

The technological dimension: The technological strategy required to apply the Paris Agreement

Kamel Ben Naceur

Director

Sustainability, Technology and Outlooks

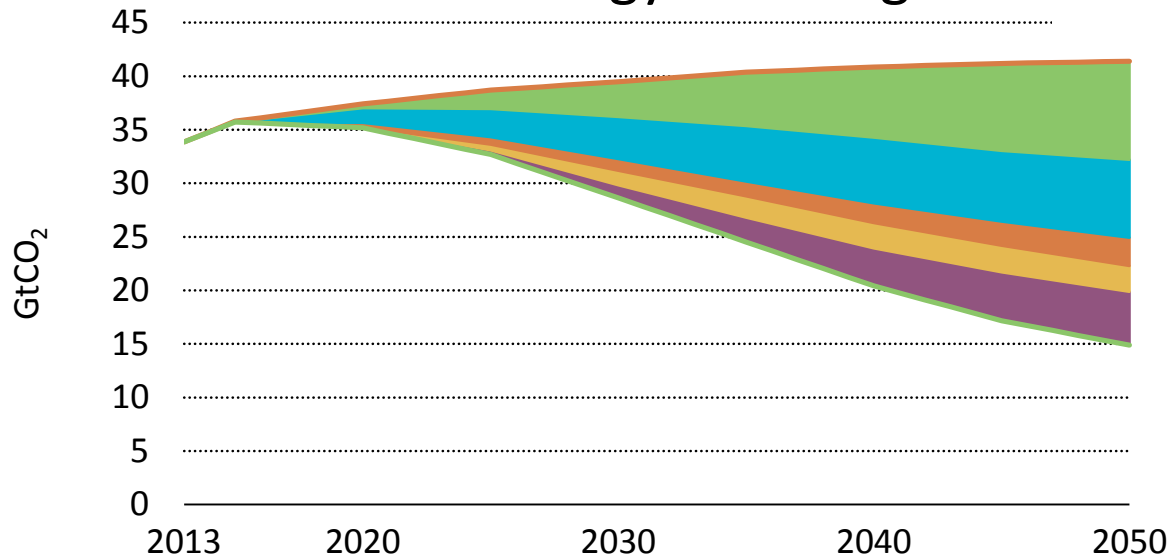
The COP21 Agreement in Paris

LONG-TERM MITIGATION GOAL

- **Temperature goal "well below" 2°C, and pursue efforts *to limit to 1.5°C***
- ***To achieve the temperature goal, Parties aim to reach a peaking of global emissions as soon as possible, and to undertake rapid reductions thereafter so as to achieve a balance between emissions and removals by sinks in the second half of this century (i.e. net-zero emissions but these words were not used).***
- ***Parties are encouraged to develop and communicate national long-term low greenhouse gas development strategies.***

