

## 10. Les énergies renouvelables

### 10.5 – IRENA Renewables and jobs

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# Question



ENR2020

- Combien d'emplois représentaient les énergies renouvelables au niveau mondial en 2018 (à un million près)?
  - 11 millions
  - 5 millions
  - 7 millions
  - 14 millions

**Rappel:** Si vous suivez cette présentation en direct sur le web (synchrone), veuillez mettre votre micro par défaut à « silence » ou « mute ». En appuyant sur la barre d'espace, votre micro sera temporairement mis en fonction pour poser une question puis il se refermera automatiquement.

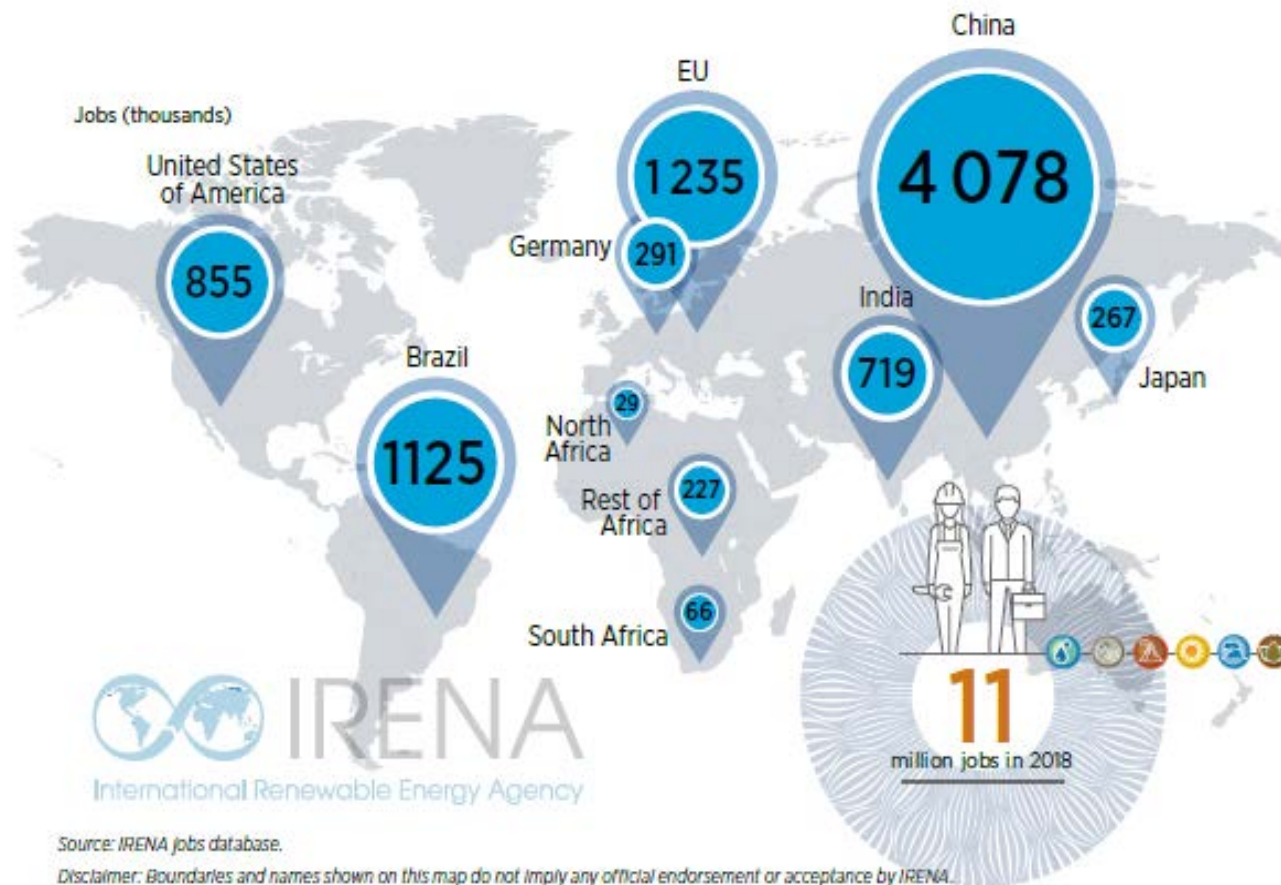
**MERCI**

# Les paramètres clés cette année

## Key Numbers

- 11 million jobs in 2018
- 39 % of all renewable energy jobs are in China
- 3.6 million jobs are in the solar PV industry
- 32 % of renewable energy jobs are held by women

FIGURE 13: RENEWABLE ENERGY EMPLOYMENT IN SELECTED COUNTRIES



# Les faits saillants de l'année

- The global renewable energy sector employed **11 million people** in 2018. This compares with 10.3 million in 2017, based on available information.
- Employment remains concentrated in a handful of countries, with **China, Brazil, the United States, India** and members of the **European Union** in the lead. Asian countries' share remained at 60% of the global total.
- Several factors — including national deployment and industrial policies, changes in the geographic footprint of supply chains and in trade patterns, and industry consolidation trends — **shape** how and where jobs are created.

