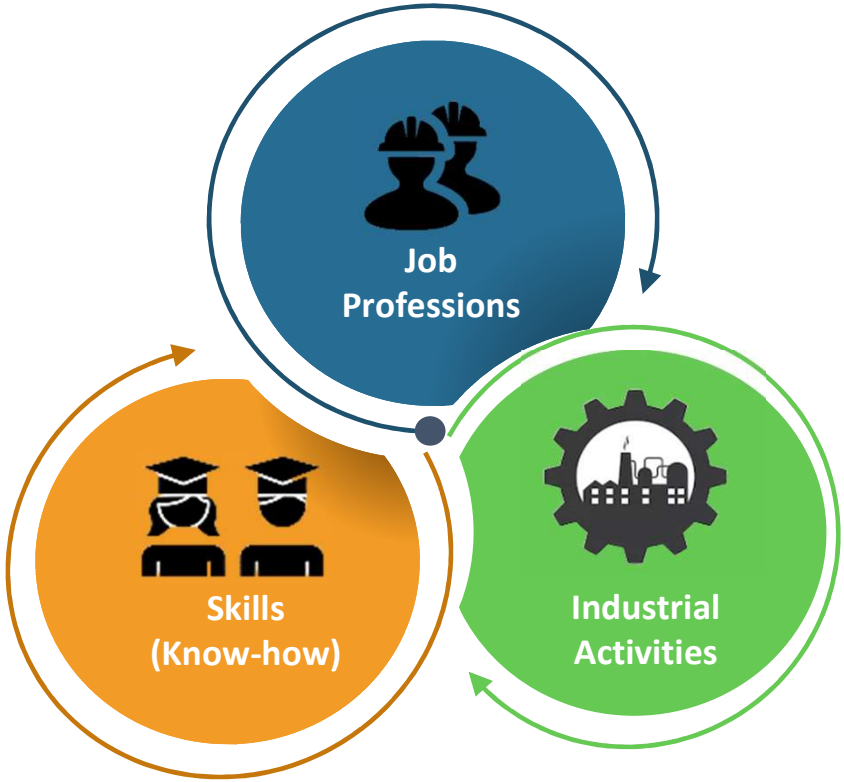
UNIDO Methodology: Three Crucial Pillars



Country Statistical Data (ISCO-ILO)
Employment outlets
Public/private employment services

Questionnaire/surveys in collaboration with the Academic Sector
and Vocational training

Country Statistical data on establishments and employees (ISIC - UNIDO)
Industrial associations and federations