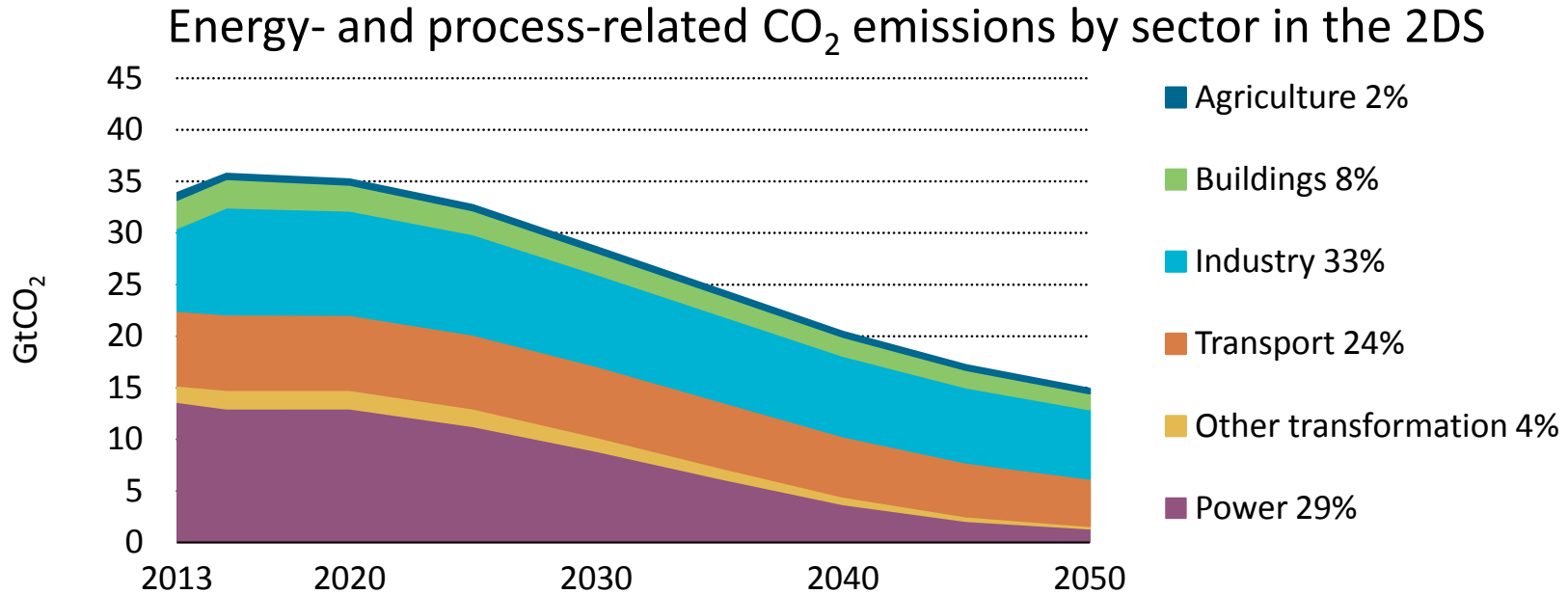
The scale of the challenge

Contribution of technology area to global cumulative CO₂ reductions



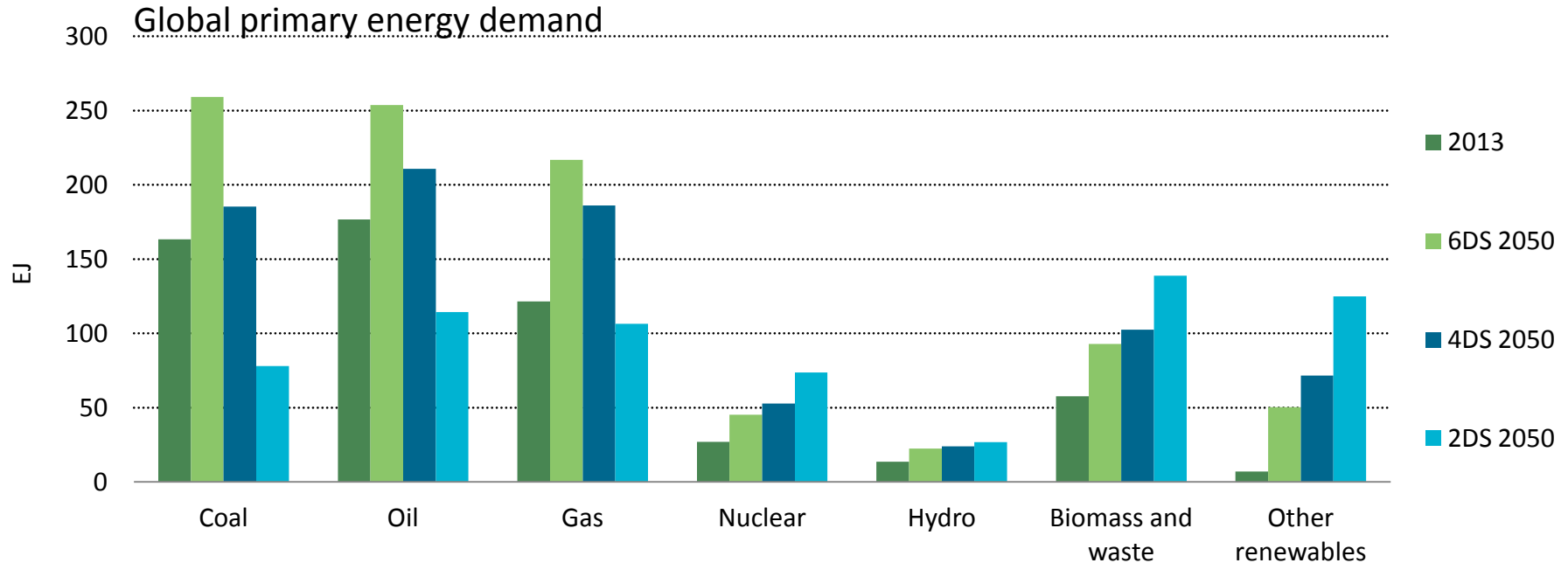
The carbon intensity of the global economy can be cut by two-thirds through a diversified energy technology mix

And the challenge increases to get from 2 degrees to “well below” 2 degrees



Industry and transport account for 75% of the remaining emissions in the 2DS in 2050