# Les faits saillants de l'année

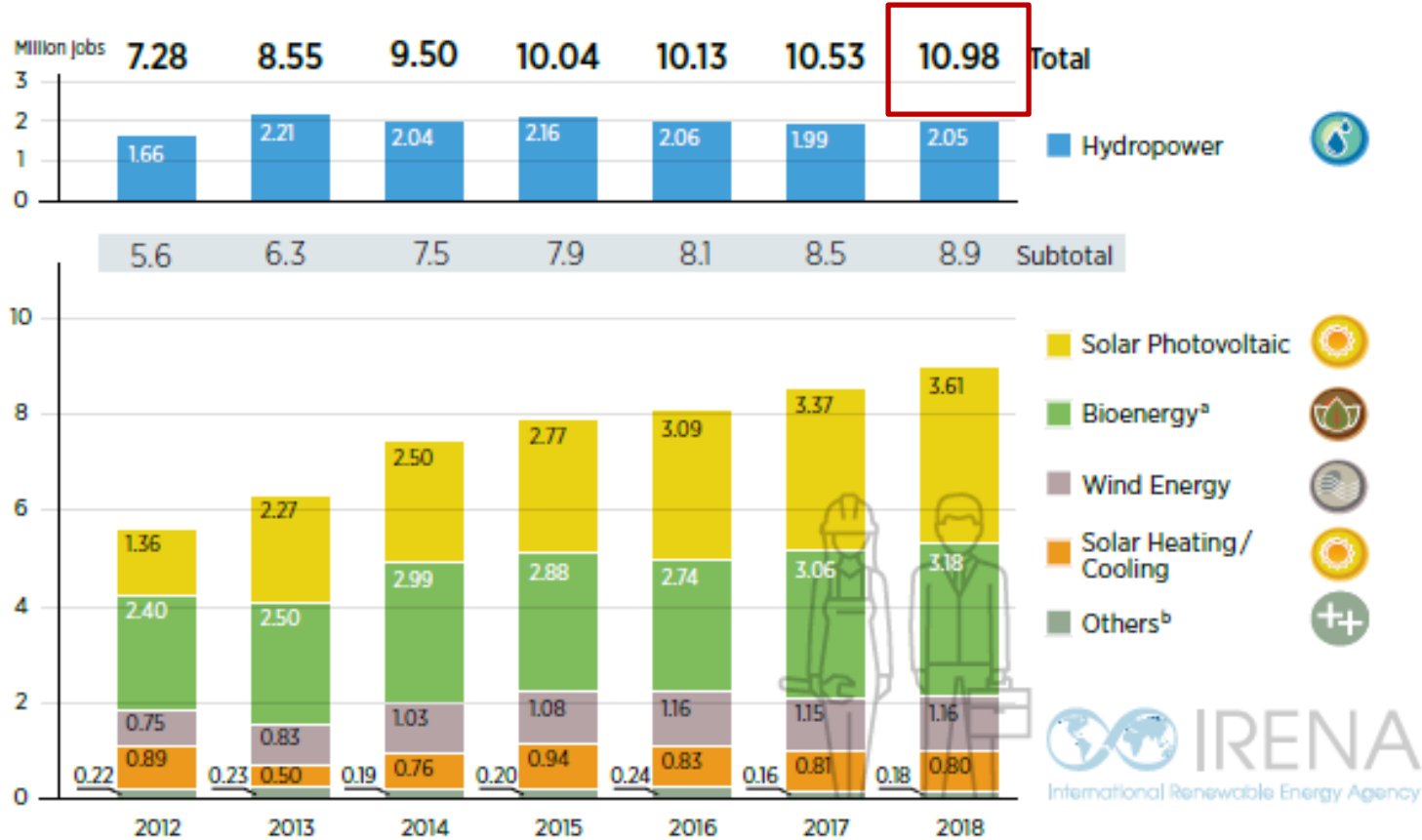
- Nonetheless, the **increasingly diverse geographic footprint** of energy-generation capacities and, to a lesser degree, assembly and manufacturing plants, has created jobs in **a rising number** of countries.
- The solar PV industry retains the **top spot**, with a third of the total renewable energy workforce. In 2018, PV employment expanded in India, Southeast Asia and Brazil, while China, the United States, Japan and the European Union **lost** jobs.
- Rising off-grid solar sales are translating **into growing numbers of jobs** in the context of expanding energy access and spurring economic activities in previously isolated communities.

# Les faits saillants de l'année

- Rising output pushed **biofuel** jobs up 6% to 2.1 million. Brazil, Colombia, and Southeast Asia have labour-intensive supply chains, whereas operations in the United States and the European Union are far more mechanised.
- Employment in **wind power** supports 1.2 million jobs. Onshore projects predominate, but the offshore segment is **gaining traction** and could build on expertise and infrastructure in the offshore oil and gas sector.
- Hydropower has the largest installed capacity of all renewables but is now expanding **slowly**. The sector employs 2.1 million people directly, three quarters of whom are in operations and maintenance.
- While the analysis suggests job growth in 2018, some of the increase reflects the continued improvement and refinement of methodologies that allows a rising share of employment to be captured in statistics.

# Emplois

FIGURE 1: GLOBAL RENEWABLE ENERGY EMPLOYMENT BY TECHNOLOGY, 2012-2018



Source: IRENA jobs database.

Note: Except for hydropower where a revised methodology led to revisions of job estimates, numbers shown in this figure reflect those reported in past editions of the Annual Review.

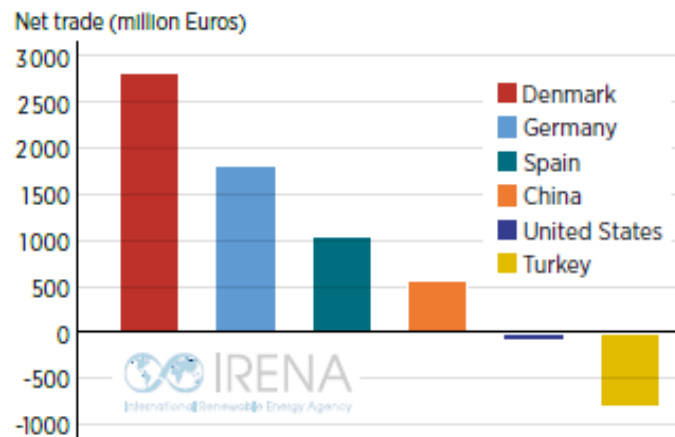
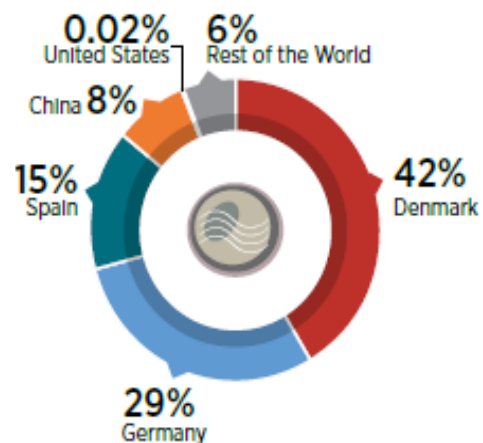
a. Includes liquid biofuels, solid biomass and biogas.

b. Other technologies include geothermal energy, concentrated solar power, heat pumps (ground-based), municipal and industrial waste, and ocean energy.

