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Energy Sector Resilience: Promoting action and collaboration

6th Forum on the Climate-Energy Security Nexus:
Emerging Best Practices and Lessons for North America
Ottawa - June 7, 2016

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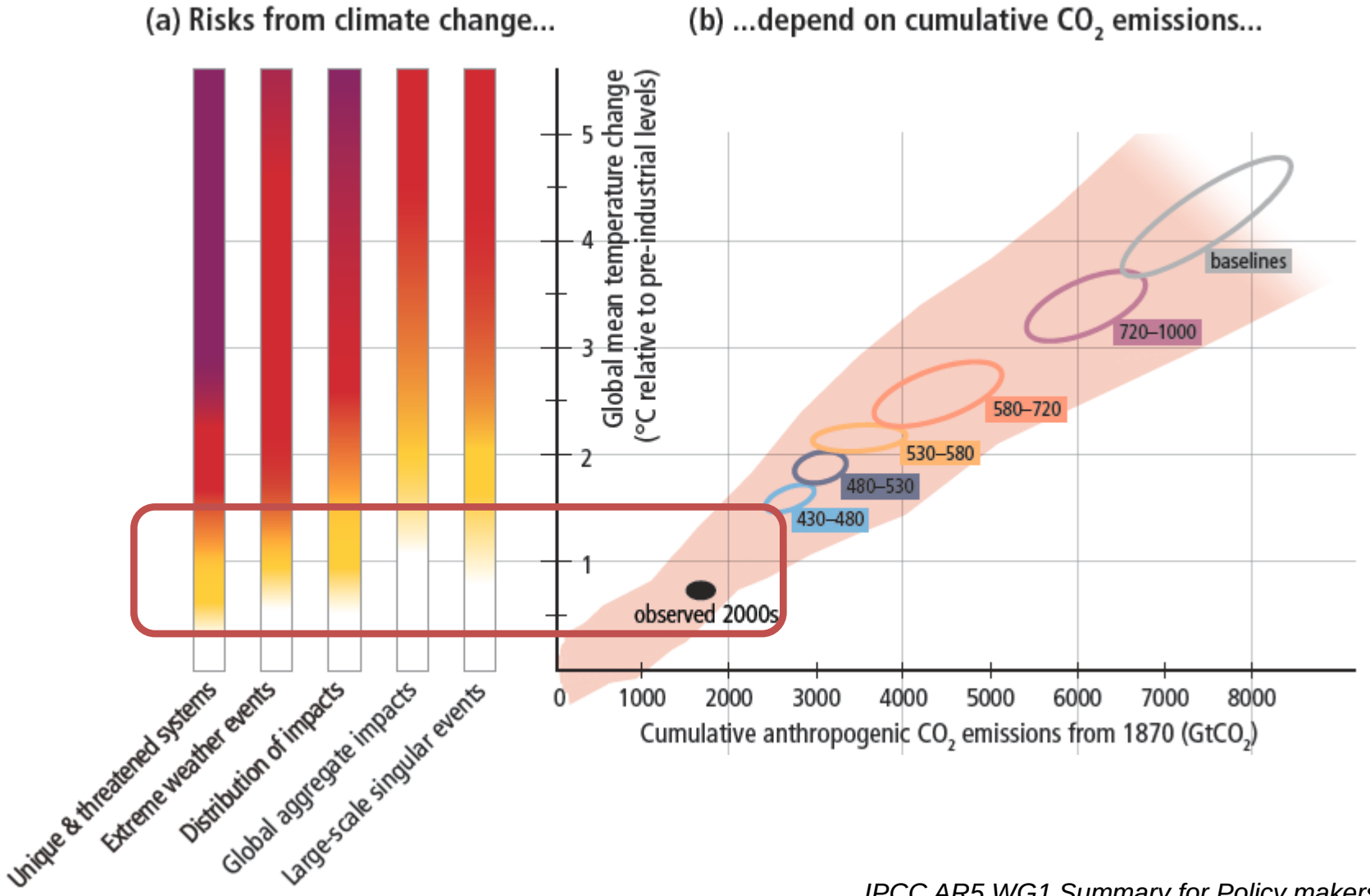
Resilience: an issue in all mitigation scenarios



IPCC AR5 WG1 Summary for Policy makers (2013)