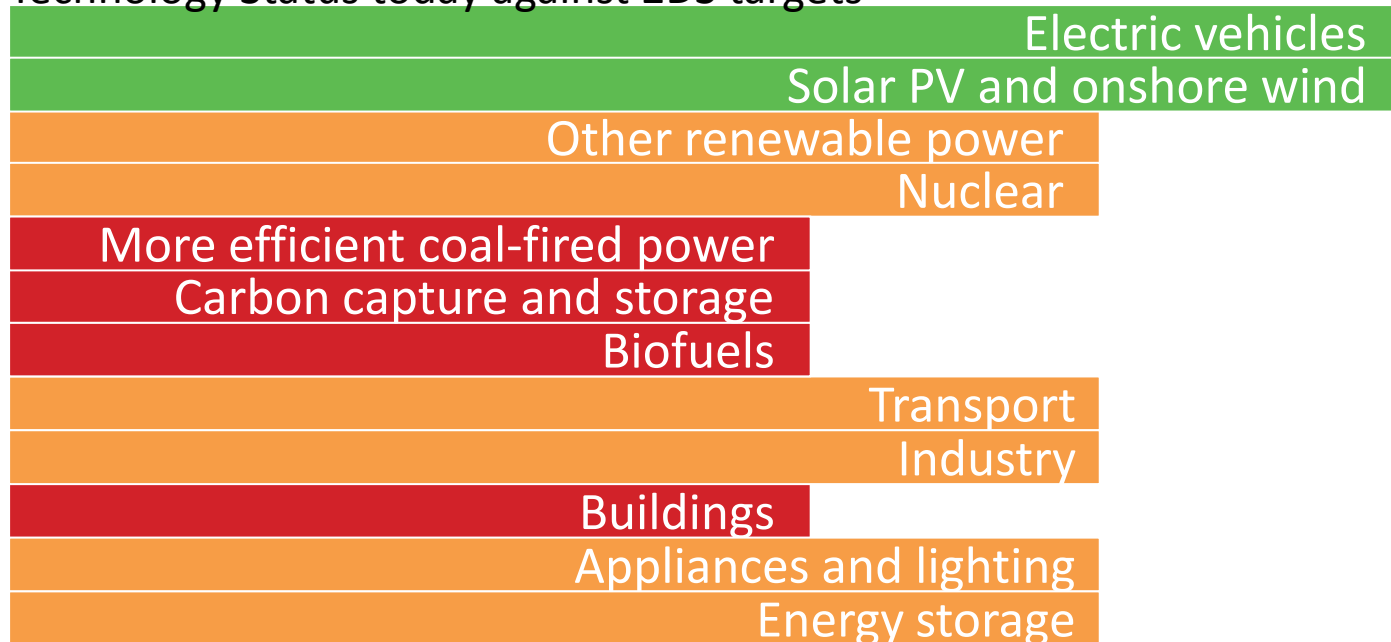
The transition to a 2-Degree world requires an exceptional effort



Share of fossil fuels in primary energy is in the 2DS with 45% almost halved by 2050 compared to today (81%), biomass becomes the largest energy source in 2050 in the 2DS

Progress in clean energy needs to accelerate

Technology Status today against 2DS targets



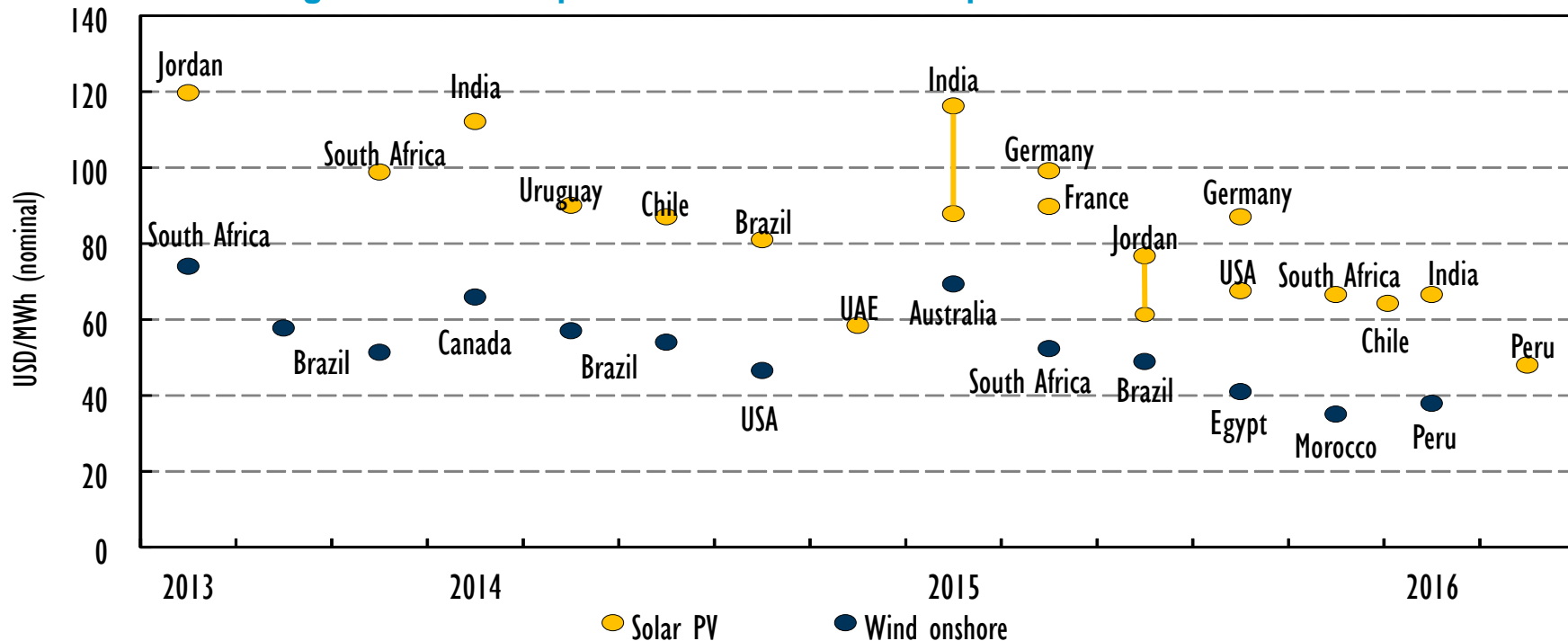
● Not on track ● Accelerated improvement needed ● On track

Clean energy deployment is still overall behind what is required to meet the 2°C goal, but recent progress on electric vehicles, solar PV and wind is promising