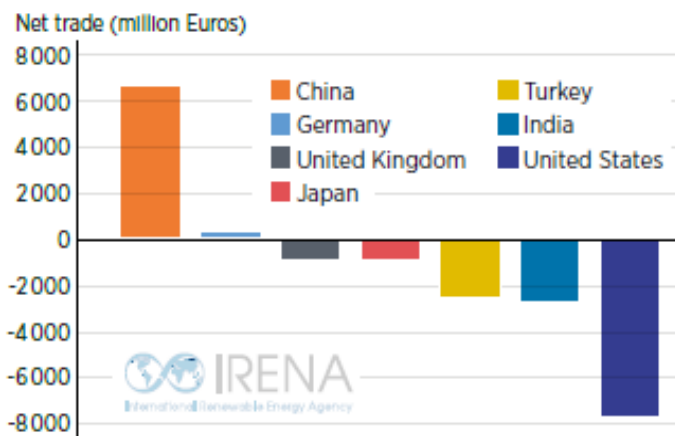
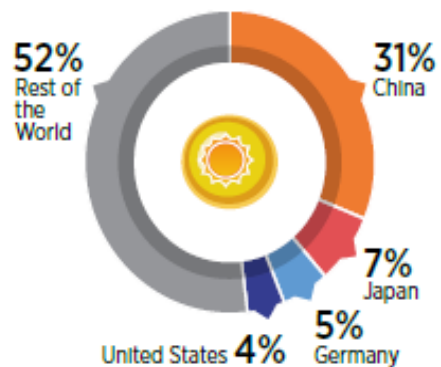
# Exportations et valeurs («Wind, Solar PV»)

FIGURE 2: SHARE OF GLOBAL EXPORTS AND NET TRADE VALUES IN THE WIND AND SOLAR PV SECTORS FOR SELECTED COUNTRIES, 2016<sup>2</sup>

## WIND



## SOLAR PV

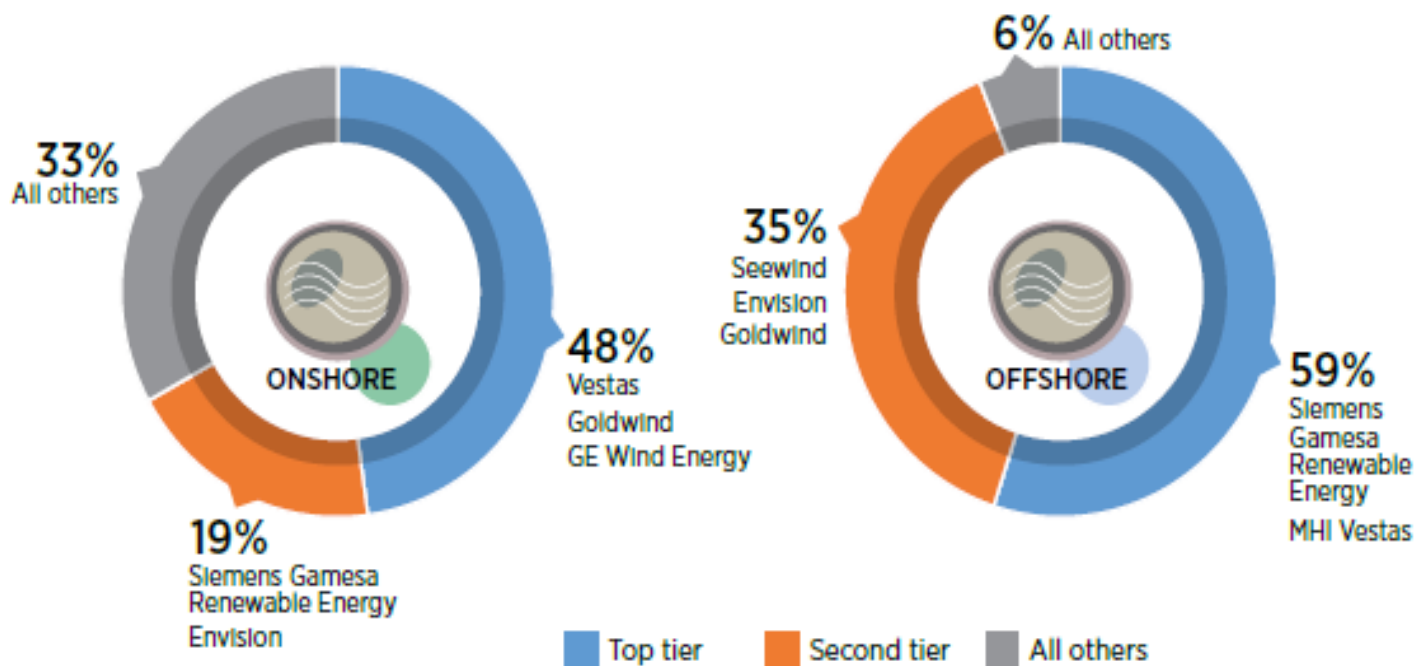


Source: EurObserv'ER, 2019.



