



Open Power for a brighter future


The evolution of the energy sector. A vision of the future

Barranquilla, March 12th, 2020

Iceland, Ok Glacier

An aerial photograph of the Ok Glacier in Iceland. The glacier is a large, brownish-grey mass with a prominent circular meltwater pond in the center. The surrounding terrain is rugged and rocky, with patches of snow and ice. The image is oriented vertically, with the glacier's flow direction from top to bottom.

September 14, 1986



Iceland, Ok Glacier

Glacier
Shrunk

From 3 km²
to <1 km²

August 1, 2019

North Europe

A satellite image of North Europe, showing the continent's outline in white. The land is covered in dense green and brown vegetation, with some white patches indicating snow or ice. The surrounding oceans are dark blue, and there are large, white, billowing clouds over the sea.

July 19, 2017



North Europe

Severe drought
Agriculture and
forestry losses
3.3 €bn

July 24, 2018

Australia, Eastern States

A satellite image of the Eastern States of Australia, showing the coastline, major cities, and surrounding waters. The image is oriented vertically, with the top of the frame showing the northern part of the continent and the bottom showing the southern part. The land is a mix of brown and green, indicating different vegetation and terrain. The ocean is dark blue, and there are white clouds scattered across the scene.

November 1, 2019

A satellite-style map of Australia showing the continent's terrain and coastline. Numerous small red dots are scattered across the eastern and southern parts of the continent, indicating the locations of wildfires. The text is overlaid on the left side of the map.