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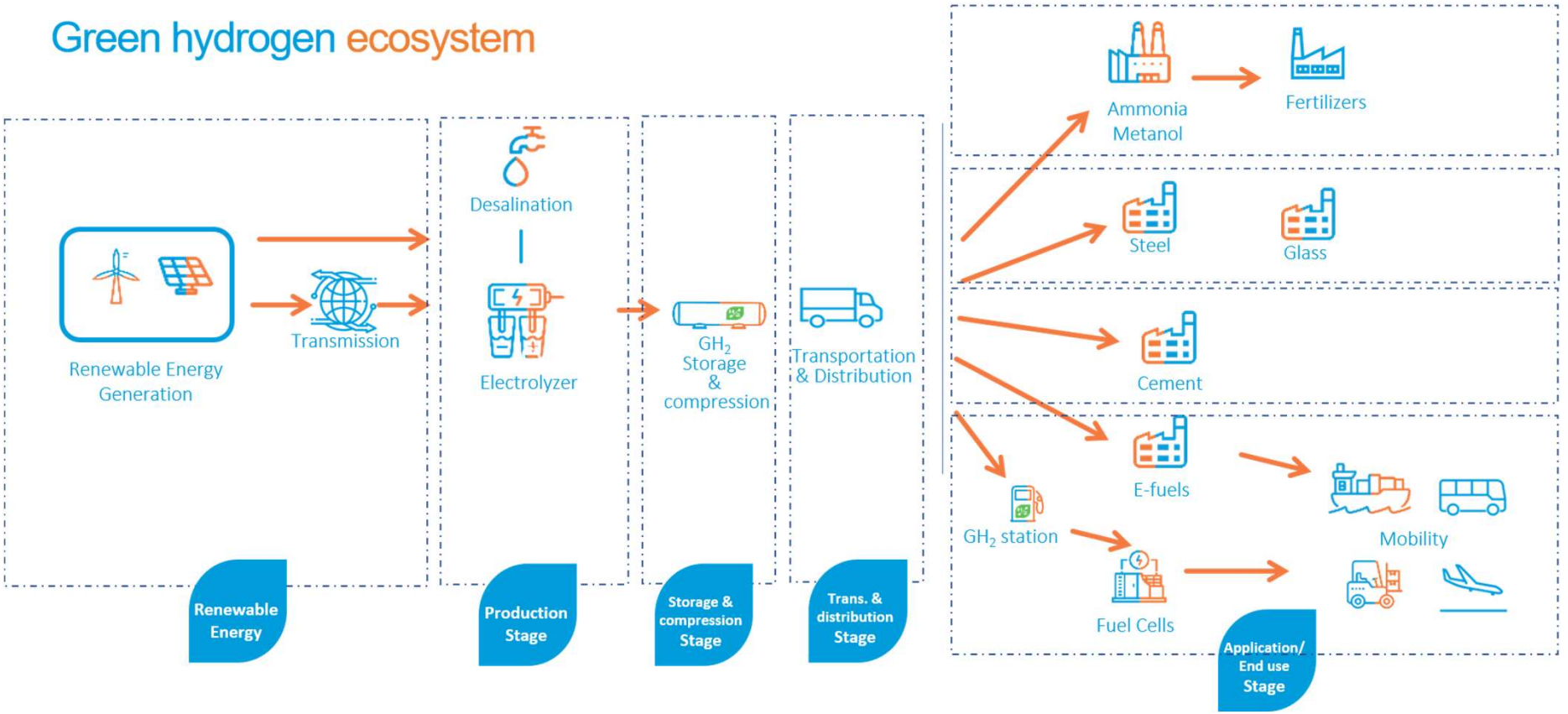
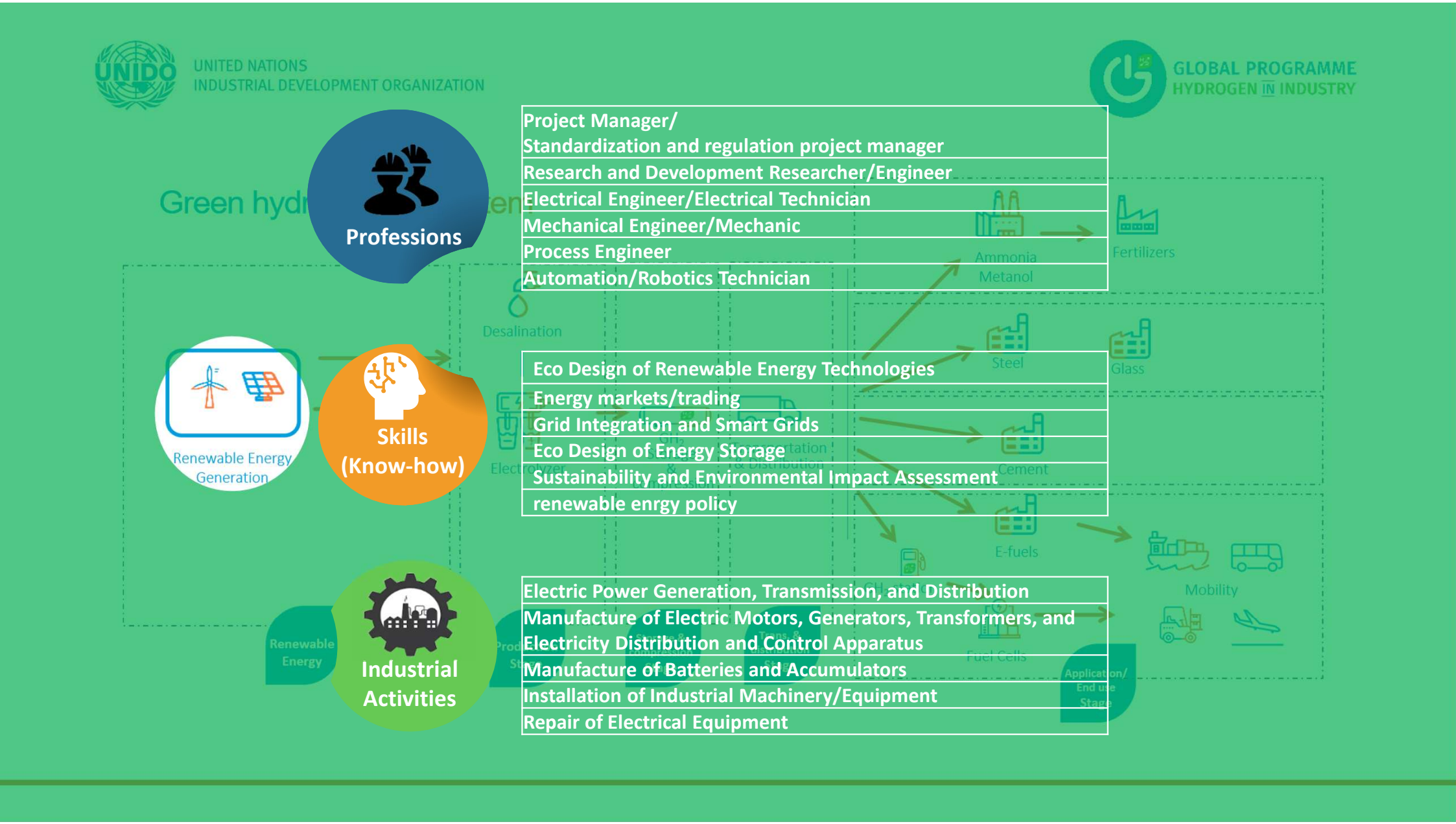
Green hydrogen ecosystem