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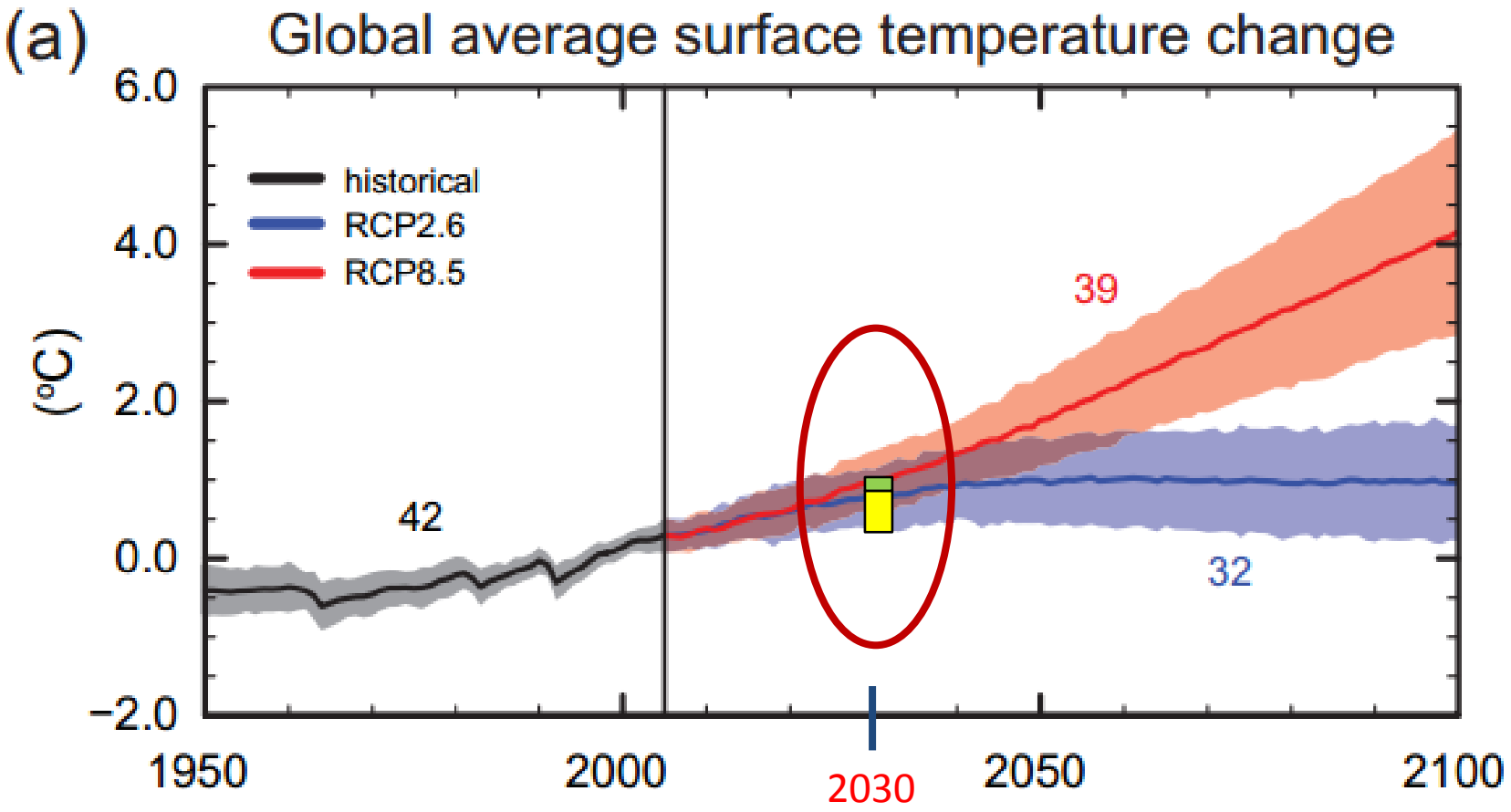

