

# The role of science, technology and innovation to increase substantially the share of renewable energy by 2030

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# Policies to promote use of renewable energies

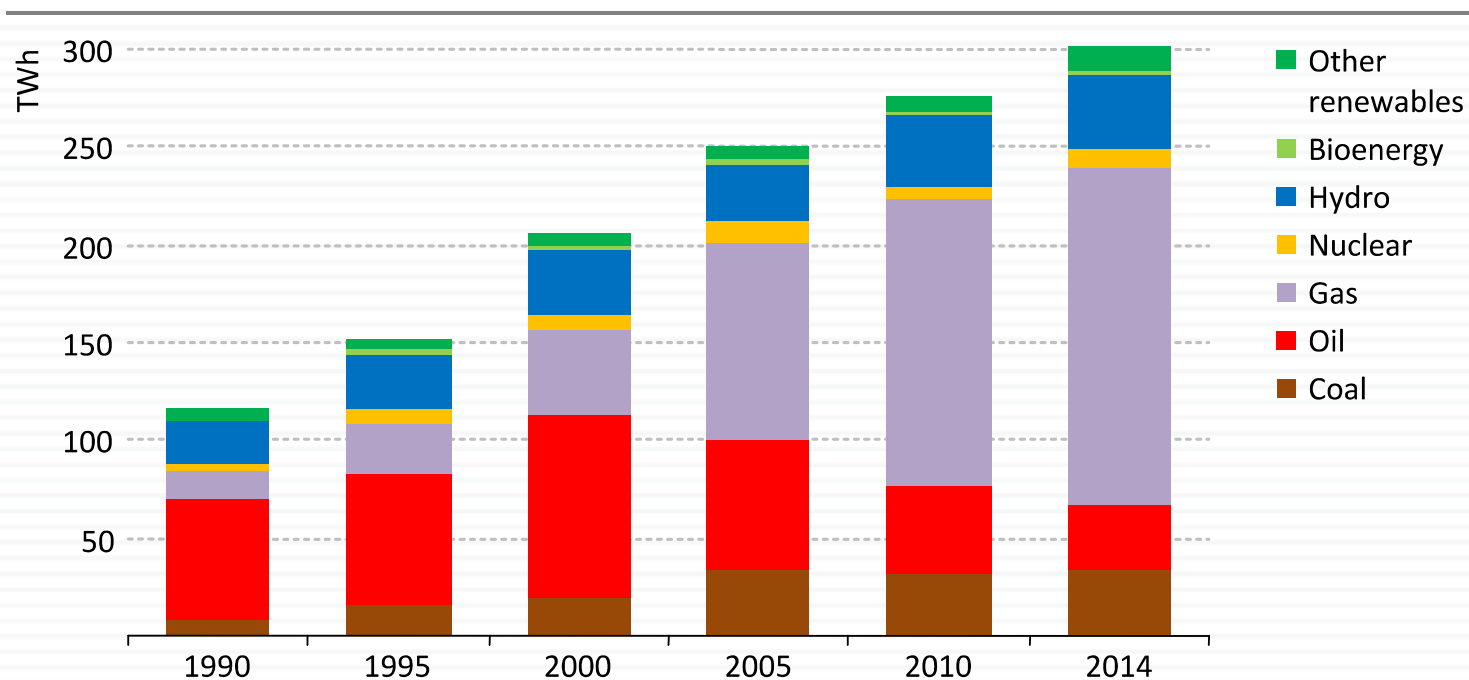
## SUMMARY

- Mexico is implementing new strategies to move towards a more reliable, clean, sustainable and environmentally friendly energy model, taking advantage of its abundant resources in renewable energies
- The **Energy Reform** and its secondary laws provide a legal framework that establishes clear goals and stimulates a greater investment in clean energies
- Currently, the share of clean energy in installed capacity is 28.8 % and in generation is 20 %

# ENERGY REFORM

- It represents the most transcendental transformation in Mexico's energy sector of the last decades and is allowing its adaptation to the international challenges
- Initiates in December 2013. In August and October 2014, 21 secondary laws and 24 regulations were published. Finally on December 24, 2015 the Energy Transition Law was enacted
- During 2016 and 2017 an energy sector in full transformation was observed
- The new tools and mechanisms establish schemes that encourage the participation of state productive companies (PEMEX, CFE) and private companies, under clearly defined rules and under equal circumstances, for the development of a sustainable, competitive and efficient energy industry
- This is attracting investments and assimilating new technologies from which to minimize the risks of investment for the state and ensure the best returns