Australia, Eastern States

Wildfires burnt
an area as big
as Iceland

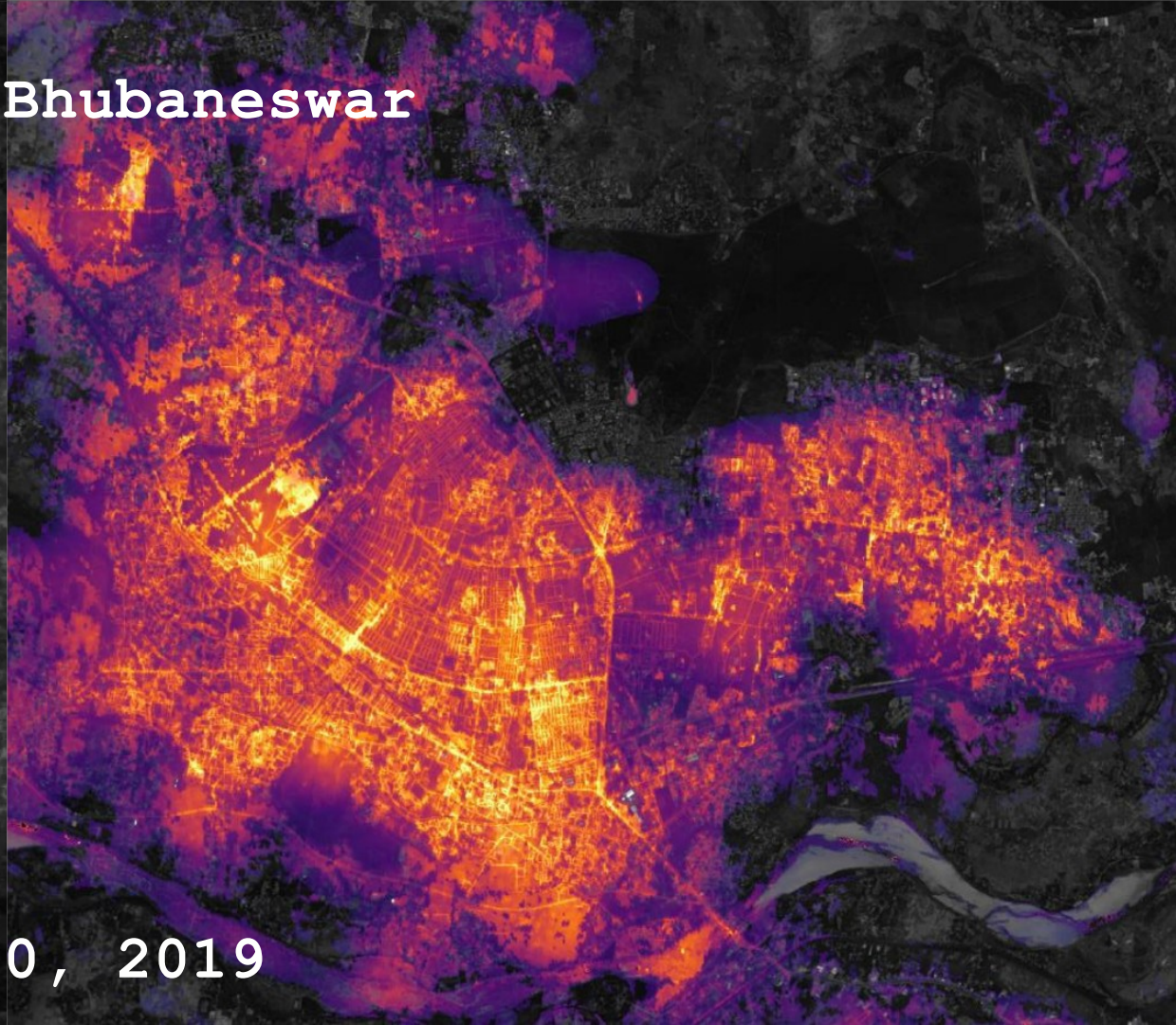
Agriculture and
forestry losses
4,3 €bn

January 3, 2020

India, Bhubaneswar



April 30, 2019



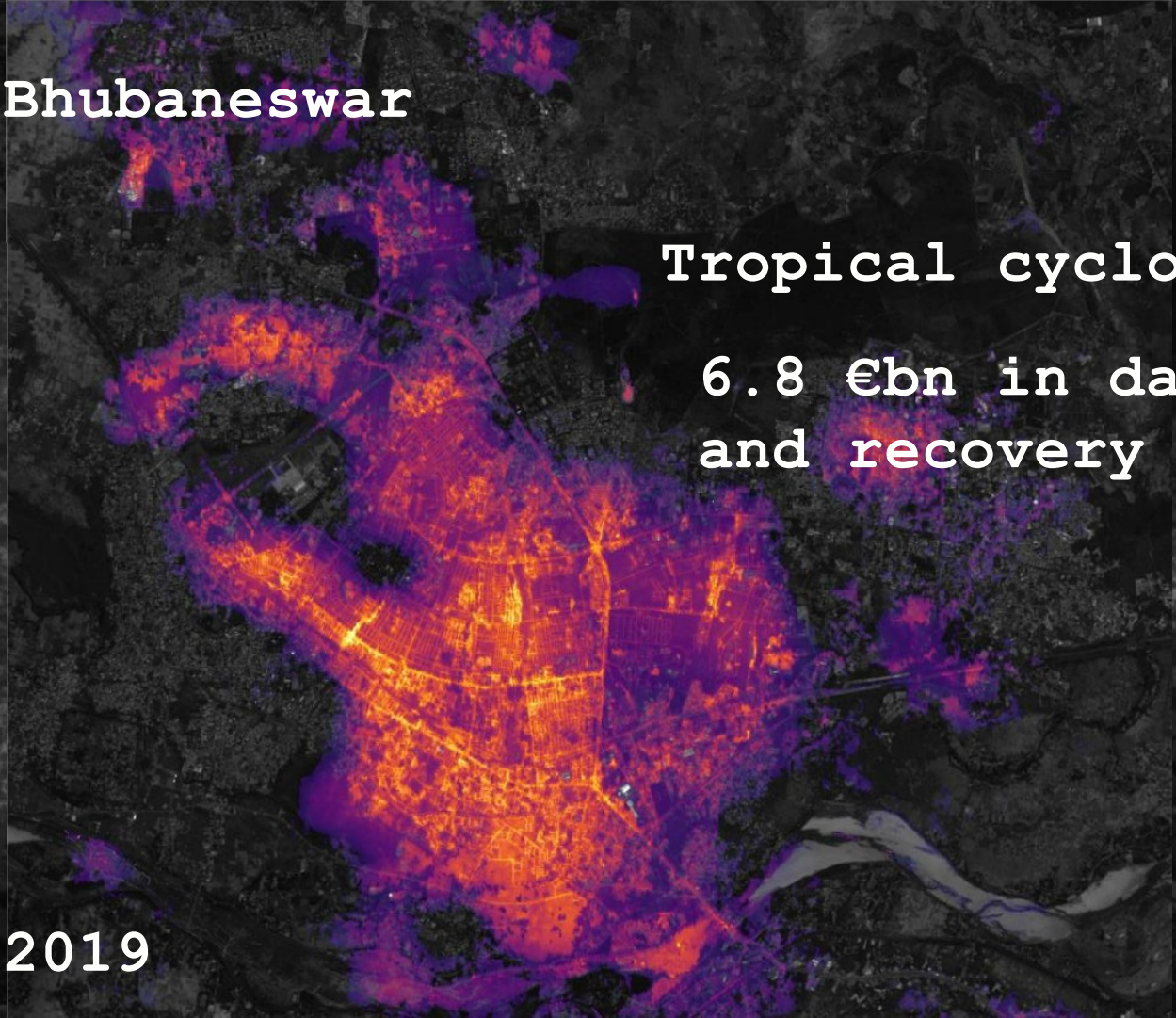
India, Bhubaneswar