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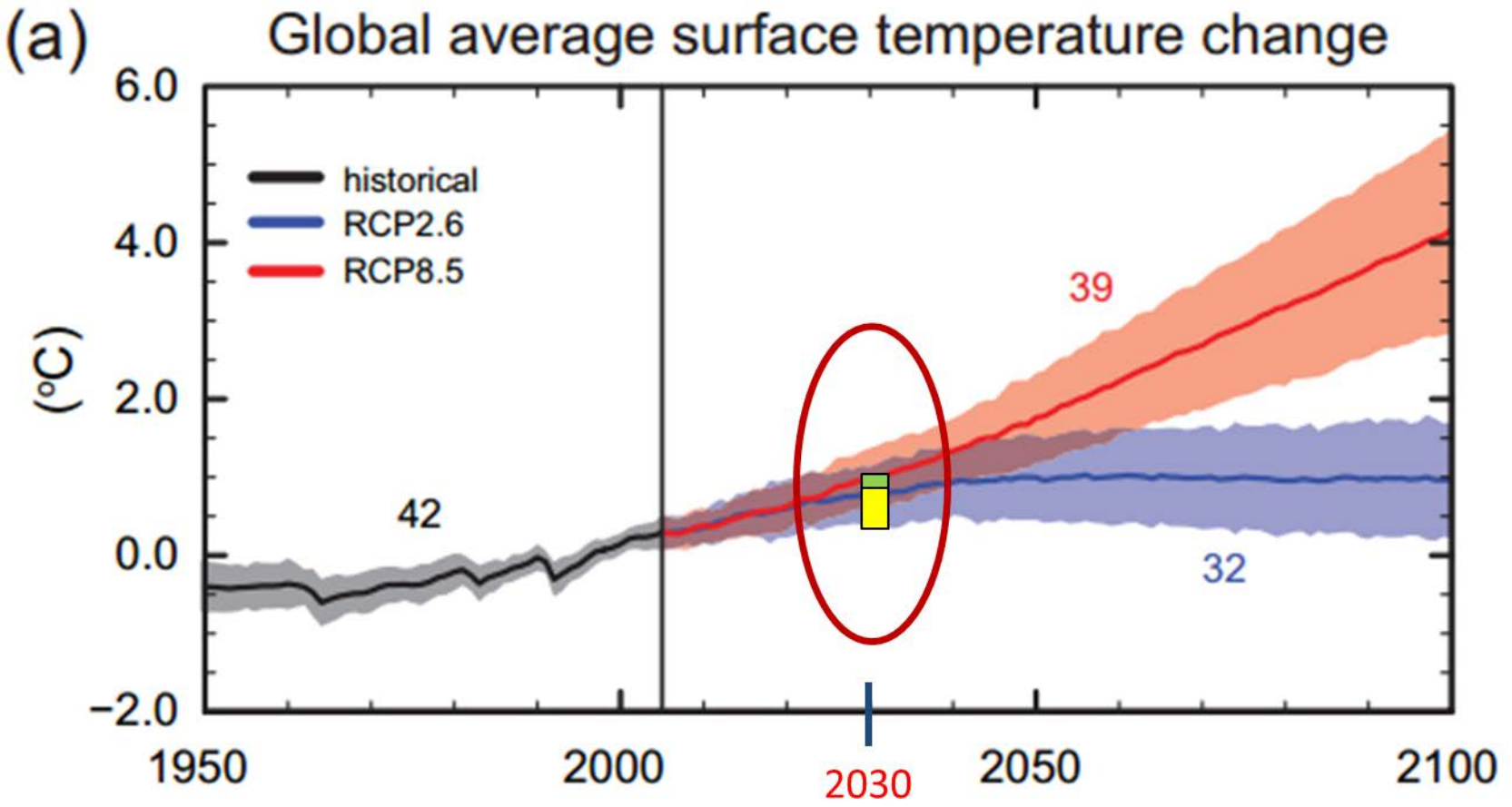

IPCC AR5 WG1 Summary for Policy makers (2013)

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Climate change requires adaptation in the energy sector