Context: Wind and PV

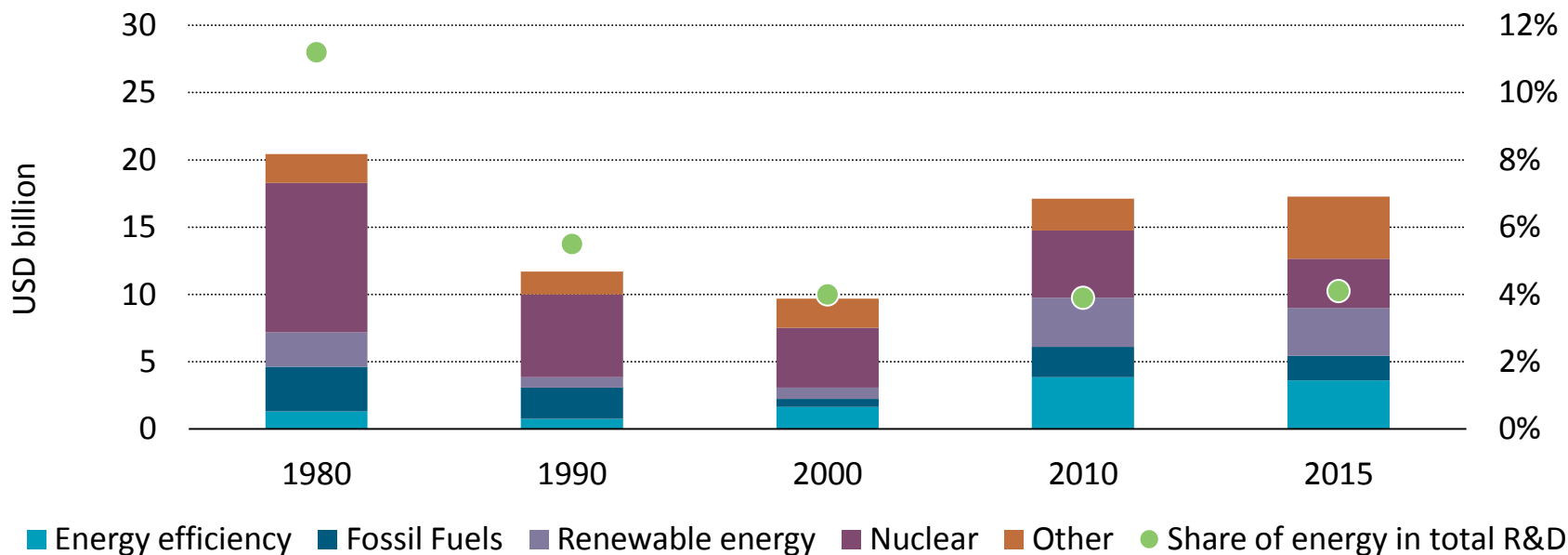
Downward price trends continuing rapidly

Recent announced long-term contract prices for new renewable power to be commissioned over 2016-2019



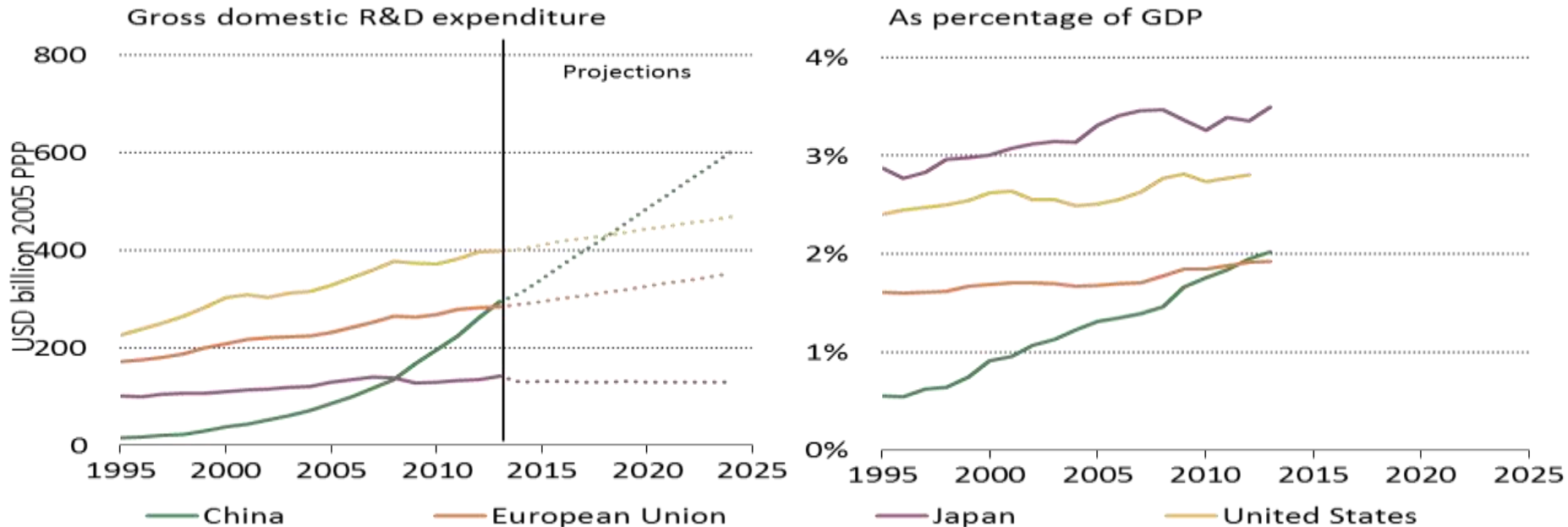
Best results occur where price competition, long-term contracts and good resource availability are combined