Tropical cyclon Fani

6.8 €bn in damages
and recovery needs

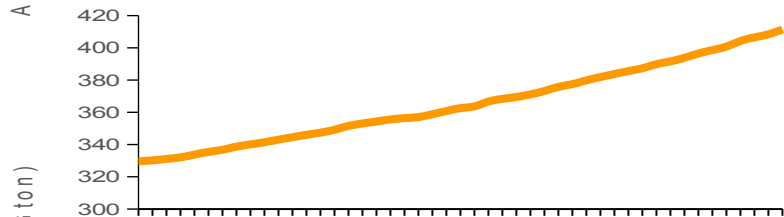
May 5, 2019



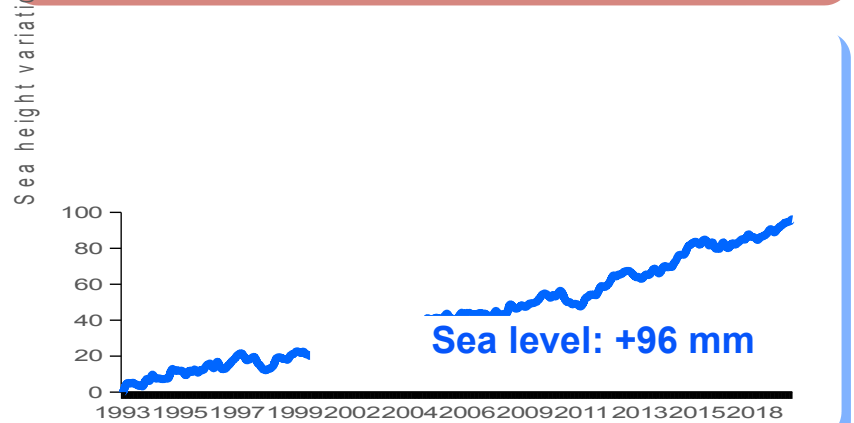
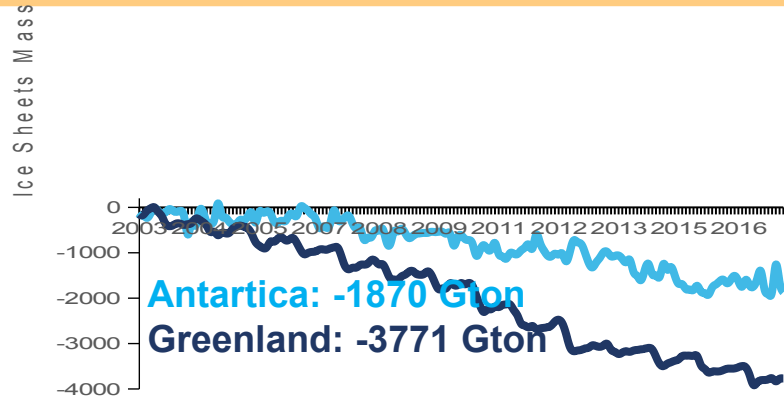
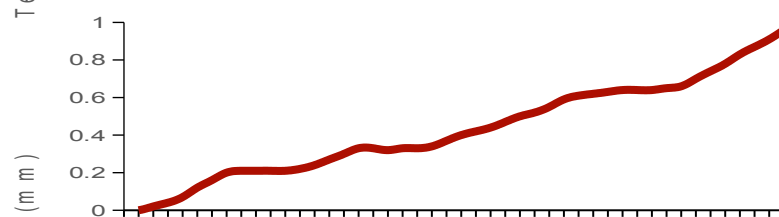
Climate indicators worsening faster than expected