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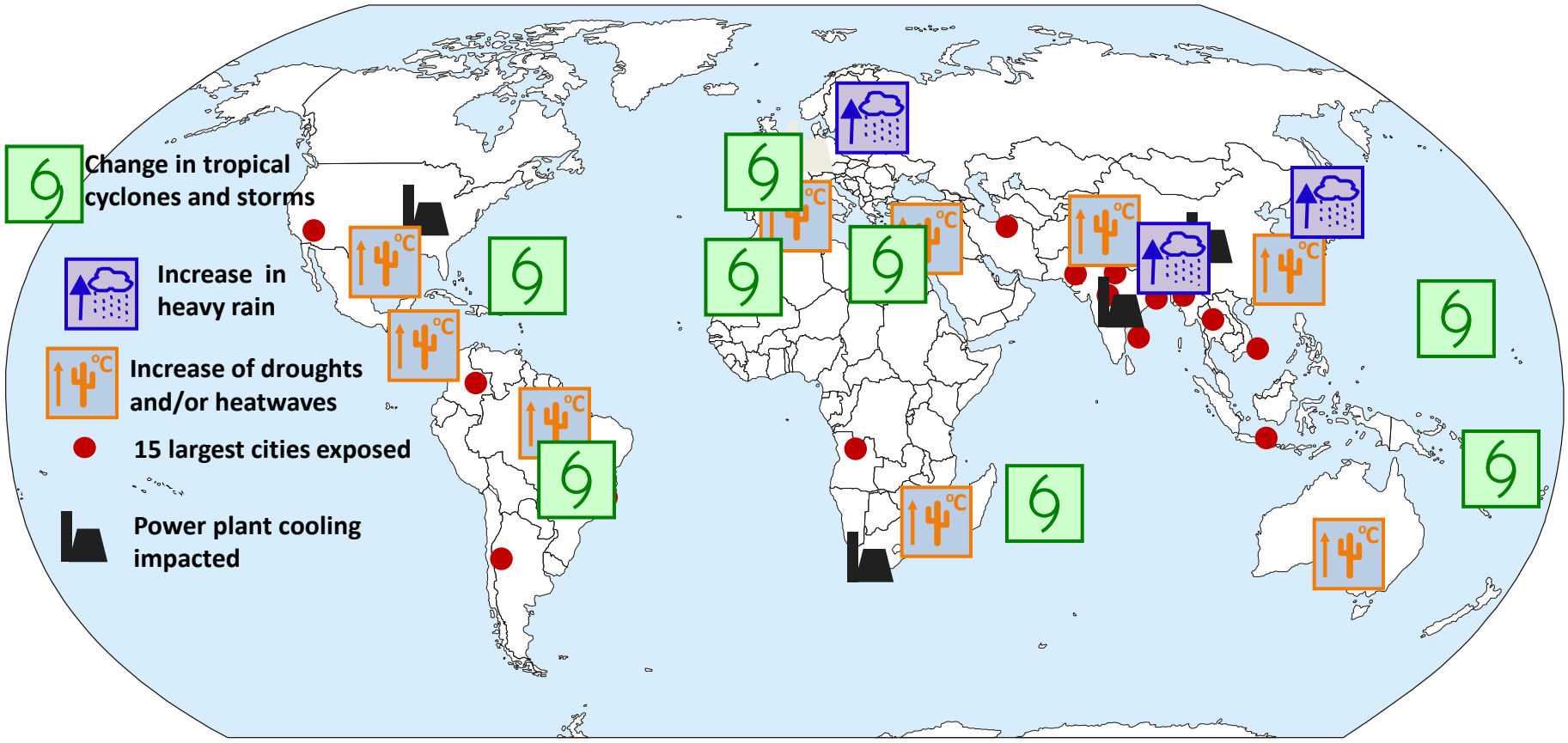