Energy RD&D funding now targets the right issues, but is not enough



Energy RD&D spending should reflect the importance of energy technology in meeting climate objectives

China has set its sight on innovation



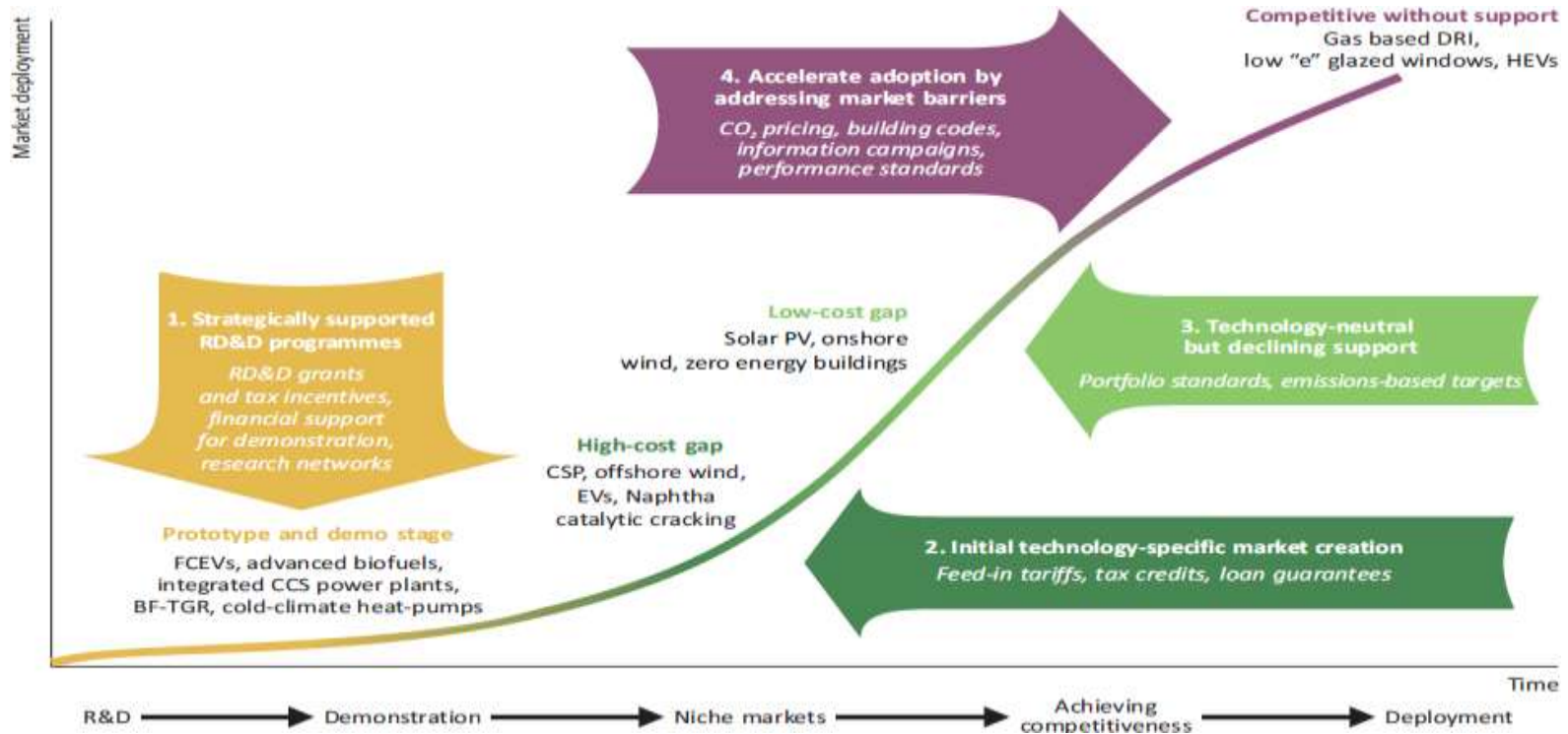
China is poised to become the global leader in R&D spending by 2019

Innovation in a diverse world: no “one-size fits all” solution

Different regions have differing technology shares today and in 2050-2DS

National circumstances and resources will drive different technology portfolios and pathways

Supporting Energy Innovation: The right policy at the right time



Innovation policy support needs to take into consideration technology and market maturity

Collaboration: the New Modus Operandi to meet sustainability goals

- COP 21 invited Non-State Actors to actively contribute to the climate solution
 - *Increased participation from Business, NGOs and Local Governments*
 - *“Paris Pledge for Action” support to ensuring that the level of ambition set by the Paris Agreement is met or exceeded*
- International co-operation can drive innovation
 - *Acting together, governments and industry can make decarbonisation easier and even more affordable*
 - *Clean Energy Ministerial, Mission: Innovation, Breakthrough Energy Coalition*

Clean Energy Ministerial (CEM)