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Professions
Project Manager/
Standardization and regulation project manager
Research and Development Researcher/Engineer
Electrical Engineer/Electrical Technician
Mechanical Engineer/Mechanic
Process Engineer
Automation/Robotics Technician
Renewable Energy Generation
Skills (Know-how)
Eco Design of Renewable Energy Technologies
Energy markets/trading
Grid Integration and Smart Grids
Eco Design of Energy Storage
Sustainability and Environmental Impact Assessment
renewable enrgy policy
Renewable Energy
Industrial Activities
Electric Power Generation, Transmission, and Distribution
Manufacture of Electric Motors, Generators, Transformers, and Electricity Distribution and Control Apparatus
Manufacture of Batteries and Accumulators
Installation of Industrial Machinery/Equipment
Repair of Electrical Equipment
Desalination
Ammonia
Metanol
Fertilizers
Steel
Glass
Cement
E-fuels
Mobility
Fuel Cells

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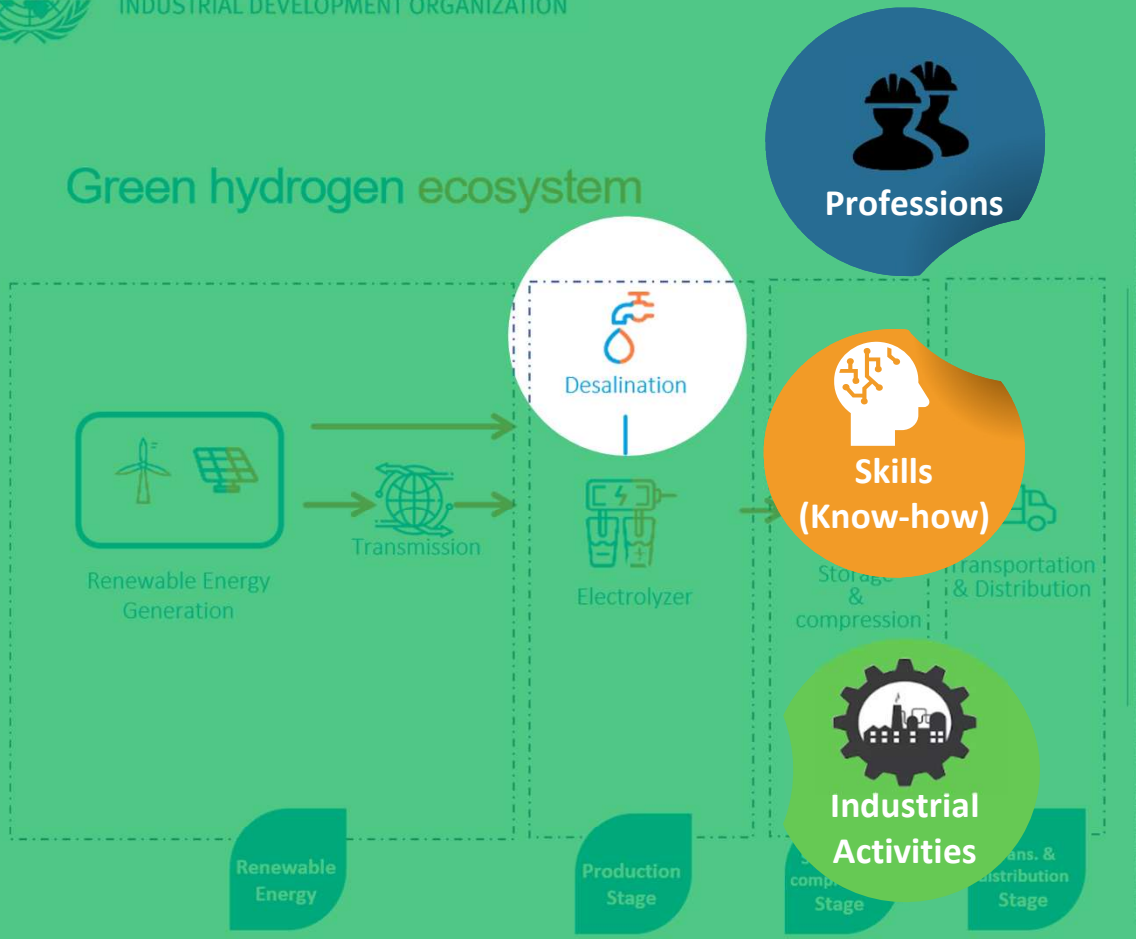