# Producteurs éoliens («Onshore, Offshore»)

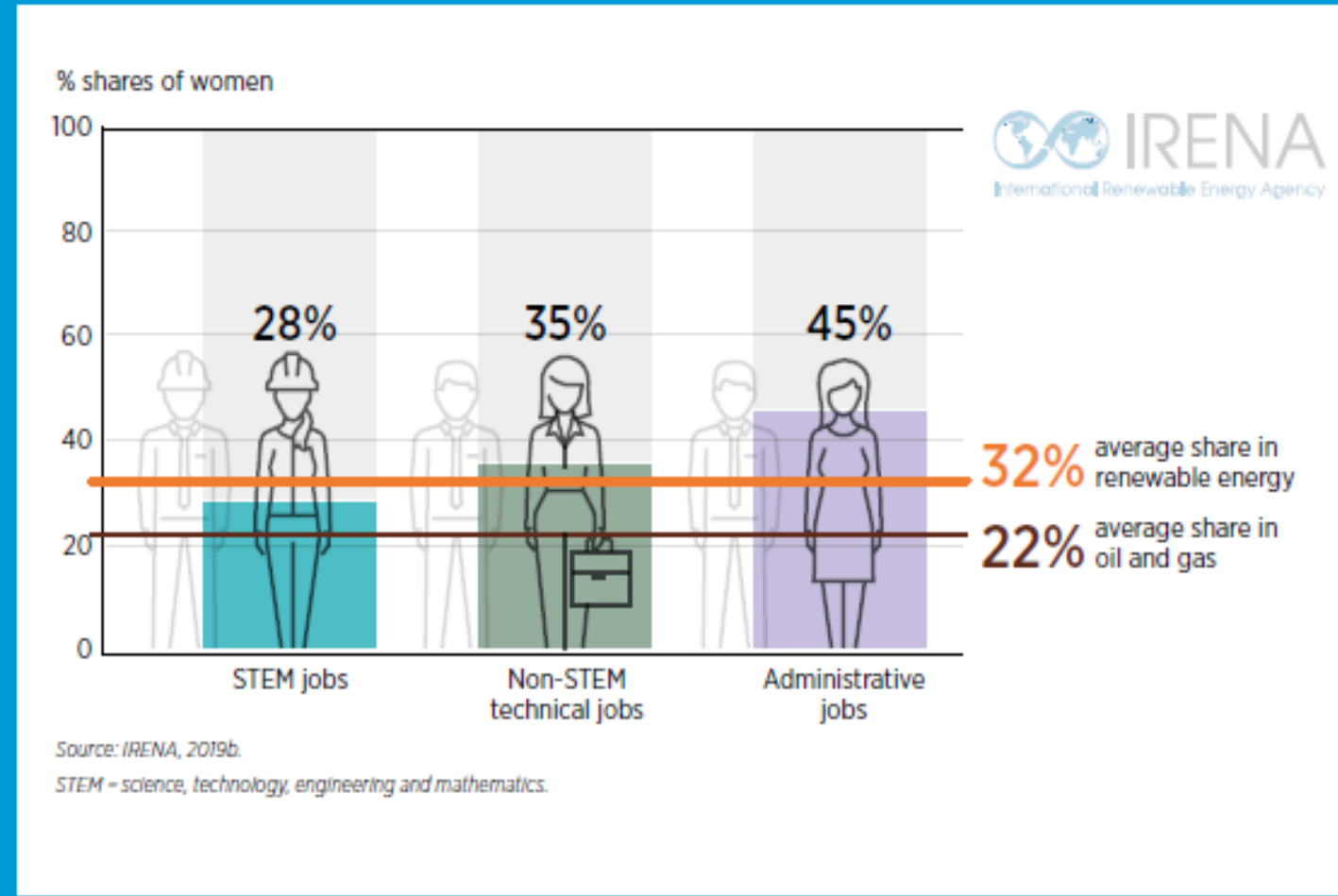
FIGURE 3: MARKET SHARES, ONSHORE AND OFFSHORE WIND, 2018



Source: Wood Mackenzie, 2019.

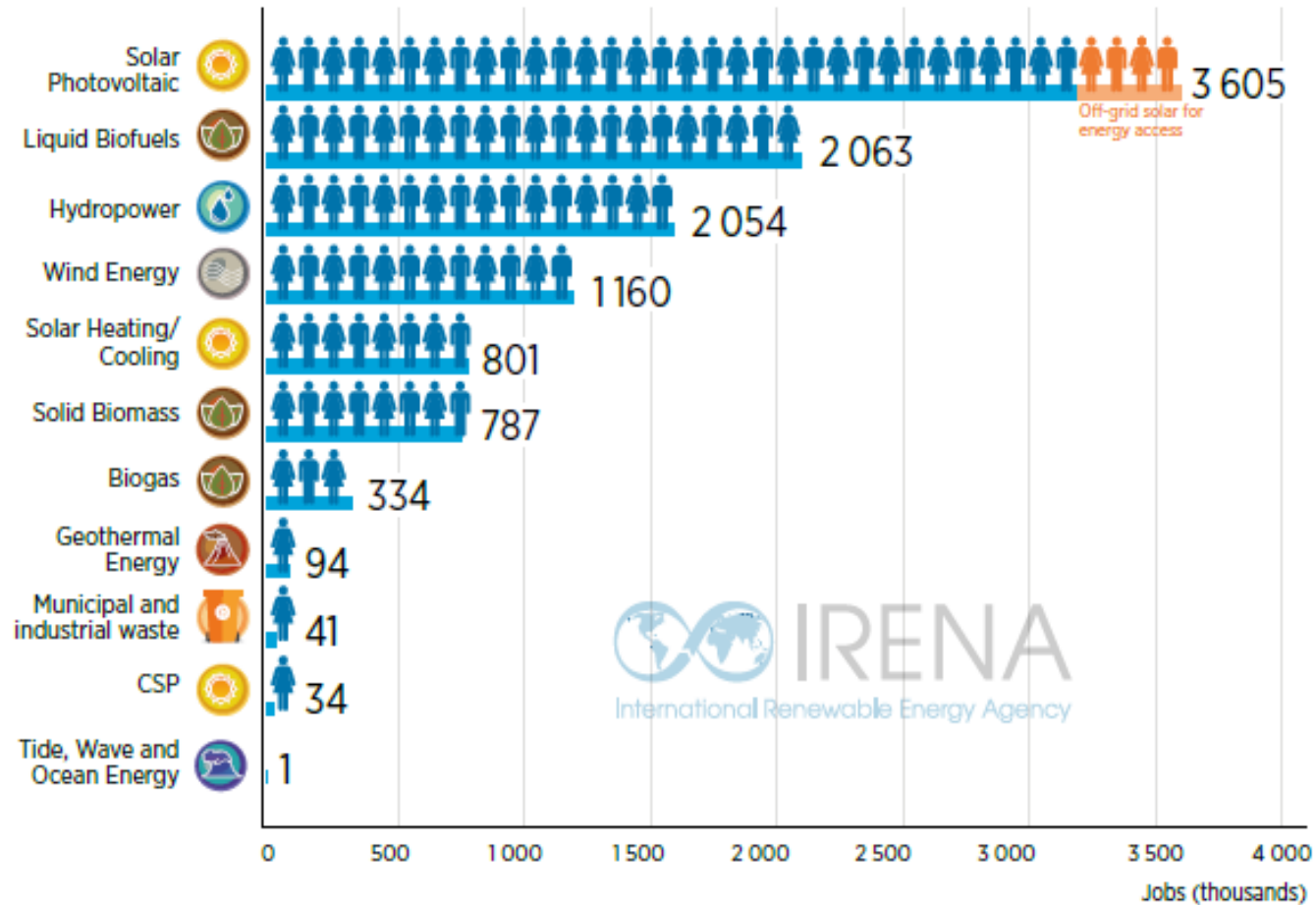
# Femmes sur le marché des énergies renouvelables

FIGURE 4: SHARES OF WOMEN IN STEM, NON-STEM AND ADMINISTRATIVE JOBS IN RENEWABLE ENERGY



# Emplois par technologie

FIGURE 5: RENEWABLE ENERGY EMPLOYMENT BY TECHNOLOGY



Source: IRENA jobs database.