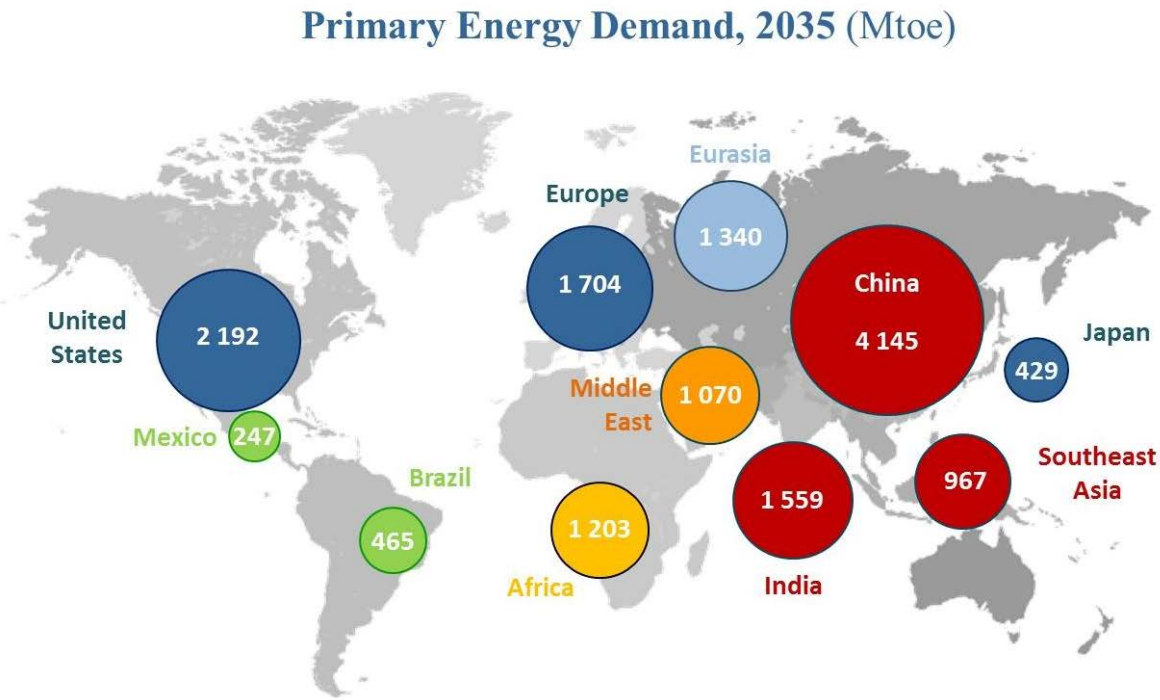
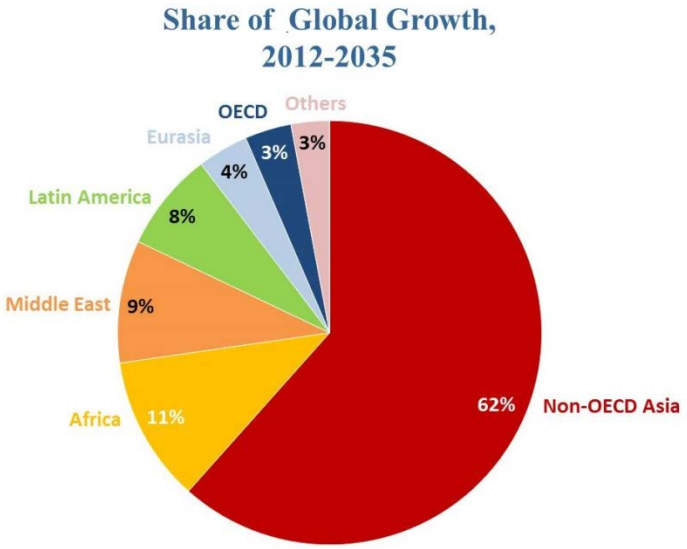