Desalination Plant Operator/Technician
Chemical Engineer/Chemical Technician
Mechanical Engineer/Mechanic
Electrical Engineer/Electrical Technician
Process Engineer/Technician

Desalination Technologies
Water Treatment
Energy Management
Membrane Technology
Water chemistry
Fluid Dynamics

Water Collection, Treatment, and Supply
Transport of Water, Liquids, etc., by Trucks
Manufacture of Tanks, Reservoirs, and Containers of Metal:
Repair of Machinery

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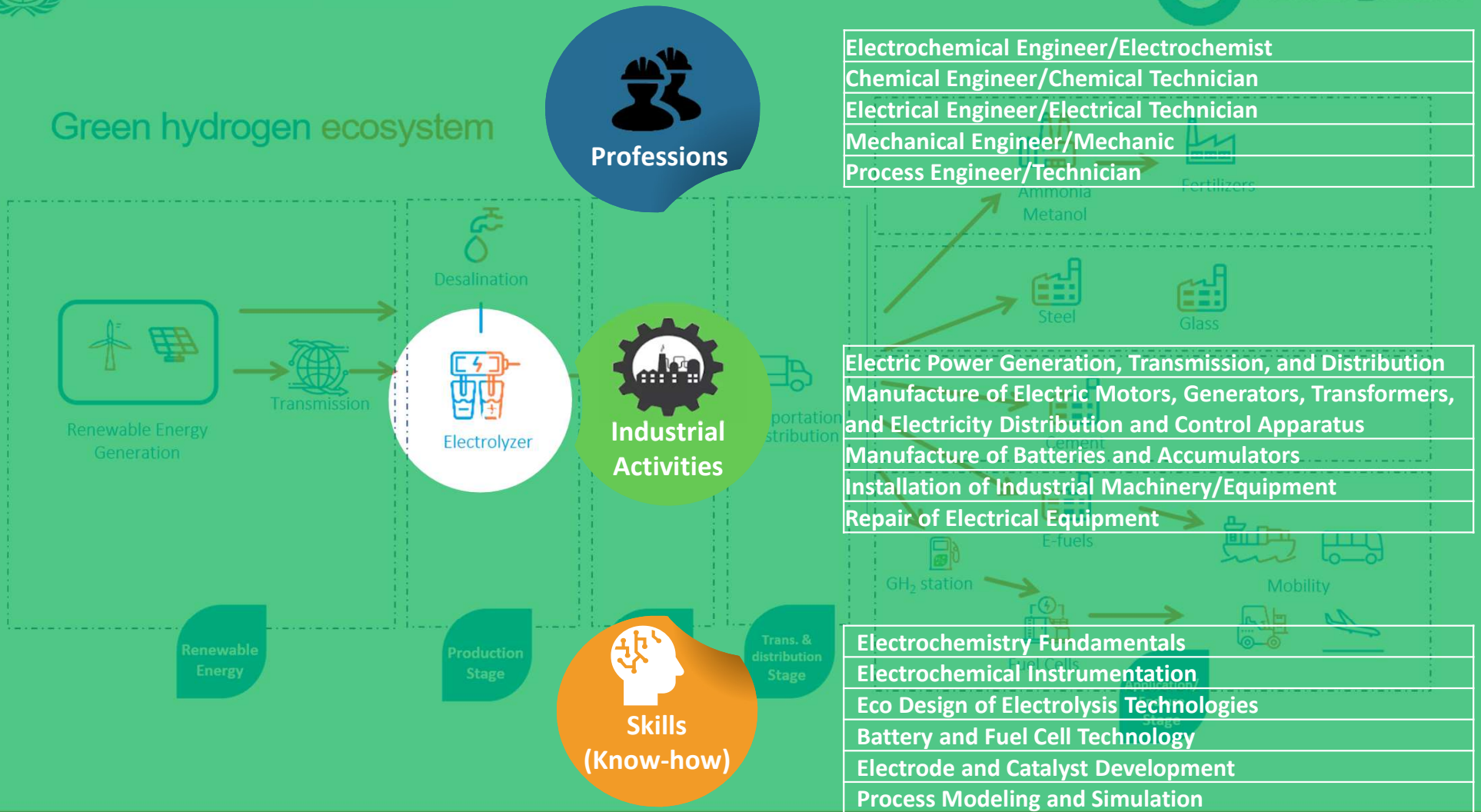
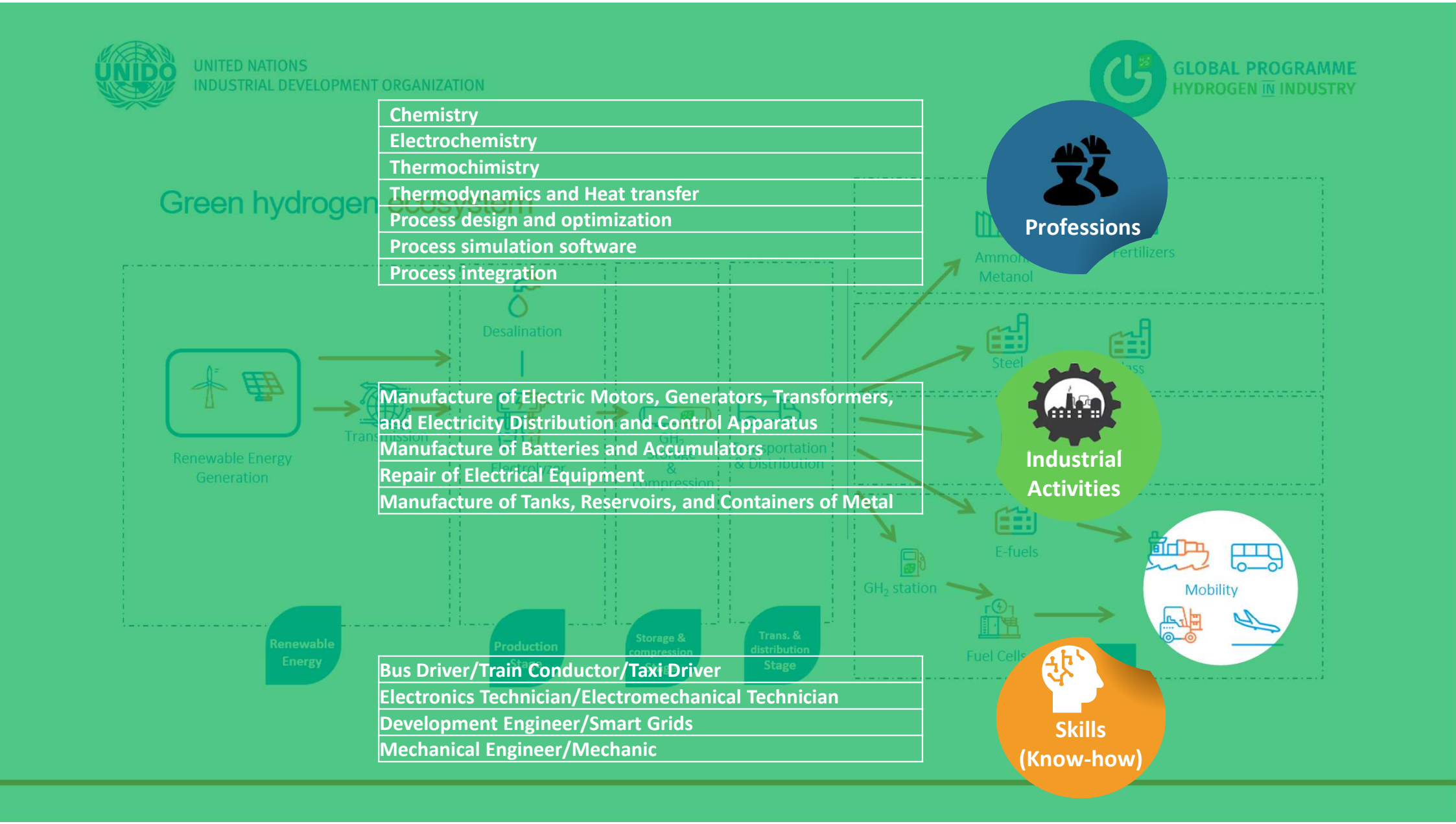