Atmospheric CO₂: +82 ppm



Global temperature: +0.96°C





Present-day
shoreline





BBC

NEWS

Science & Environment

Climate change: 'Hothouse Earth' risks even if CO2 emissions slashed



ALJAZEERA

NEWS / CLIMATE SOS

Earth at risk of tipping into hellish 'hothouse' conditions

World could be entering warmer period that would see average temperatures rise by between four and five

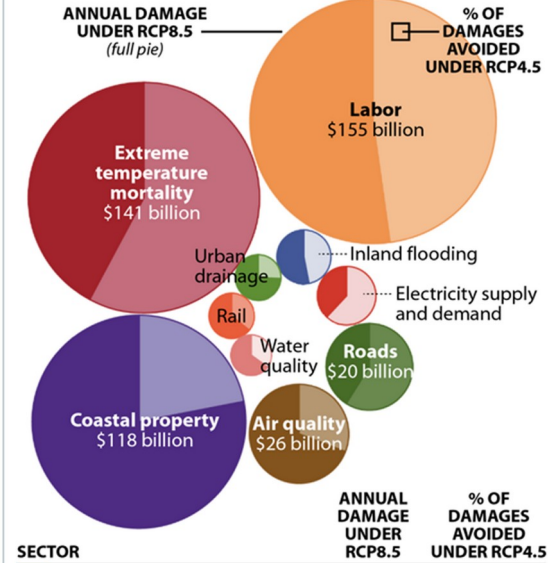
CNN

Earth at risk of becoming 'hothouse' tipping point reached, report warns

By Euan McKirdy, CNN



Climate Change's Economic Impact



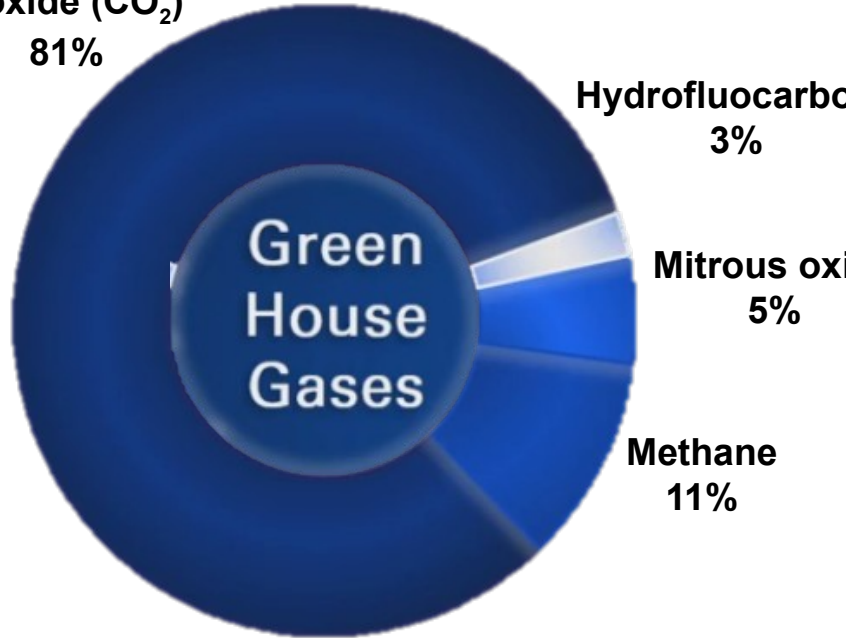
SOURCE: Fourth National Climate Assessment InsideClimate News