Note: Another 7 600 jobs, not shown separately here, cannot readily be broken down by individual renewable energy technology.

# Emplois par technologie

- Solaire PV

FIGURE 6: TOP 10 COUNTRIES IN SOLAR PV EMPLOYMENT

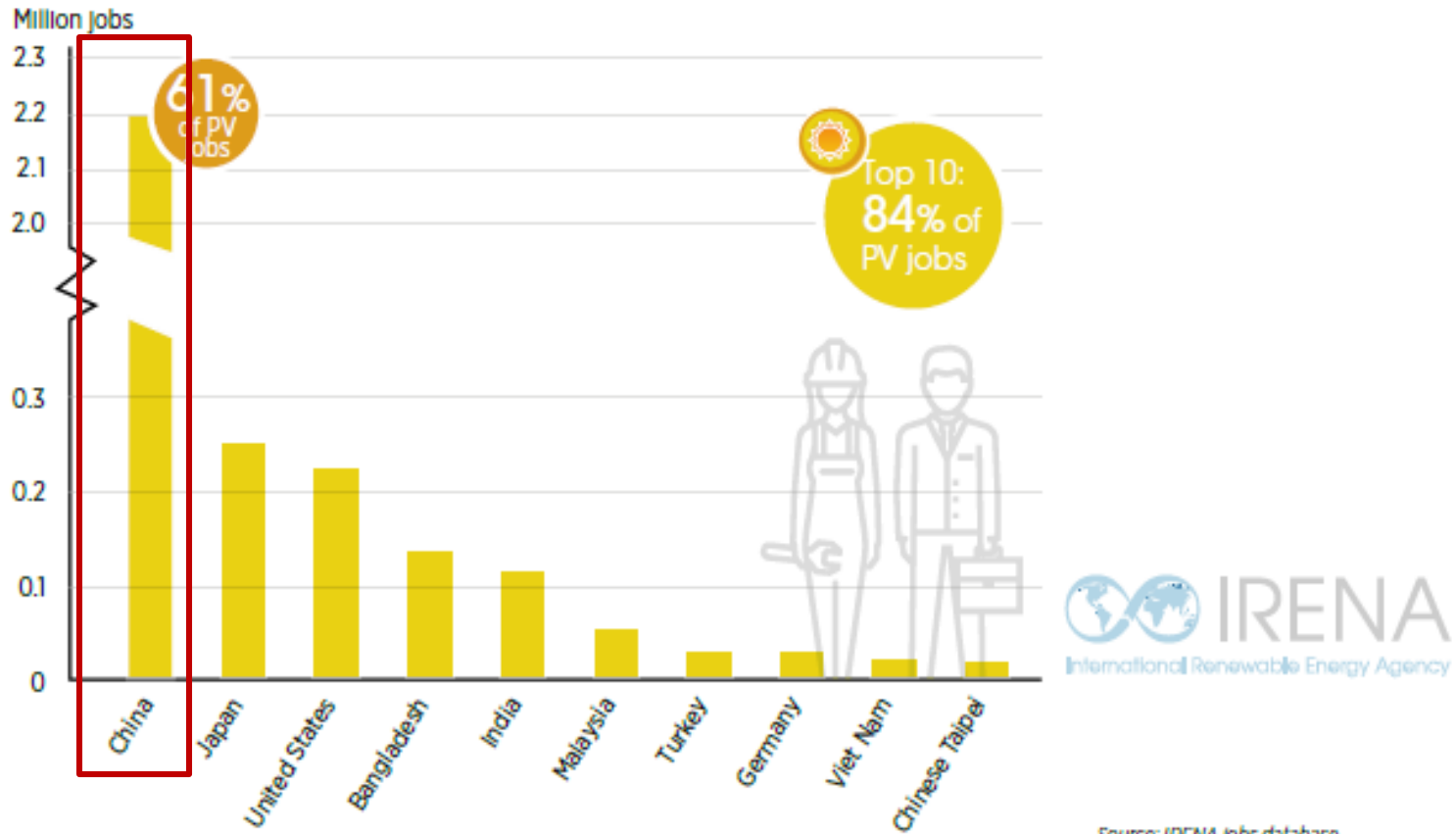
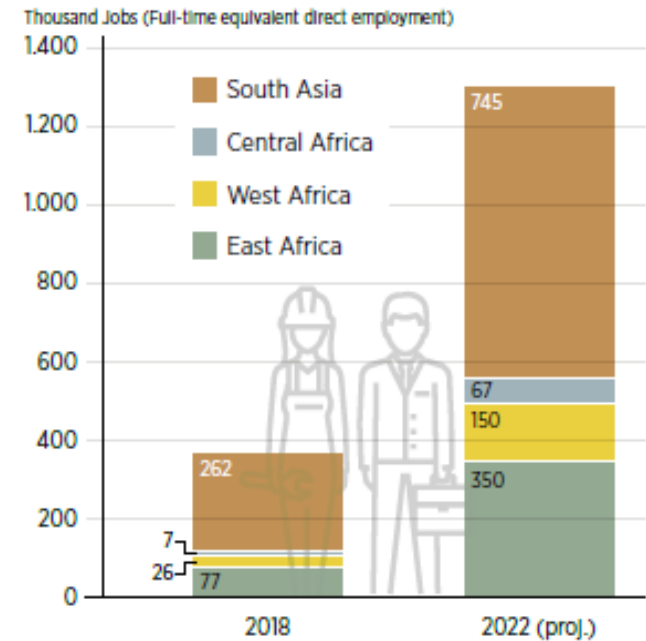