Professions
Electrochemical Engineer/Electrochemist
Chemical Engineer/Chemical Technician
Electrical Engineer/Electrical Technician
Mechanical Engineer/Mechanic
Process Engineer/Technician

Industrial Activities
Electric Power Generation, Transmission, and Distribution
Manufacture of Electric Motors, Generators, Transformers, and Electricity Distribution and Control Apparatus
Manufacture of Batteries and Accumulators
Installation of Industrial Machinery/Equipment
Repair of Electrical Equipment

Skills (Know-how)
Electrochemistry Fundamentals
Electrochemical Instrumentation
Eco Design of Electrolysis Technologies
Battery and Fuel Cell Technology
Electrode and Catalyst Development
Process Modeling and Simulation
Environmental and Corrosion Control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Green hydrogen ecosystem
Chemistry
Electrochemistry
Thermochimistry
Thermodynamics and Heat transfer
Process design and optimization
Process simulation software
Process integration
Professions
Desalination
Renewable Energy Generation
Manufacture of Electric Motors, Generators, Transformers, and Electricity Distribution and Control Apparatus
Manufacture of Batteries and Accumulators
Repair of Electrical Equipment
Manufacture of Tanks, Reservoirs, and Containers of Metal
Industrial Activities
Metanol
Fertilizers
Steel
E-fuels
GH2 station
Fuel Cells
Mobility
Renewable Energy
Production Stage
Storage & compression Stage
Trans. & distribution Stage
Bus Driver/Train Conductor/Taxi Driver
Electronics Technician/Electromechanical Technician
Development Engineer/Smart Grids
Mechanical Engineer/Mechanic
Skills (Know-how)

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Skills gap assessments for the hydrogen value chain

How do we systematically evaluate and address skills gaps in the hydrogen value chain?

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Methodology of skill gap assessments for the hydrogen value chain

Which skills, already acquired by graduates, are currently discernible within the Hydrogen value chain?

1 Questionnaire

- Cover hydrogen value chain skills.
- Use both qualitative and quantitative questions to assess graduate skills

2 Data collection process

- Partner locally for accurate data.
- Conduct structured online surveys to gather data from institutions.

3 Data Analysis

- Compare skills vs. requirements to measure the gap.
- Recommend solutions for identified gaps.