Global Warming causes

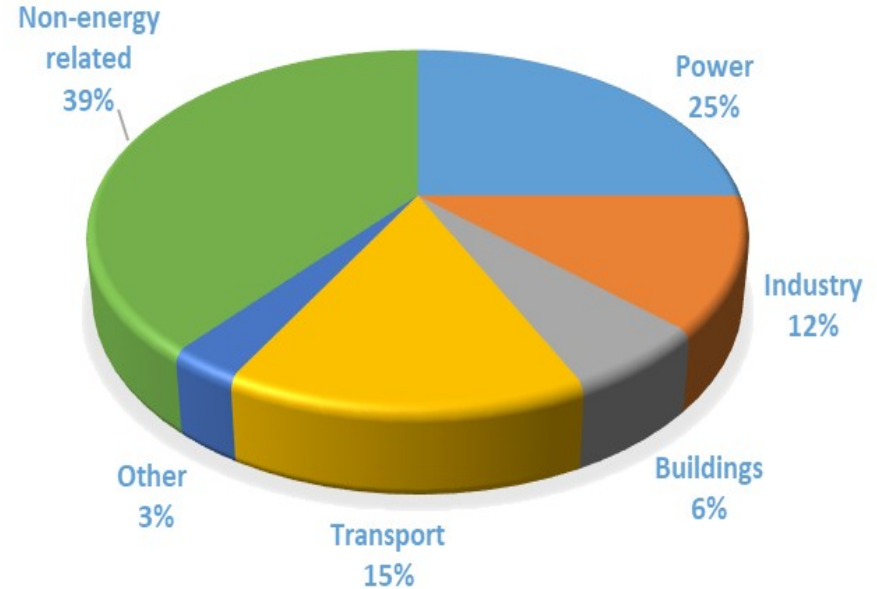
Energy- related emissions account for global carbon emissions



Carbon dioxide (CO₂)
81%



2017 GLOBAL CO₂ EMISSIONS



60% of total CO₂ emissions are energy-related (power, industry, buildings and transport)

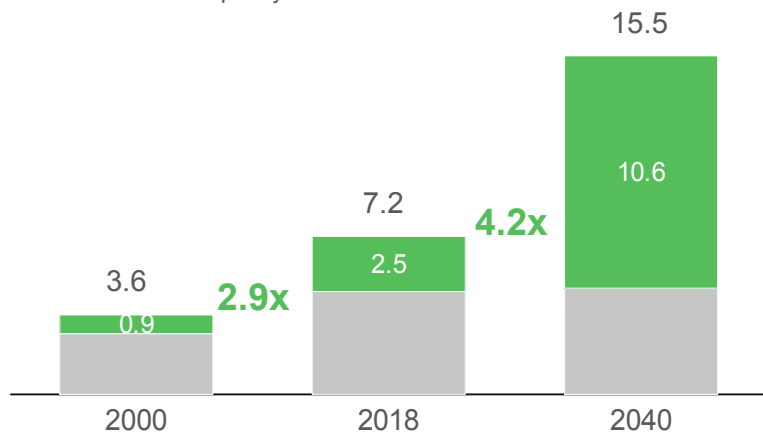
Decarbonisation through new renewables



Global installed capacity¹

(TW)

■ Renewable capacity



RES Investments²
(\$bn)