© Natural hazards adapted from Munich RE (2011)

Energy resilience challenge expands and shifts as asset base expands . . .



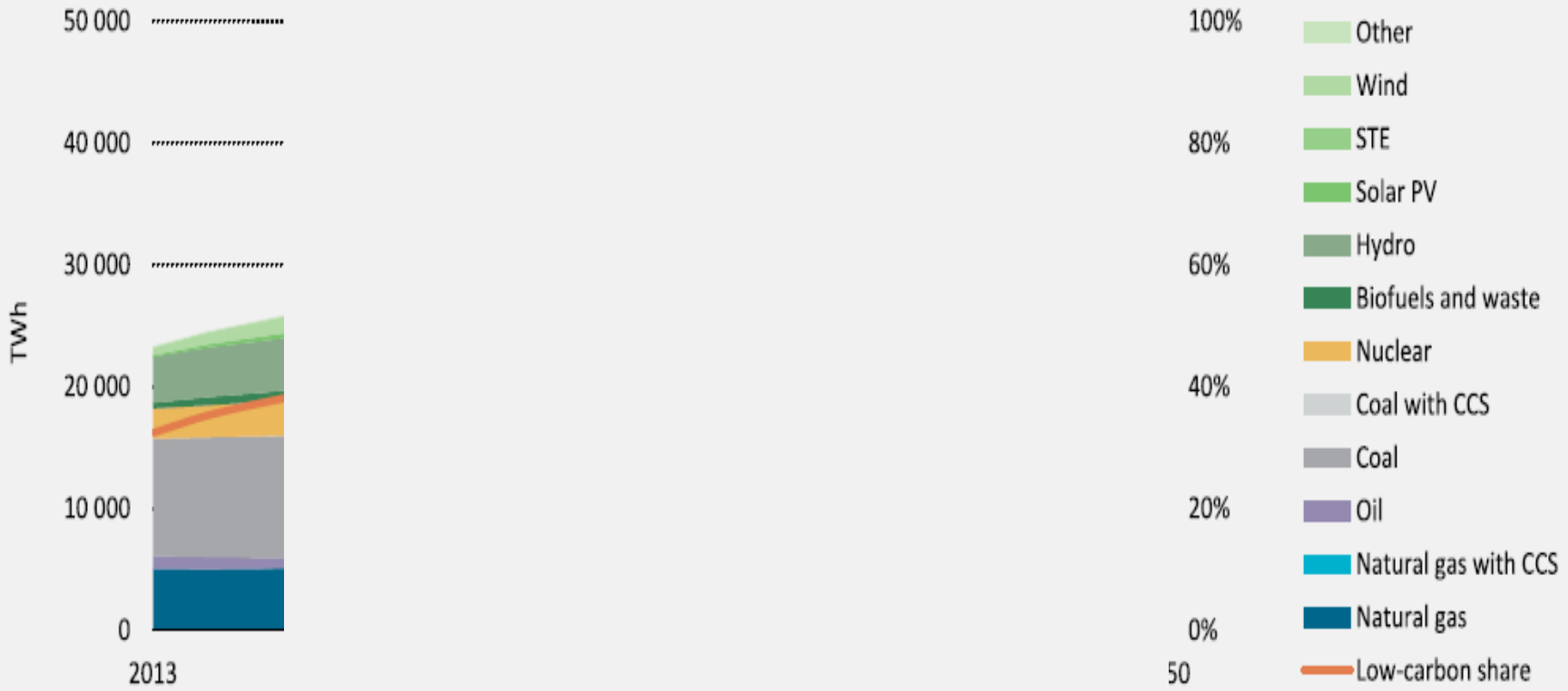


Over 95% of the projected growth in energy demand between now and 2035 happens outside the OECD (NPS)

Source: **based on World Energy Outlook 2014**

Energy resilience effort needs to adapt to energy sector of the 'future'