**Figure 1.4** ▶ Electricity generation by fuel



*Electricity generation in Mexico has more than doubled since 1990 and diversified away from a costly reliance on oil*

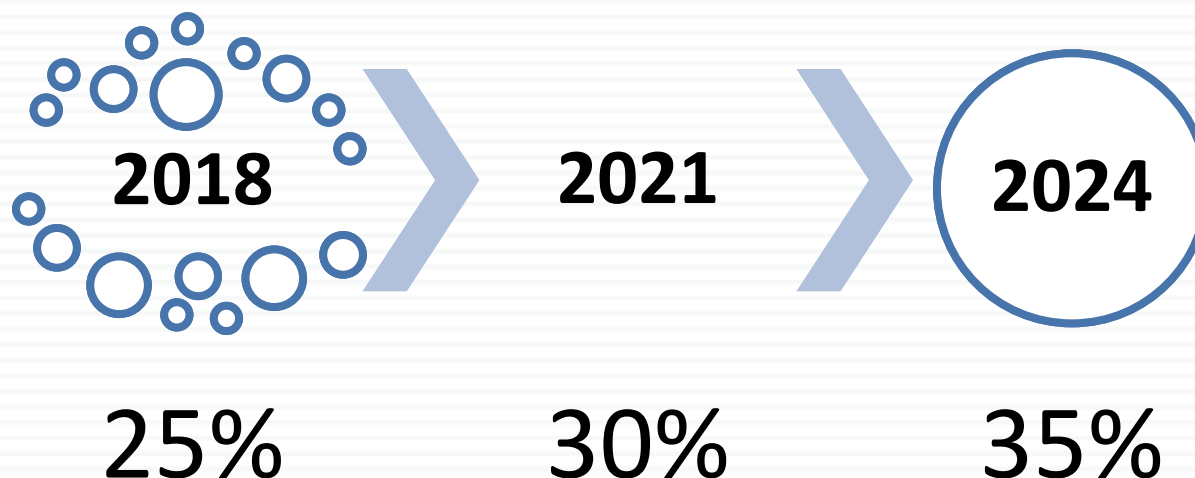
Notes: TWh = terawatt-hours. Other renewables include geothermal, solar PV and wind.

## Real (2014) and potential electricity generation with renewable energies (Gwh/year)

	Generation 2014	Proven Potential	Probable Potential	Possible Potential
Hydroelectric	38,822	4,457	23,028	44,180
Eolic	6,426	15,307	-	87,600
Geothermal	6,000	1,932	45,207	52,013
Solar	85	8,171	-	6,500,000
Biogas	148	728	391	11,485
Oceanic			1,057	
<b>Total</b>	<b>51,481</b>	<b>30,595</b>	<b>69,683</b>	<b>&gt;195,278</b>