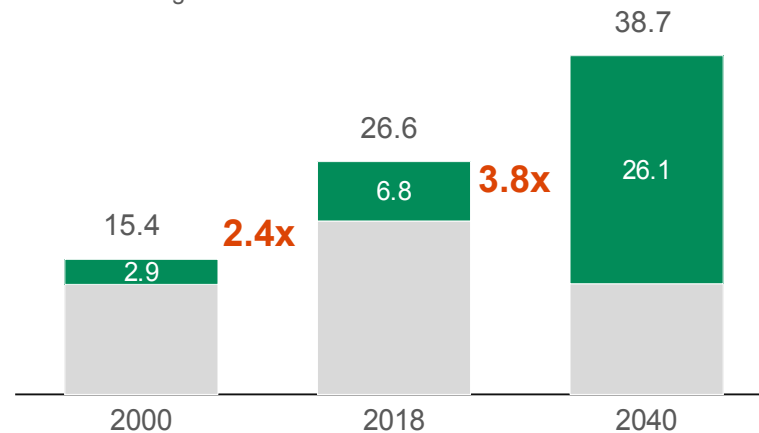
304

670

Global generation¹

('000 TWh)

■ Renewable generation



Carbon intensity
(gCO₂/kWh)

476

81

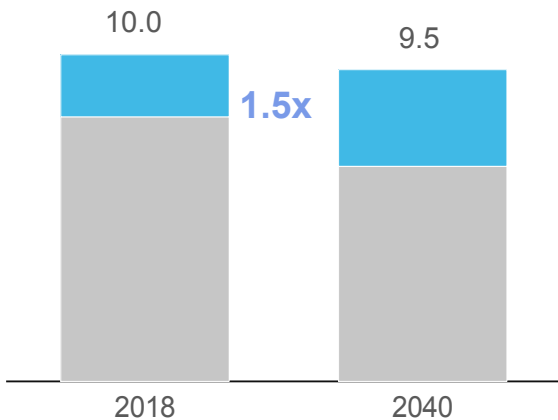
Electricity is winning the energy battle



Global final consumptions

(Gtoe)

■ Electricity share

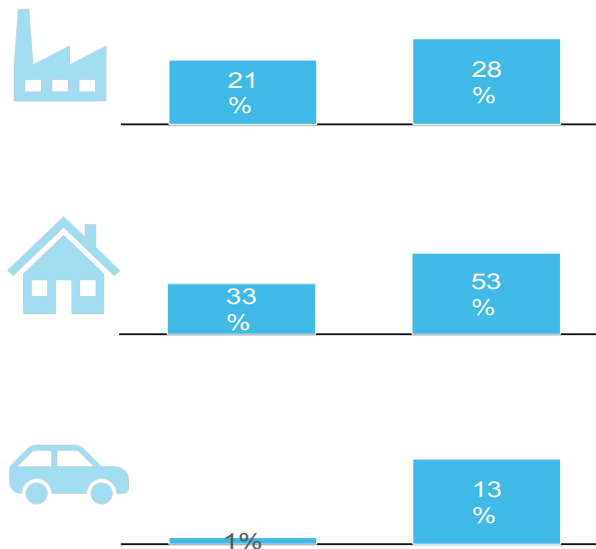


Share in useful energy

24%

43%

Electrification by sector



Top 10 PV Market by Installed Capacity

2018 - 2030



2018 Top 10 PV Markets - GW

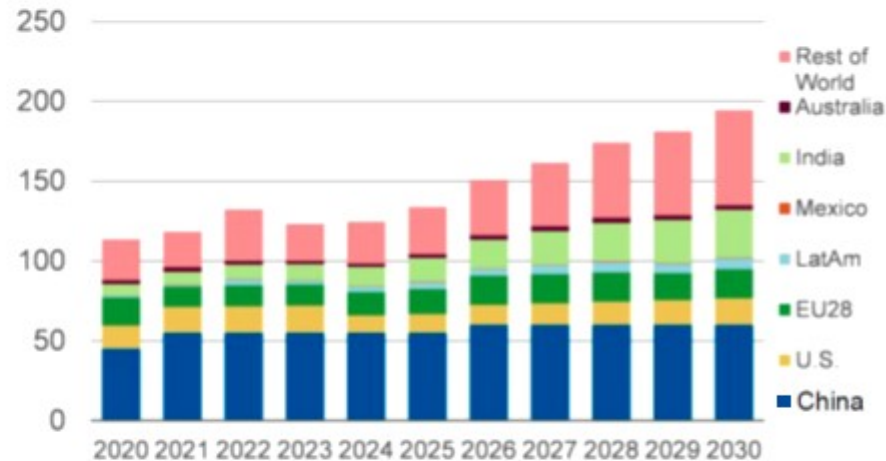
69%



- ✓ China is the top player in PV generation and is projected to maintain 50 GW/y of solar additions
- ✓ India will have an important growth in the next years
- ✓ LatAm projected to remain a small player in PV, notwithstanding a good solar irradiation