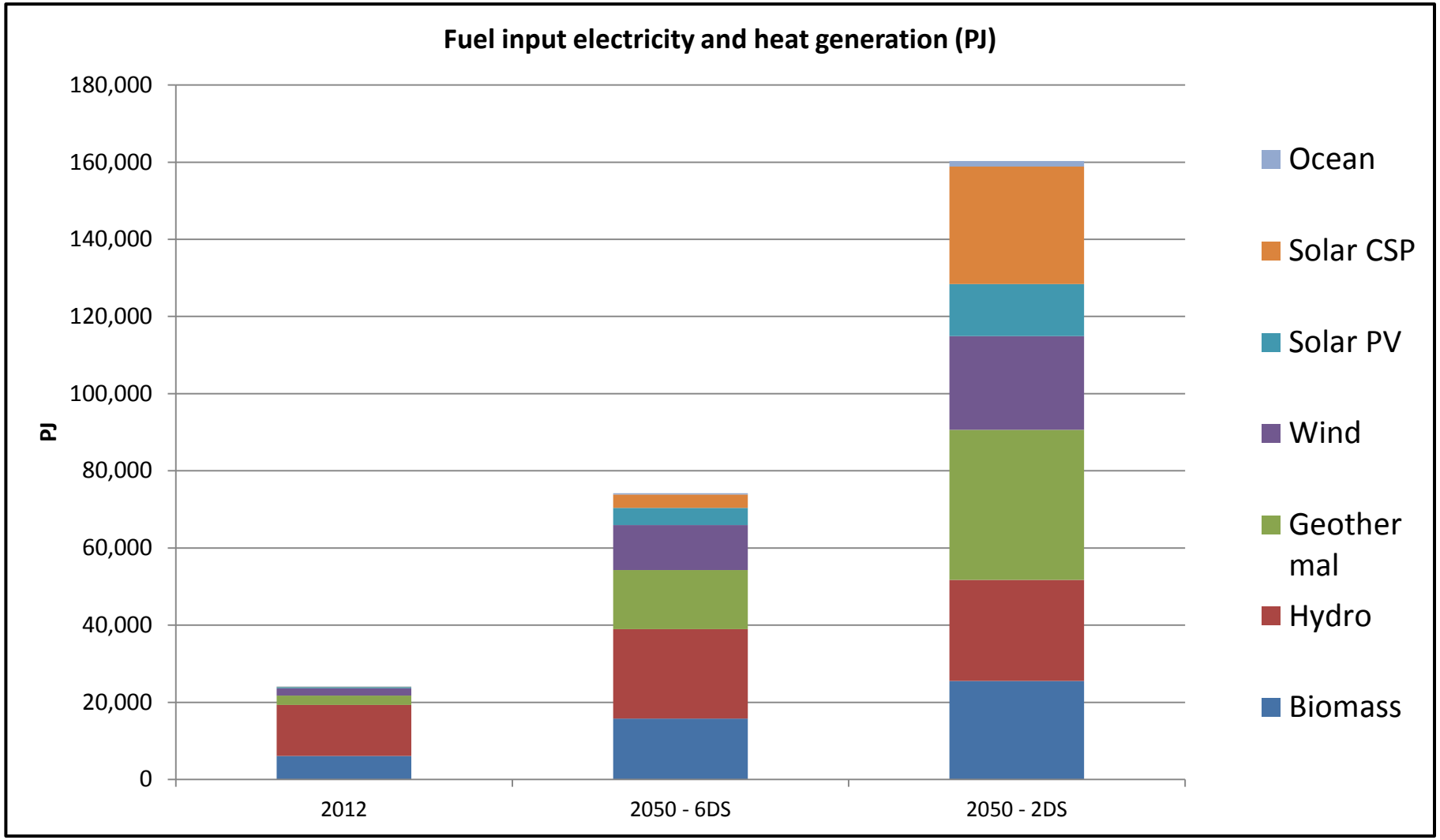
Global electricity generation mix in the 2DS, 2013-50



Notes: STE = solar thermal electricity. Low-carbon share refers to the combined share of the generation of electricity from renewables, nuclear and CCS.
Source: IEA analysis and IEA (2015f), *World Energy Statistics and Balances*, www.iea.org/statistics.

IEA Energy Technology Perspectives 2016

Expanded role for renewables assets in a low carbon future



ETP 2014, 2015

The resilience 'value chain'

- **Robustness: ability to withstand threats**
  - Risk assessment, auditing, reporting
  - Adaptive practices by businesses and governments
- **Resourcefulness: capacity to maintain essential functions under extreme events**
  - Emergency preparedness measures
- **Recovery: capacity to overcome service interruptions**
  - Reactivating systems
  - Pre-deployment of recovery assets

Governments are key actors

1. **Create enabling frameworks/incentives to facilitate/to prompt resilience-building by business**

- **… but much more:**
  2. **Awareness raising and modelling**
  3. **Service provider (e.g. climate services, data)**
  4. **Managing "own-assets" (utilities, etc.)**
  5. **Financing and facilitating investments**
  6. **Inter-governmental coordination: domestic and international**

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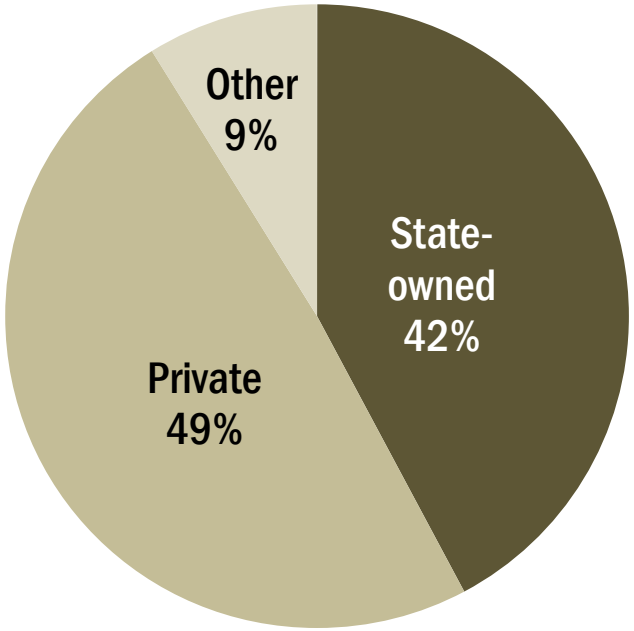
State-owned enterprises: not just the what and how, but the who