- Created in 2010 as a forum for major economies and forward-leaning countries
 - 24 countries plus the European Commission
 - 9 Initiatives
 - 5 Campaigns

Participation in Clean Energy Ministerial Initiatives and Campaigns

September 2016

		AUSTRALIA	BRAZIL	CANADA	CHILE	CHINA	DENMARK	EUROPEAN COMMISSION	FINLAND	FRANCE	GERMANY	INDIA	INDONESIA	ITALY	JAPAN	KOREA	MEXICO	NORWAY	RUSSIA	SAUDI ARABIA	SOUTH AFRICA	SPAIN	SWEDEN	UNITED ARAB EMIRATES	UNITED KINGDOM	UNITED STATES	
Initiatives	APPLIANCES (SEAD)	●	●	●	●		●			●	■	●			●	●		●	●	●	●	●	●	●	●	■	
	ELECTRIC VEHICLES (EVI)			●		■				●	●	●			●	●		●			●	●		●	●	●	■
	ENERGY MANAGEMENT (EMWG)	●		●	●				●		●	●	●		●	●	●			●	●		●	●		●	■
	21 ST CENTURY POWER (21CPP)						●		●			■					●				●	●				●	■
	ENERGY ACCESS (GLOBAL LEAP)													●						●	●				●	●	■
	SMART GRIDS (ISGAN)	●		●		●	●	●	●	●	●	●	●		■	●	■	●	●	●		●	●	■			■
	SOLAR AND WIND							■			●	■	●	●		●	●	●		●	●	■			●	●	■
	CLEAN ENERGY POLICY (SOLUTIONS CENTER)	■		●						●		●	●	●			●	●			●	●		●	●		■
	WOMEN IN ENERGY (C3E)			●								●	●			●	●				●	●		●	●	●	■
Campaigns	ADVANCED COOLING CHALLENGE			●	●	●					●									●						●	
	CORPORATE SOURCING OF RENEWABLES CHALLENGE					●	●	●			●						●							●	●	●	
	ENERGY MANAGEMENT CAMPAIGN		●	●	●		●	●			●	●	●		●	●	●		●		●	●		●	●	●	
	GLOBAL LIGHTING CHALLENGE	●	●	●	●		●	●		●	●	●	●			●	●	●		●		●	●	●	●	●	
	POWER SYSTEMS CHALLENGE						●	●	●	●	●	●	●		●	●	●	●			●	●		●	●	●	

Non-CEM countries, non-governmental organizations, and private businesses also participate in selected initiatives and campaigns.

■ Lead ● Participant

CEM – high level policy dialogue

The IEA is a key regular contributor to Annual CEM Ministerial meetings



2012: Clean Energy Ministerial



25–26 April 2012, London, UK

2013: Clean Energy Ministerial



17–18 April 2013, New Delhi, India

2014: Clean Energy Ministerial



12–13 May, Seoul, Korea

2015: Clean Energy Ministerial 6 (CEM6)