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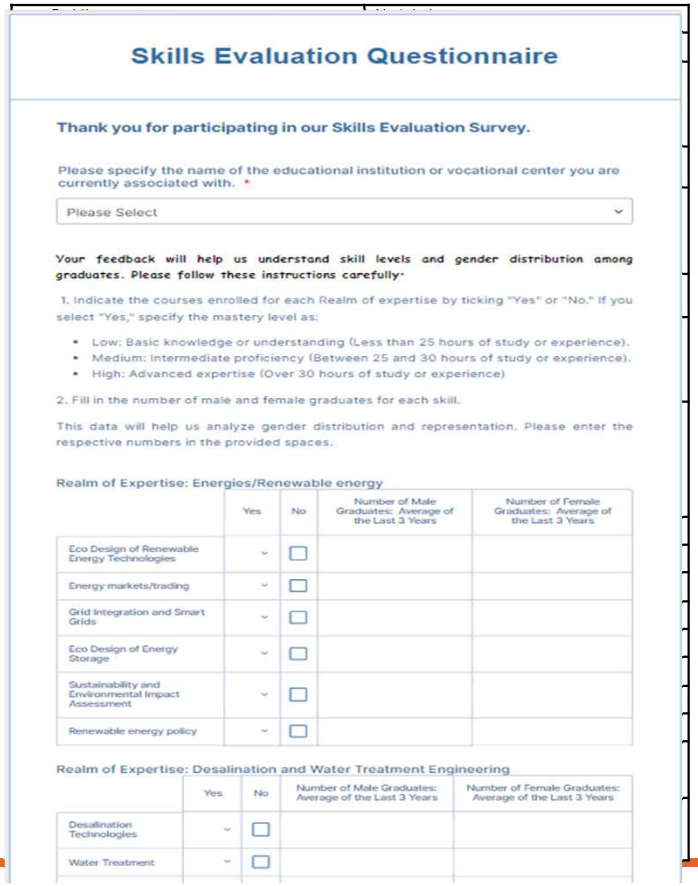
Skill
Level of expertise
Level of grade
Annual graduates
Gender



Skills Evaluation Questionnaire

Thank you for participating in our Skills Evaluation Survey.

Please specify the name of the educational institution or vocational center you are currently associated with. *

Please Select

Your feedback will help us understand skill levels and gender distribution among graduates. Please follow these instructions carefully:

1. Indicate the courses enrolled for each Realm of expertise by ticking "Yes" or "No." If you select "Yes," specify the mastery level as:

- Low: Basic knowledge or understanding (Less than 25 hours of study or experience).
- Medium: Intermediate proficiency (Between 25 and 30 hours of study or experience).
- High: Advanced expertise (Over 30 hours of study or experience)

2. Fill in the number of male and female graduates for each skill.

This data will help us analyze gender distribution and representation. Please enter the respective numbers in the provided spaces.

Realm of Expertise: Energies/Renewable energy

	Yes	No	Number of Male Graduates: Average of the Last 3 Years	Number of Female Graduates: Average of the Last 3 Years
Eco Design of Renewable Energy Technologies		☐		
Energy markets/trading		☐		
Grid Integration and Smart Grids		☐		
Eco Design of Energy Storage		☐		
Sustainability and Environmental Impact Assessment		☐		
Renewable energy policy		☐		

Realm of Expertise: Desalination and Water Treatment Engineering

	Yes	No	Number of Male Graduates: Average of the Last 3 Years	Number of Female Graduates: Average of the Last 3 Years
Desalination Technologies		☐		
Water Treatment		☐		

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Methodology of skill gap assessments for the hydrogen value chain

Professions

What are the prevalent occupations in the country?

- *Country Statistical Data (ISCO-ILO)*
- *Employment outlets*
- *Public/private employment services*

		Egypt-2021			Tunisia-2019			Jordan -2021		
	ISCO-08, 2 digit level	Total	Male	Female	Total	Male	Female	Total	Male	Female
82	Assemblers	61.7	59.8	1.9	42.1	18.8	23.3	-	-	-
12	Administrative and commercial managers	201.4	174.5	26.9	16.6	10.3	6.2	0.2	0.2	
81	Stationary plant and machine operators	823.7	674.4	149.2	208.1	63.6	144.4	24.9	24.9	0
83	Drivers and mobile-plant operators	2332.6	2332.3		199.6	197.9	1.7	121.6	121.6	0
11	Chief executives, senior officials and legislators	142.5	113.5	29	37.6	28.2	9.5	0.3	0.1	
21	Science and engineering professionals	403.1	344.8	58.3	42	30.4	11.5	51.6	40.3	11.3
31	Science and engineering associate professionals	660.1	642.6	17.5	37.7	30.4	7.3	18.3	18	0.4
25	Information and communications technology professionals	34.4	27.9	6.4	13.3	8.1	5.3	11.6	9.2	2.4
71	Building and related trades workers, excluding electricians	3321.3	3318.8	2.5	193.5	191.3	2.2	162.8	162.8	0
72	Metal, machinery and related trades workers	647.4	647.1	-	112.1	108	4.1	71.9	71.9	0

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Methodology of skill gap assessments for the hydrogen value chain.