## Mexico's Goals on renewable energies

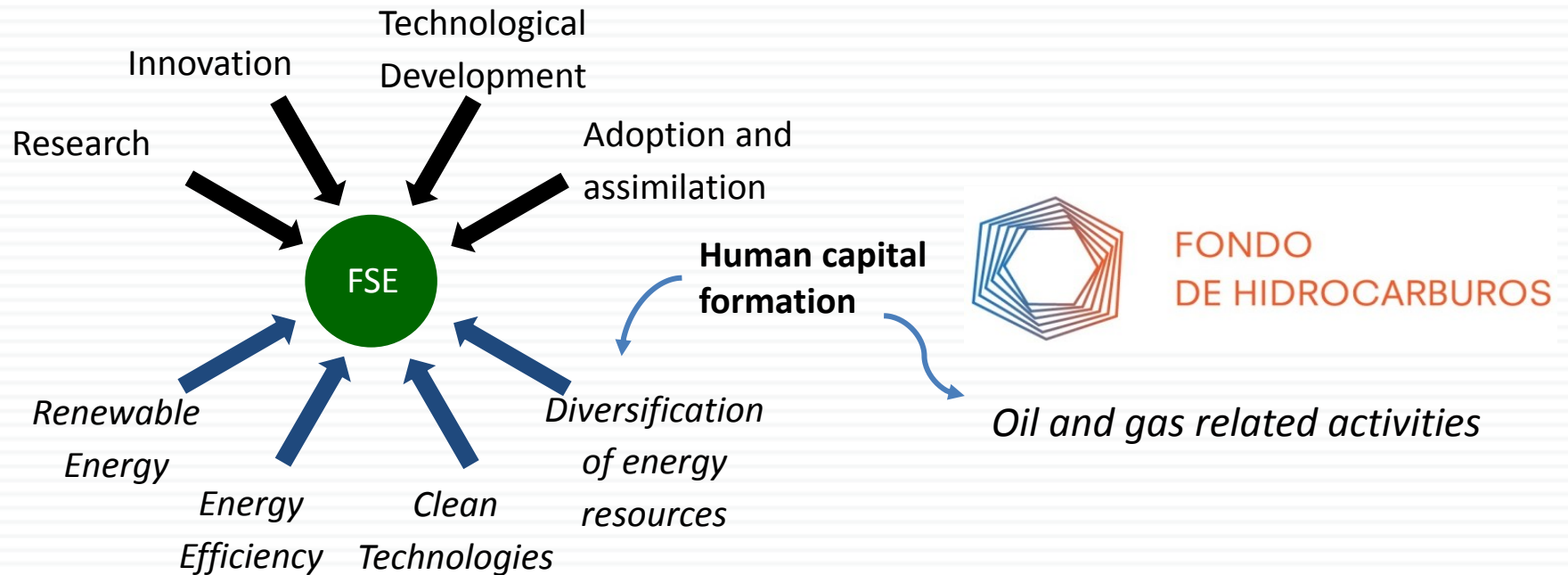
The Energy Transition Law establishes the following goals to generate clean energy\* in total electricity generation:



\*Clean energy, defined by the Electricity Law, includes renewables, efficient cogeneration, nuclear and thermal power plants with carbon capture and storage

# Mexico's Energy Funds

The Sustainability Energy and the Hydrocarbons Funds SENER-CONACYT were created in 2008 by the Mexican Government to fund and foster:

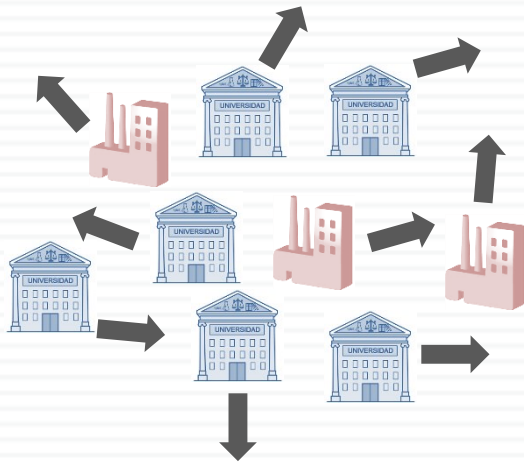


**Promoting closer links between the scientific and academia community with industry**



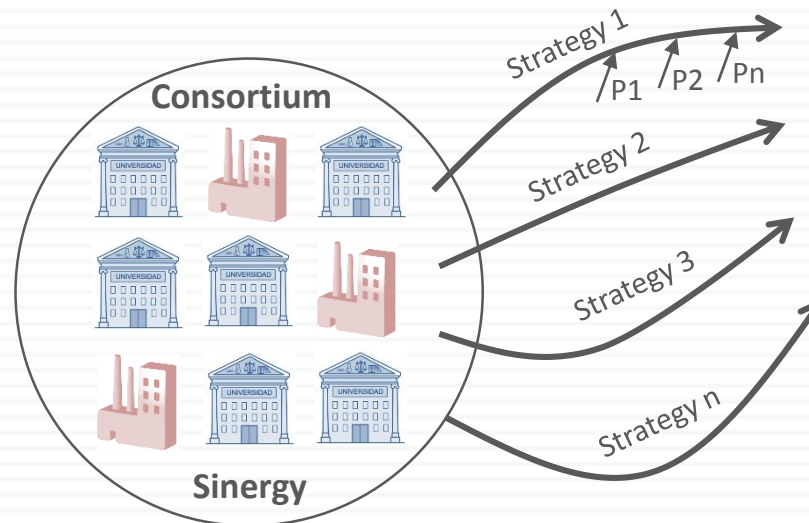
# CeMIEs

Situation  
before  
early 2014



- Dispersion of efforts
- Weak links between scientific community and industry

## MEXICAN ENERGY INNOVATION CENTRES



- State of the art
- Technology based products and services



- Human Resources development
- Research infrastructure strengthened

## A strategic shift to large projects in 2014 ...

- Under the FSE, SENER and CONACYT launched **three cluster-type** Mexican Energy Innovation Centres (CeMIEs) on renewable energy
- The CeMIEs are expected to provide a platform to launch and grow an unprecedented portfolio of low carbon initiatives
- They are not new physical buildings but a virtual network of research centres, universities and companies working together
- The CeMIEs have been awarded a guaranteed 4 year funding. Altogether, the first three CeMIEs have received an equivalent of **USD \$120 million**, which represents an **unprecedented investment in this topic in Mexico**

## The first **Mexican Energy Innovation Centres (CeMIEs)** that started in 2014 are:

- A. CeMIE-Geothermal**, USD \$70.8 million, 21 members (12 academic & 9 industry), led by CICESE (Center for Scientific Research and Higher Education of Ensenada, BC)
  
- B. CeMIE-Solar**, USD \$33.2 million, a consortia of 57 members (47 academic & 10 industry), led by UNAM's Renewable Energy Institute
  
- C. CeMIE-Wind**, USD \$16 million, formed by 32 members (22 academic & 10 national and international industry), led by INEEL (National Institute of Electricity and Clean Energies)

## CeMIEs that started in 2016

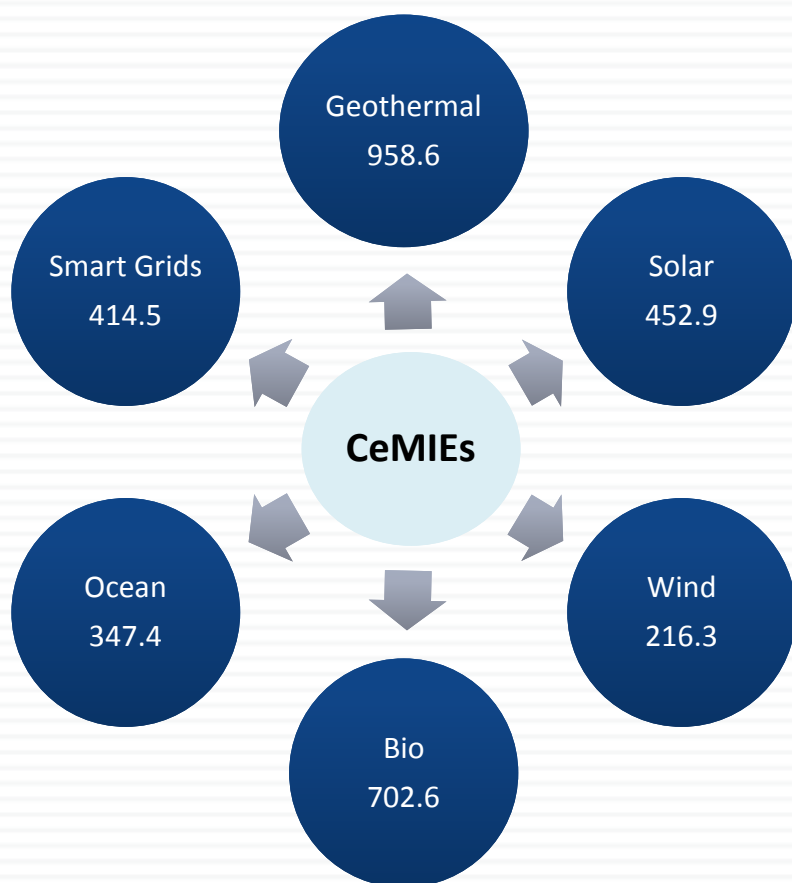
- D. Ocean Energy**, led by UNAM's Institute of Engineering
  
- E. Bioenergy (solid biofuels, bioalcohol, biodiesel, biogas and bioturbosine)**, led by UNAM's Ecosystems and Sustainability Research Institute (IIES), CINVESTAV Guadalajara, CIATEJ, IPICYT and IPICYT, respectively.