Growth in Solar Power capacity, 2020-30

Solar Additions (GW)



Source: Morgan Stanley Research estimates

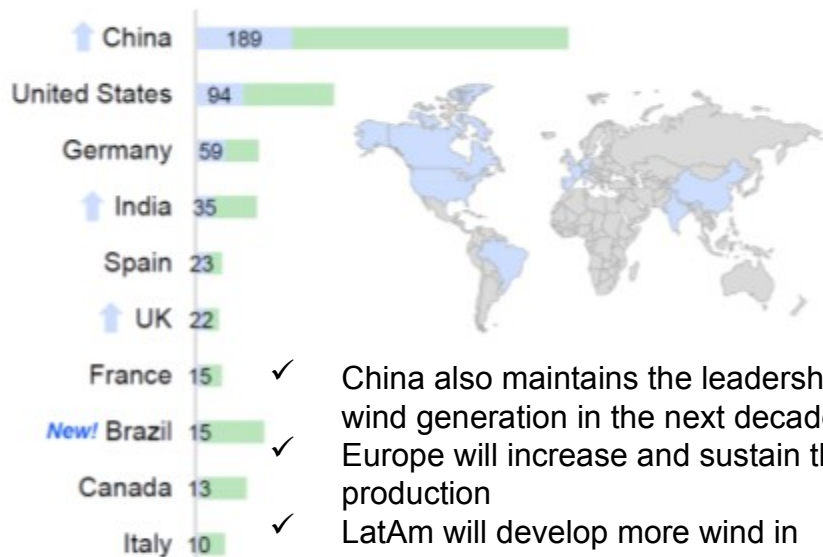
Top 10 Wind onshore Market by Installed Capacity

2018 - 2030



2018 Top 10 Wind Markets - GW

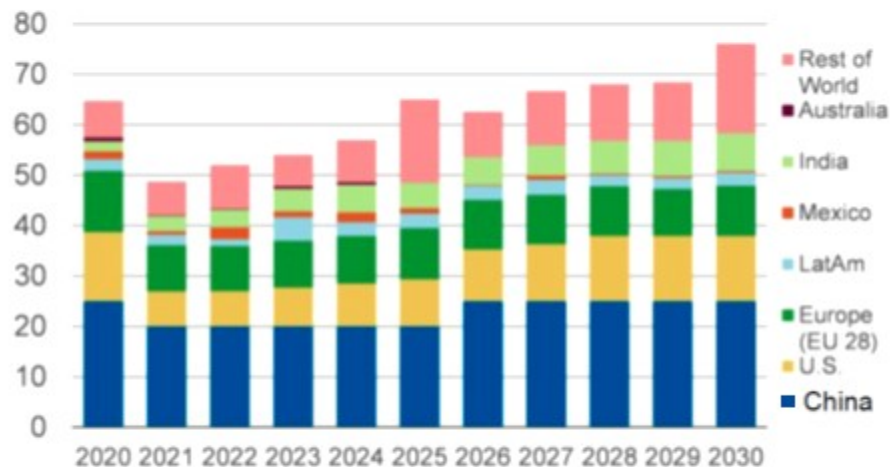
83%



China also maintains the leadership in wind generation in the next decade
 Europe will increase and sustain the production
 LatAm will develop more wind in comparison with PV

Growth in Onshore Wind power, 2020-30

Onshore Wind Additions (GW)