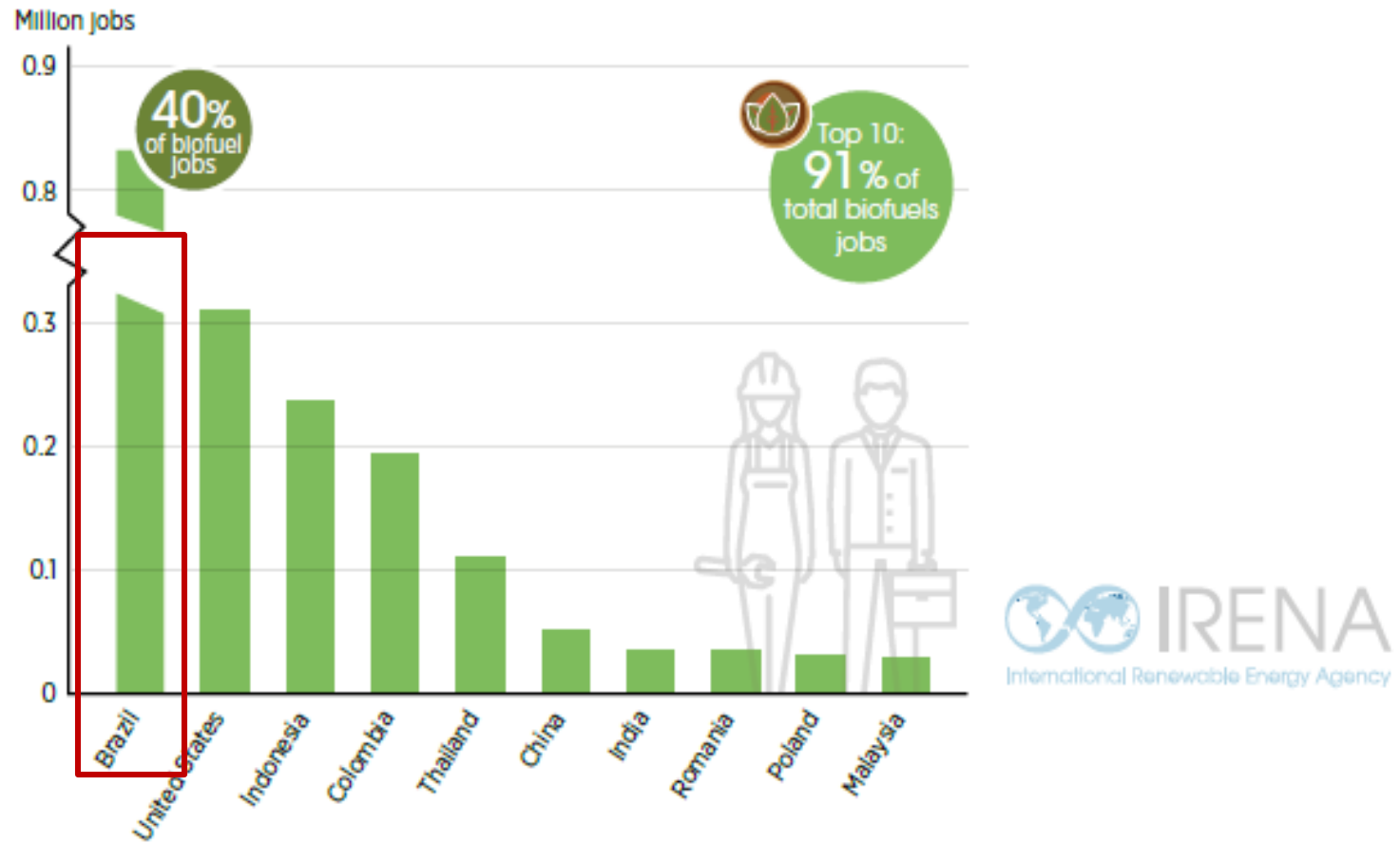
FIGURE 12: DIRECT EMPLOYMENT IN OFF-GRID SOLAR, 2018 AND 2022