CeMIEs starting in 2017:

- F. Smart Grids (CFE, Siemens, Honeywell)**

# FSE, funds for the CeMIEs

(Millions of Mexican pesos)

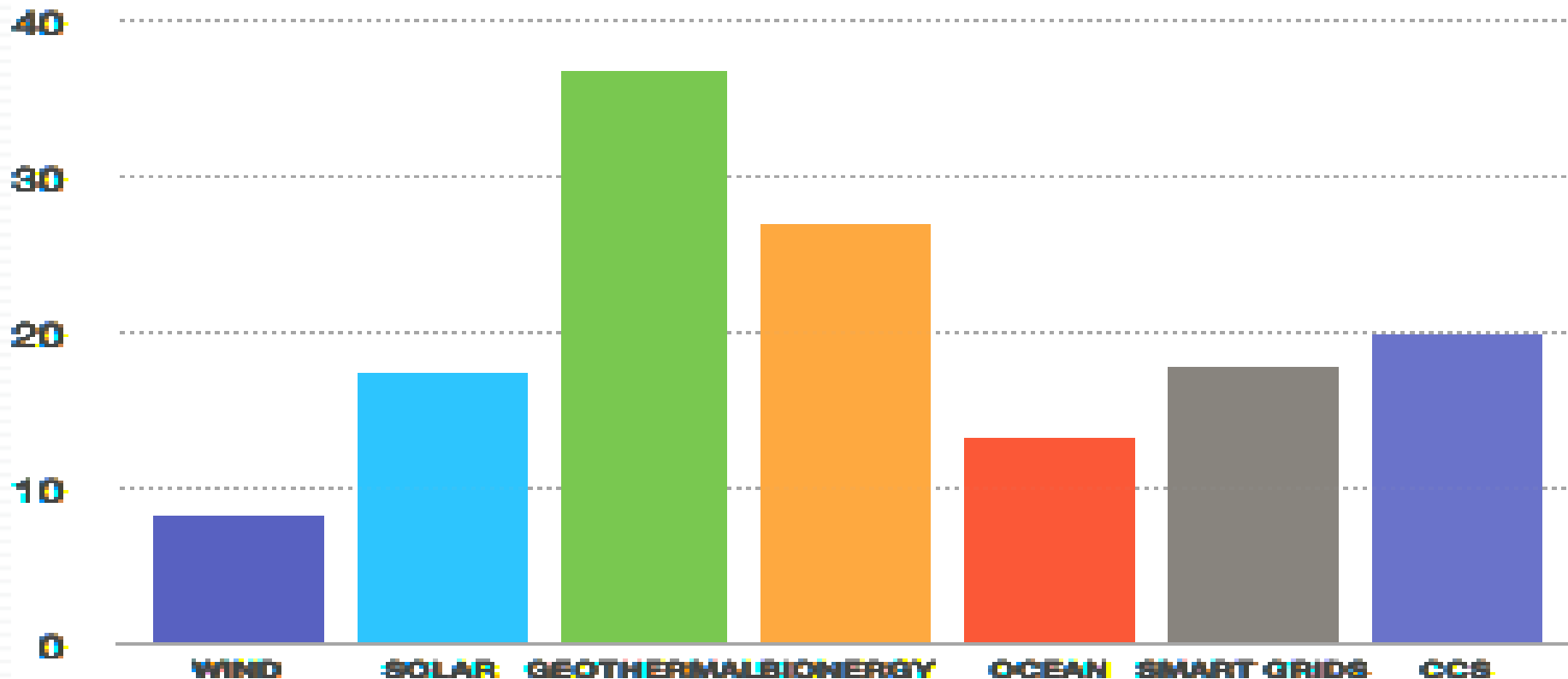


The Mexican Energy Innovation Centres **Geothermal, Solar, Wind, Bio, Ocean and Smart Grids** represent an investment of Mexico's Federal Government through the FSE in research and development on renewable energies of around **\$3,100 million pesos (around USD \$210 million)**.