27–28 May 2015, Mérida, Mexico

Clean Energy Ministerial 7
San Francisco, 1-2 June 2016

2011: Clean Energy Ministerial

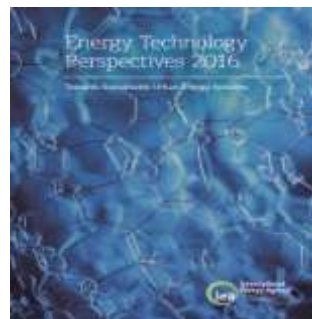


6–7 April 2011, Abu Dhabi, UAE

2010: Clean Energy Ministerial

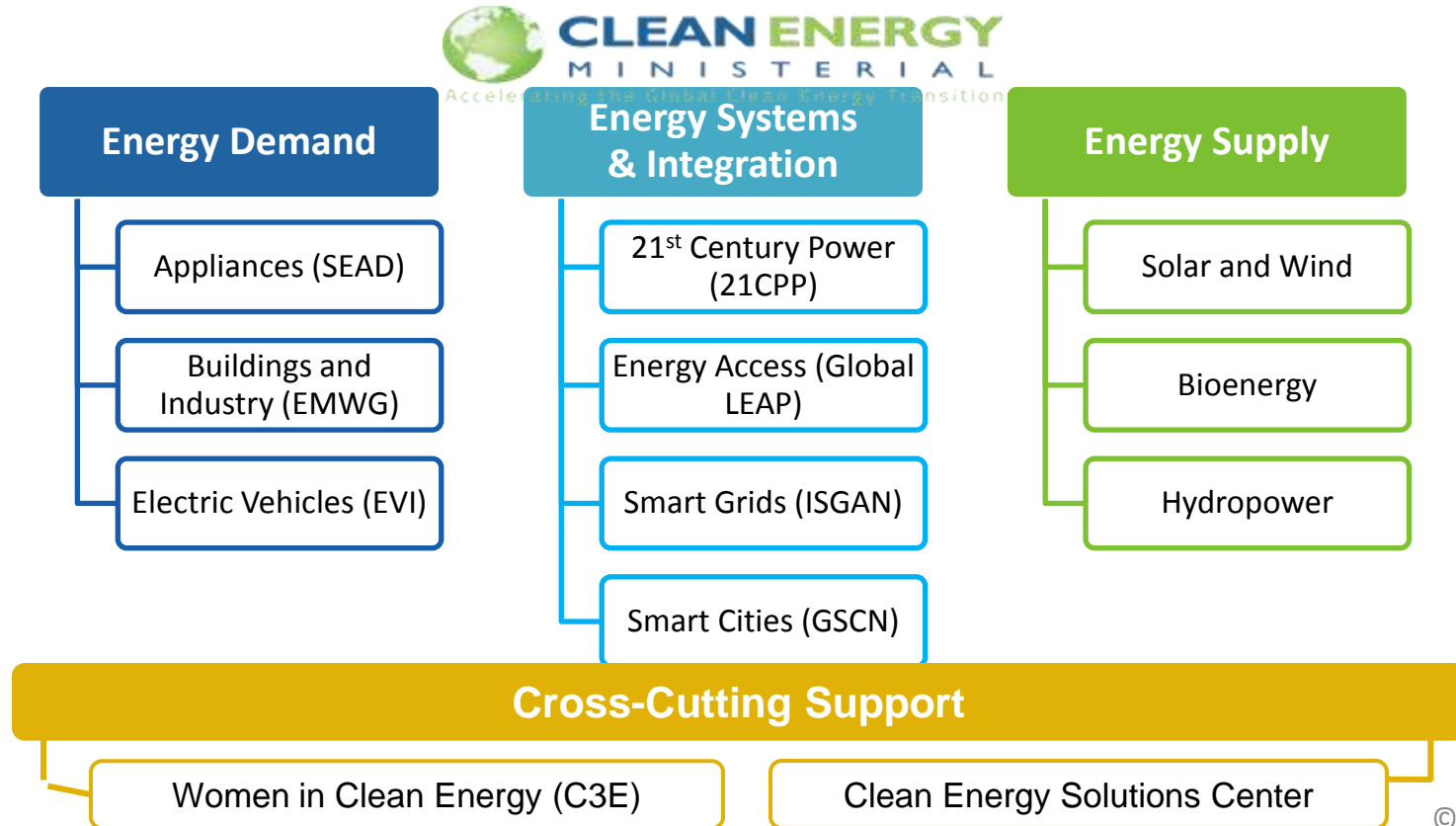


19–20 July 2010, Washington, DC



- IEA involvement in all CEM initiatives
 - Lead and/or coordination role
 - Electric Vehicles Initiative (EVI) → IEA Secretariat
 - International Smart Grid Action Network (ISGAN) → also a TCP
 - Substantial input
 - 21st Century Power Partnership
 - Bioenergy Working Group [*inactive*]
 - Clean Energy Policy (Solutions Center)
 - Multilateral Solar and Wind Working Group
 - Super-Efficient Equipment and Appliance Deployment (SEAD)
 - Sustainable Development of Hydropower Initiatives [*inactive*]
 - Partial participation
 - Energy Management Working Group (EMWG)
 - Global Lighting and Energy Access Partnership (Global LEAP)
 - Sustainable Cities (GSCN) [*inactive*]
 - Women in Clean Energy (C3E) **NEW!**

The Clean Energy Ministerial – A new home at the IEA





- Joint Launch Statement at COP21
- Leaders of over **20 countries plus the European Union**, representing well over 80% of global clean energy R&D investments
- Each country supporting a **doubling** of its clean energy R&D investments over next 5 years; see: www.mission-innovation.net

Innovation and Deployment – Essential Complements

Mission Innovation

Future Innovations

Science
Research
Development
Analysis

Clean Energy Ministerial

Deployment Now

Policies
Best Practices
Capacity Building
Prizes, Recognition

Tech
Demos

Create
New Ideas

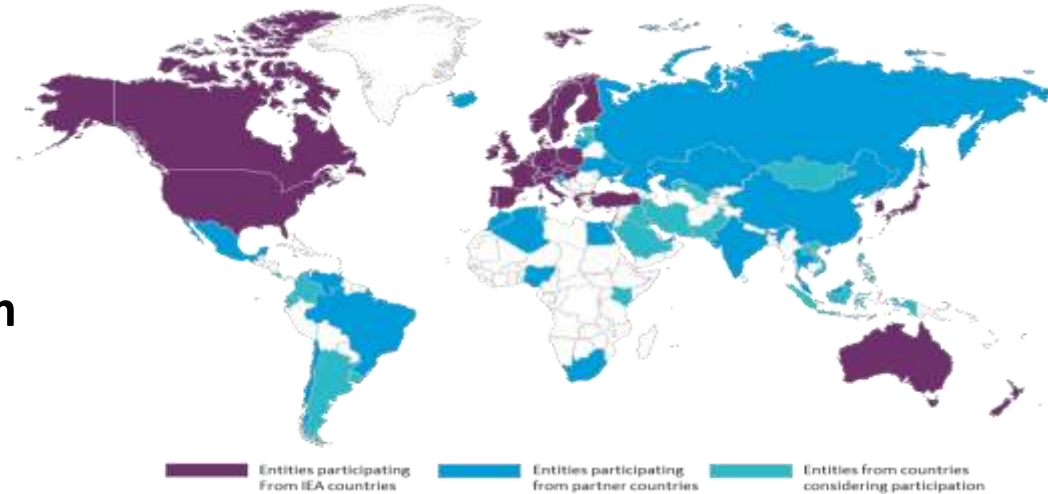
Improve
Performance

Reduce
Cost

Raise
Awareness

Facilitate
Market Uptake

The IEA's Technology Collaboration Programmes (TCPs)



This map is without prejudice to the status of sovereignty over any territory, to the delimitation of international frontiers and boundaries, and to the name of any territory, city or area.