# Emplois par technologie

- Biocarburant

FIGURE 7: TOP 10 COUNTRIES FOR EMPLOYMENT IN LIQUID BIOFUELS

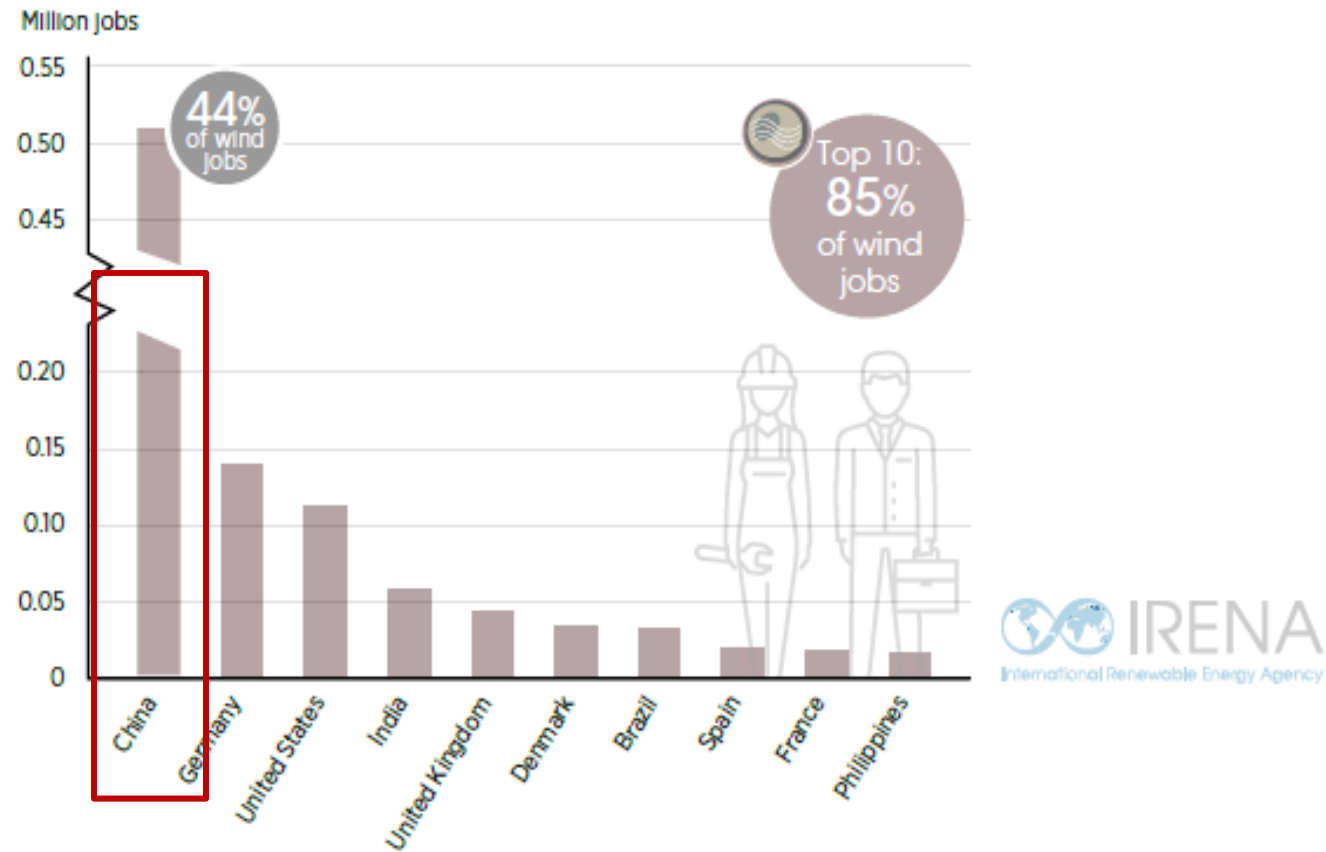


Source: IRENA jobs database.

# Emplois par technologie

- Éolien

FIGURE 8: TOP 10 COUNTRIES FOR WIND EMPLOYMENT

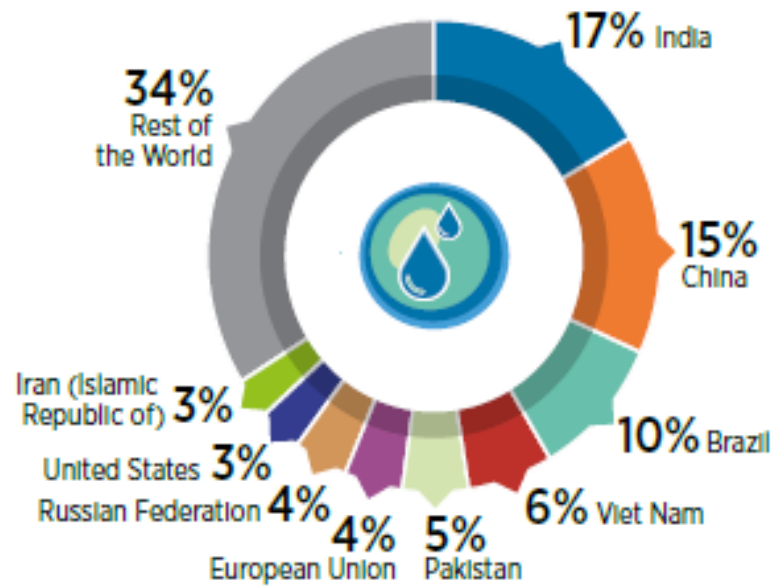


Source: IRENA jobs database.

# Emplois par technologie

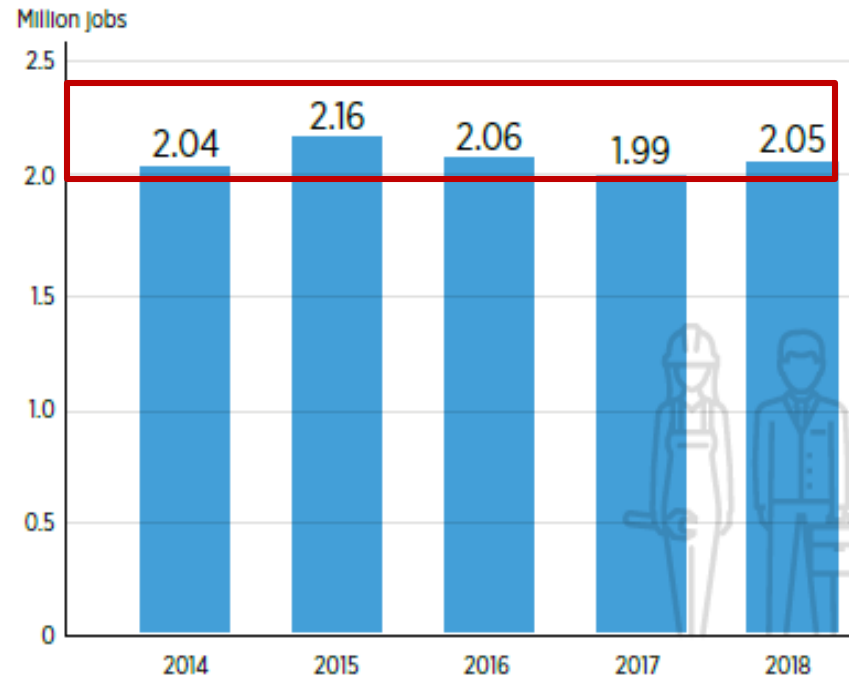
- Hydroélectrique

FIGURE 11: HYDROPOWER EMPLOYMENT BY COUNTRY, 2018



Source: IRENA jobs database.

FIGURE 10: HYDROPOWER EMPLOYMENT, 2014-2018



Source: IRENA jobs database.

Note: Employment in hydropower is derived from a macroeconomic model and adjusted with national and regional data.