What the industrial activities may be related to the green hydrogen value chain?

- *Country Statistical data on establishments and employees (ISIC - UNIDO)*

Industrie connexe	ISIC	Description	Maroc 2019		Egypte 2017			Tunisie- 2020		Algérie - 2015	
			Etablissements	Employés	Etablissements	Employés	Employées(Femme)	Etablissements	Employés	Etablissements	Employés
Énergies renouvelables	2610	Fabrication de composants électroniques et de cartes électroniques	23	ND	10	661	48	NPD	28512	ND	ND
	2811	Fabrication de moteurs et turbines	3	ND	2	1815	128	ND	ND	ND	ND
	2710	Fabrication de moteurs électriques, de générateurs, de transformateurs, etc.	40	ND	135	11066	899	123	7600	ND	ND
	2720	Fabrication de batteries et d'accumulateurs	5	ND	22	2863	122	20	1091	ND	ND
	3314	Réparation d'équipements électriques	33	ND	161	1549	72	ND	ND	ND	ND
	3320	Installation de machines et équipements industriels	34	ND	121	1211	56	NPD	5528	ND	ND
	2812	Fabrication d'équipements de puissance hydraulique	7	ND	3	180	6	NPD	ND	ND	ND
Dessalement et traitement de l'eau	3600	Collecte, traitement et distribution d'eau	ND	ND	ND	ND	ND	ND	ND	303	44
	2812	Fabrication d'équipements de puissance hydraulique	7	ND	3	180	6	ND	ND	ND	ND
	4923	Transport d'eau, de liquides, etc. par camions	ND	ND	ND	ND	ND	ND	ND	ND	ND
		GDP per capita	3,853		3,898			3,807		3,700	

ISIC: The UNIDO Industrial Statistics Database


The Skills gap assessment study is just the beginning
to develop the strategy to strengthen the skills in the hydrogen sector.
Education and Training
Quality Education
Vocational and Technical Training
Development of Existing Workforce
Skills Certification
Employee Training Programs
Innovation and Research
Technology Centers
Collaborative Research Initiatives
H2

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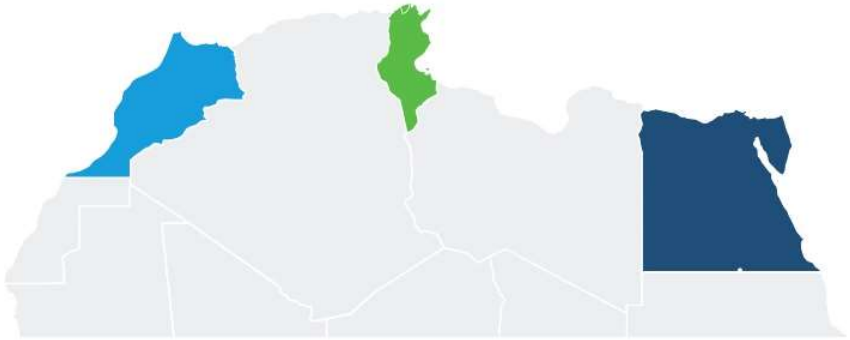
Skills gaps assessment



North Africa

This assessment constitutes a comprehensive endeavor aimed at collecting both quantitative and qualitative data concerning the skills within a country's hydrogen value chain.

The primary goal is to identify and address existing gaps to design targeted strategies for skill enhancement and national-level training programs.

Morocco

Tunisia

Egypt

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Workshop on Green hydrogen Skills Development Methodology

UNIDO hosted a workshop on the methodology for developing green hydrogen skills at the PAGE Green Crossroads 2023 conference.

Workshop Name: Challenges and Opportunities for Morocco's Transition to a Green Economy

Participants: Hydrogen Europe Research, GIZ Morocco, IRESEN

Date: October 26th, 2023

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Global fora and participation in events in Skills Development

UNIDO organized a side event on *green hydrogen skills development* at the International Vienna Energy and Climate Forum.

Name of the event: skills development Skills development for green hydrogen value chains in developing countries. Case study: Tunisia & Morocco

Date: 3rd November 2023.

Co-organizers: Austrian Ministry of Climate, TU Wien, Verbund, Hydrogen Europe Research, ENIT

https://www.youtube.com/watch?v=k2tKfG0ys7w

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THANK YOU!

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