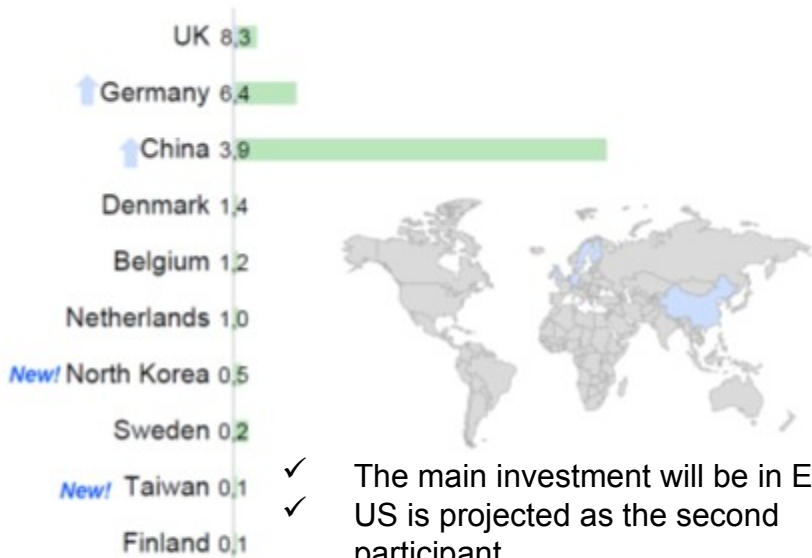
Source: Morgan Stanley Research estimates

Top 10 Offshore Wind Market by Installed Capacity



2018 Top 10 Wind Markets - GW

95%



- ✓ The main investment will be in Europe
- ✓ US is projected as the second participant
- ✓ China will have a small growth.

Growth in Offshore Wind power, 2020-30

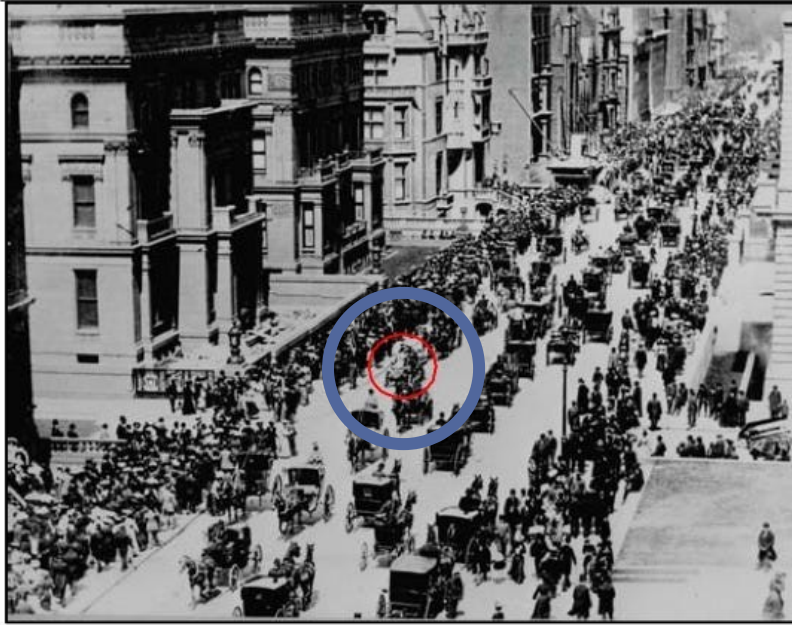
Offshore Wind Additions (GW)



Source: Morgan Stanley Research estimates

Fast changes in technology

Easter morning 1900: 5th Ave, New York City. Spot the automobile.



Source: US National Archives.

Easter morning 1913: 5th Ave, New York City. Spot the horse.



Source: George Grantham Bain Collection.



Thank you

WORLD
ENERGY
COUNCIL

COLOMBIA

SerCOLOMBIA
Asociación Energía Renovable



4^{to} ENCUENTRO
INTERNACIONAL DE
**ENERGÍAS
RENOVABLES**
Liderando la Transición Energética

12-13
de marzo
2020

Hotel Dann Carlton
Barranquilla