- A time-proven, flexible mechanism
- Created or discontinued according to energy policy challenges
- Currently 39 TCPs
 - Cross-cutting activities
 - Energy efficiency
 - Fossil fuels
 - Fusion power
 - Renewable energy and hydrogen

Technology Roadmapping: Bringing stakeholders together



2009 2010 2011 2012 2013 2014 2015

- Goal to achieve
- Milestones to be met
- Gaps to be filled
- Actions to overcome gaps and barriers
- What and when things need to be achieved

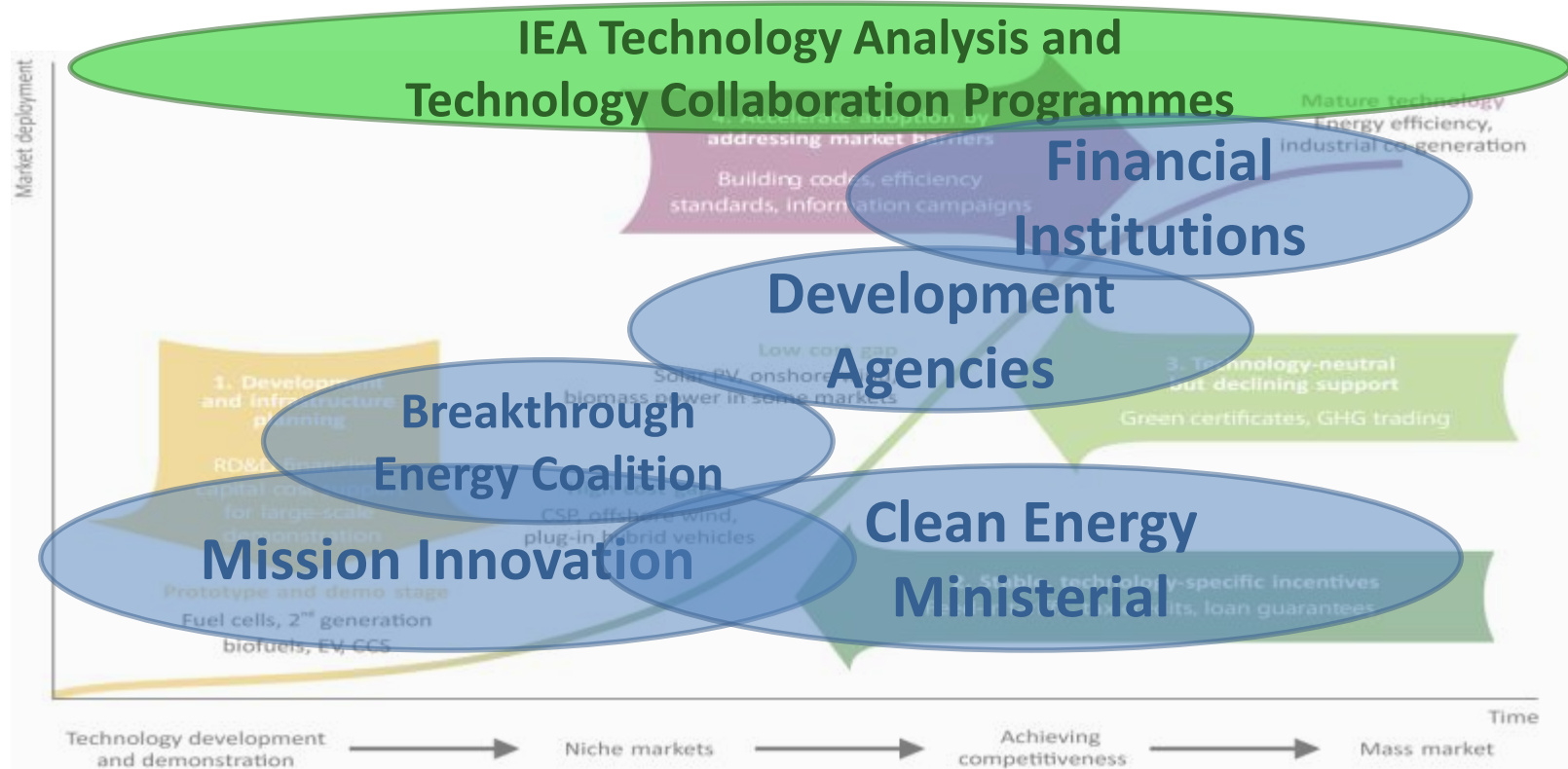


- 32 global publications, 21 different technology areas
- Re-endorsed at G7 Energy Ministerial Meeting in May 2016 (Kitakyushu)
- New Cycle for Implementation:
 - Near-term actions
 - Regional Relevance
 - Key partnerships (e.g. Finance)
 - Metrics and Tracking



Low-Carbon Technology Roadmaps

Supporting Energy Innovation Throughout the Entire Cycle



Thank you for your attention