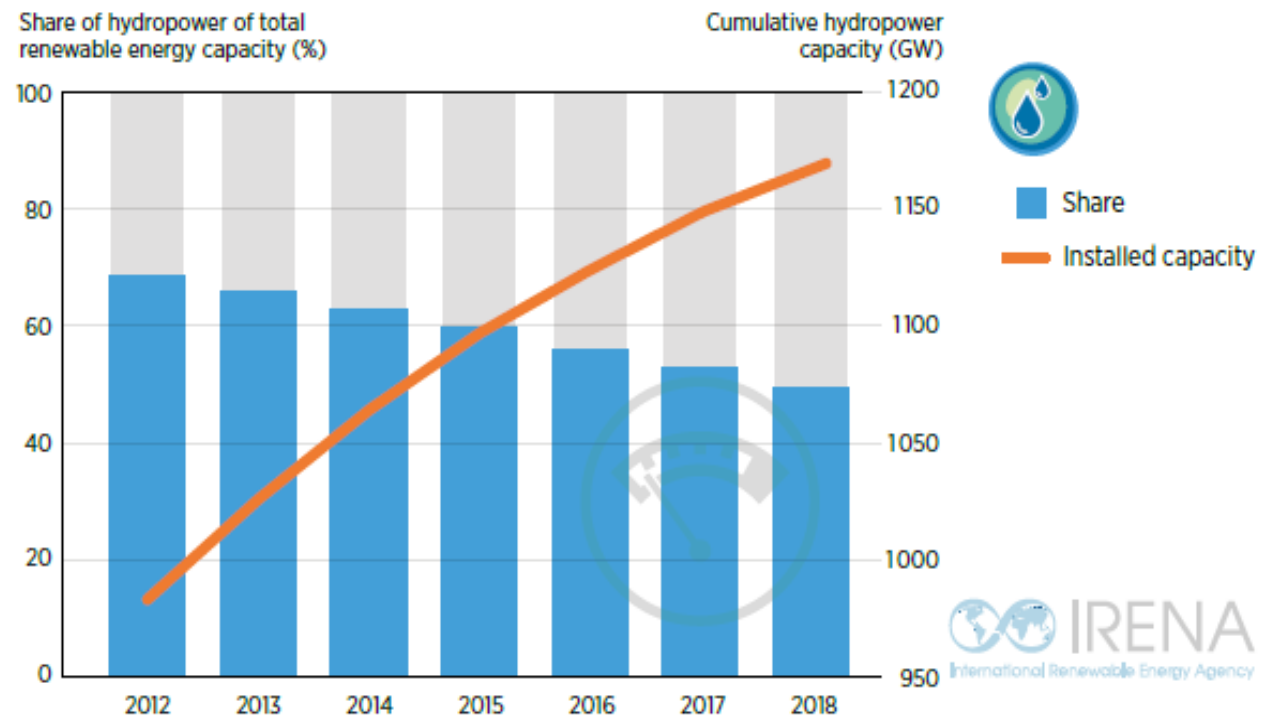


 IRENA  
International Renewable Energy Agency

# Emplois par technologie

- Hydroélectrique
  - Of all renewable energy technologies, hydropower continues to have the largest installed capacity. In 2018, it accounted for almost 50% of renewable energy in the world, but the share has declined as other renewables, in particular solar PV and wind, have grown faster than hydropower.

FIGURE 9: HYDROPOWER CAPACITY, TOTAL AND RELATIVE TO ALL RENEWABLE ELECTRICITY CAPACITY, 2012-2018



Source: IRENA, 2019b.



# Question



ENR2020

- Combien d'emplois représentaient les énergies renouvelables au Québec en 2018?
  - 5 000
  - 2 000
  - 10 000
  - 8 000

# «Leading market» - En résumé

## CHINA



**39%** of global renewable energy jobs

- Solar PV: **2.2 million** jobs
- Solar Water Heating: **670 000** jobs
- Wind: **510 000** jobs

## BRAZIL



**Largest** biofuels employer

- Biofuels: **832 000** jobs
- Solar Water Heating: **41 000** jobs
- Solar PV: **15 600** jobs
- Wind: **34 000** jobs

## United States



**Largest** biofuels producer

- Biofuels: **311 000** jobs
- Solar: **242 000** jobs
- Wind: **114 000** jobs

## INDIA



**719 000** jobs

- Hydropower: **347 000** jobs
- Solar PV: **115 000** jobs (Grid-connected)
- Wind: **58 000** jobs

## EUROPEAN UNION

















**1.2 million** jobs

- Solid biomass: **387 000** jobs
- Wind: **314 000** jobs
- Solar PV: **96 000** jobs

# «Leading market» - En résumé

TABLE 2. ESTIMATED DIRECT AND INDIRECT JOBS IN RENEWABLE ENERGY WORLDWIDE, BY INDUSTRY, 2017-18

Thousand Jobs

	World	 China	 Brazil	 United States	 India	 European Union <sup>k</sup>
<b>Solar Photovoltaic</b> 	3 605 <sup>e</sup>	2 194	15.6	225	115 <sup>k</sup>	96
<b>Liquid biofuels</b> 	2 063	51	832 <sup>g</sup>	311 <sup>h</sup>	35	208
<b>Hydropower</b> 	2 054	308	203	66.5	347	74
<b>Wind power</b> 	1 160	510	34	114	58	314
<b>Solar heating/cooling</b> 	801	670	41	12	20.7	24 <sup>m</sup>
<b>Solid biomass</b> <sup>a,b</sup> 	787	186		79 <sup>i</sup>	58	387
<b>Biogas</b> 	334	145		7	85	67
<b>Geothermal energy</b> <sup>c,d</sup> 	94	2.5		35 <sup>j</sup>		23 <sup>d</sup>
<b>CSP</b> 	34	11		5		5
<b>Total</b>	<b>10 983<sup>i</sup></b>	<b>4 078</b>	<b>1 125</b>	<b>855</b>	<b>719</b>	<b>1 235</b>

Source: IRENA jobs database.

# Au Canada

- Canada has long had a footprint in hydropower and biomass, but wind is growing in importance, particularly in the provinces of Ontario and Quebec. Wind contributed **6%** to national electricity in 2018.
- In Quebec, the industry employs **5 000 full-time workers**, including 1 000 in the city of Montreal.

# Au Canada

- Wind power has also helped to promote economic development in the Gaspé peninsula, where an industrial cluster of some **30 businesses** comprises **1 000 direct jobs**. Among them is a blade factory producing for the Canadian and US markets. Its expansion brought employment to 450 in 2018.
- The province of Alberta has the **third-largest** installed capacity. A supply chain study found that 4.5 GW worth of new projects could result in about 14 900 job-years of employment by 2030.



**Merci de votre attention !**

Si vous avez des questions à formuler, veuillez les poser par écrit et spécifier le nom et le numéro de la présentation. Nous vous répondrons le plus rapidement possible.

# Période de questions