**The CeMIEs** bring closer the private sector with experts from national and international academic institutions to encourage applied research in renewable energies.

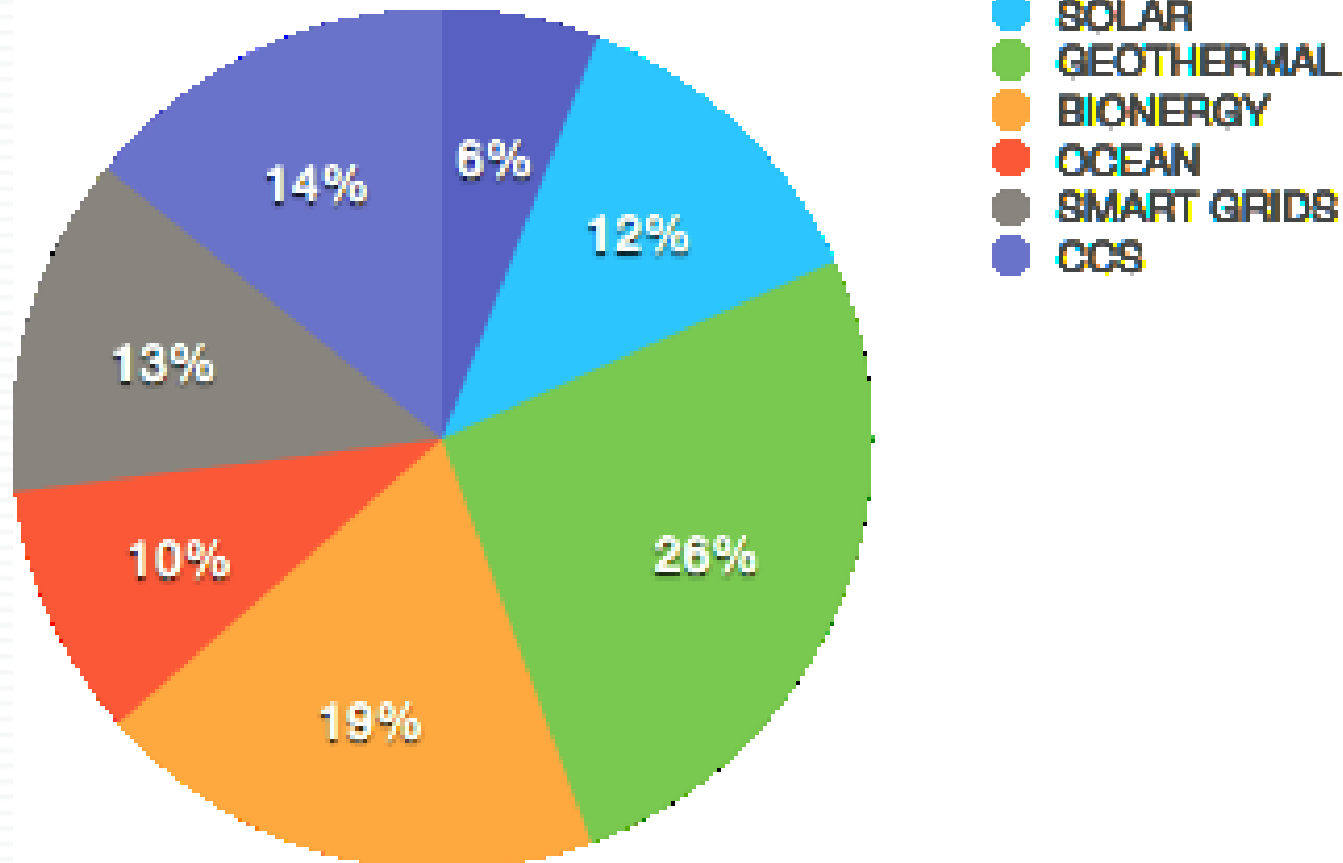
## INVESTMENT IN CEMIEs

### INVESTMENT IN ENERGY R&D CEMIEs CENTRES (Million Pounds)



# DISTRIBUTION OF INVESTMENT IN THE CEMIEs

**R&D ENERGY CENTRES  
DISTRIBUTION**

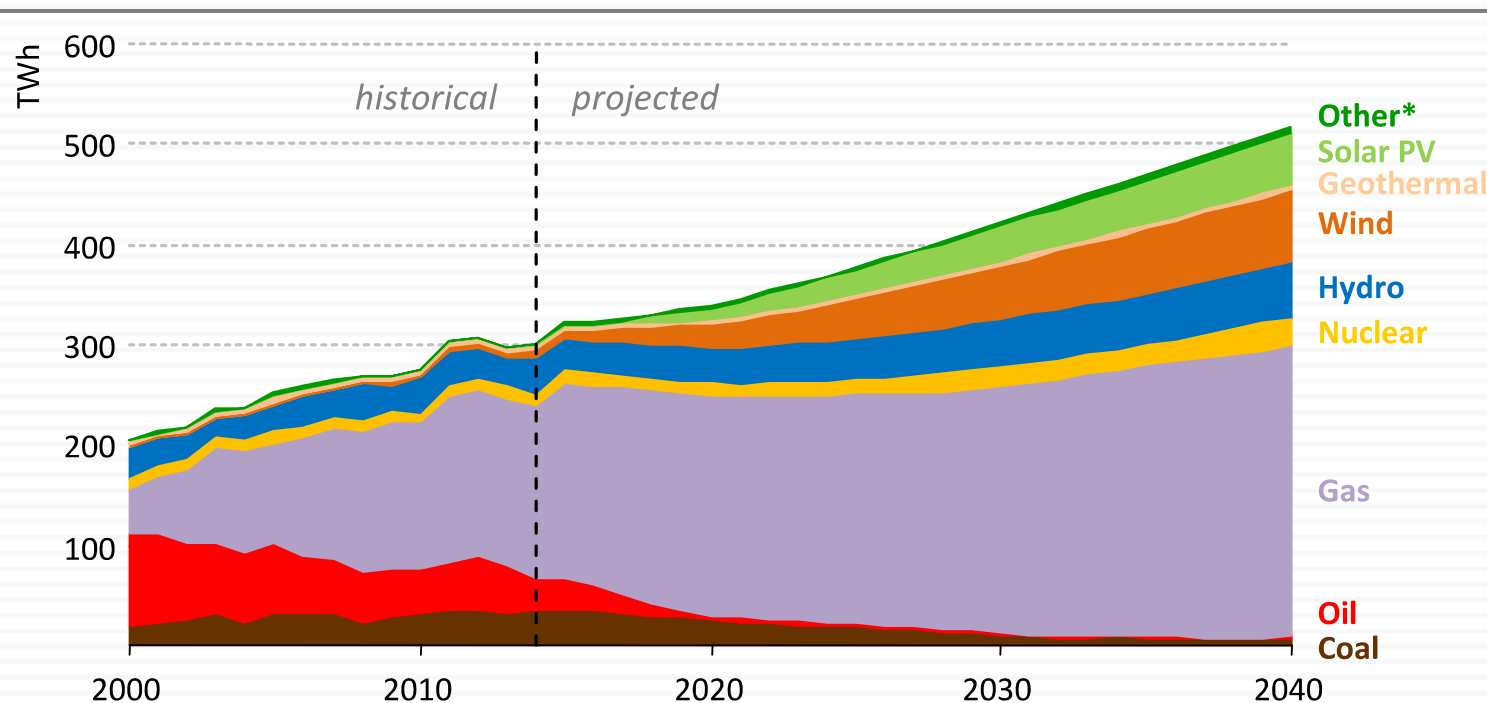


# Energy Outlook in Mexico to 2040

- ❖ Mexico's economy expands over twice its current size in our projections to 2040, but total energy demand increases by only around 20% ==> a significant decoupling of energy demand from economic output.
- ❖ Almost all of the growth in demand is met by natural gas and renewables.
- ❖ Solar PV and wind account for around half of total investment in generation. CO<sub>2</sub> emissions from power generation are around 20% lower in 2040 than in 2014.



**Figure 2.6** ▶ Electricity generation by source in the New Policies Scenario, 2000-2040



*The power generation mix in Mexico becomes steadily more diverse and less carbon-intensive in the New Policies Scenario*

\*Other renewables include bioenergy and concentrating solar power.

Our future looks promising.

Thank you!

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