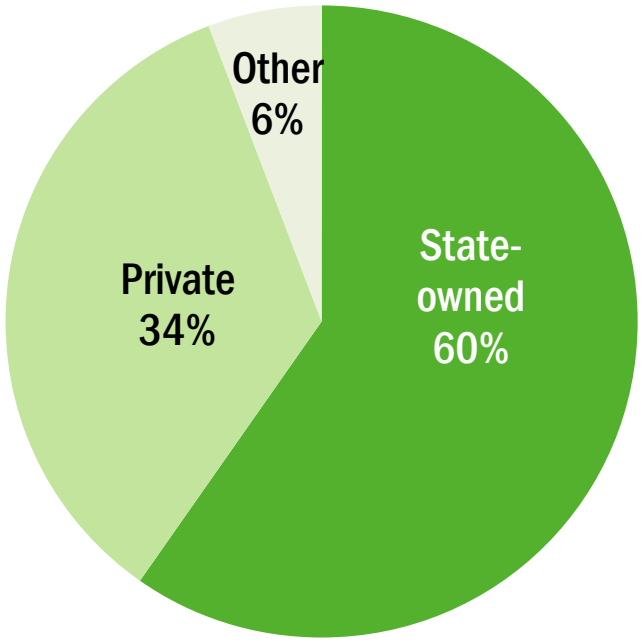
Ownership of fossil fuel generation capacity

3 702 GW



Ownership of 'zero-carbon' generation capacity

1 980 GW (hydropower, other utility-scale renewables and nuclear)



IEA working to enhance energy sector resilience

To shift the energy sector onto a low-carbon path that supports economic growth & energy access:

1. Take 5 key actions, led by energy efficiency & renewables, to peak then reduce global energy emissions
2. Use the Paris Agreement to drive short-term actions consistent with long-term emission goals
3. Accelerate energy technology innovation to make decarbonisation easier and even more affordable
4. Enhance energy security by making the energy sector more resilient to climate change impacts

IEA activities

1. Dialogue facilitation:

Five Nexus Forum meetings since 2012:

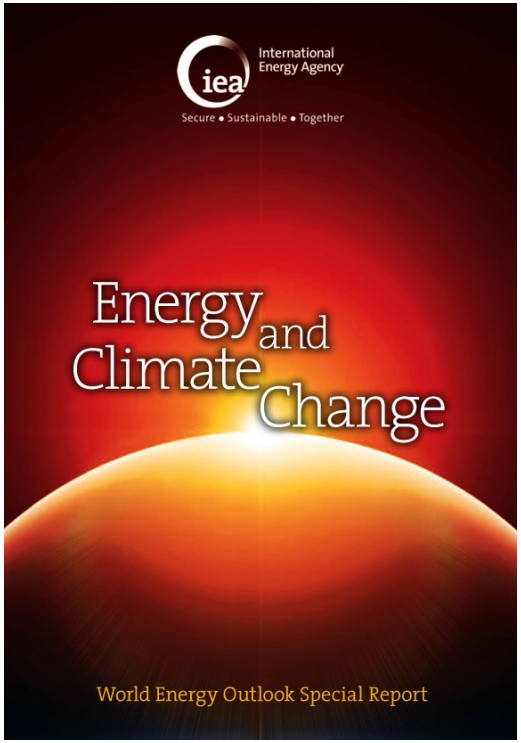
- Implications for Business (Nov. 2012)
- Cities and Insurance (June 2013)
- Electricity Sector Resilience (Oct. 2013)
- Water and Energy (June 2014)
- Policies and Practices (Nov. 2014)
- **North America** (June 2016)

IEA activities

2. Data and modelling

World Energy Outlook (WEO) has been looking at energy and climate resilience over the past few years:

- 2012: freshwater required for energy production and the outlook for global water use in energy production
- 2013: energy infrastructure and climate resiliency
- 2015: impact of water scarcity on coal-fired power plants in India and China
- 2016: chapter on water/energy nexus: water for energy, energy for water, and future regional/policy stress points and synergies

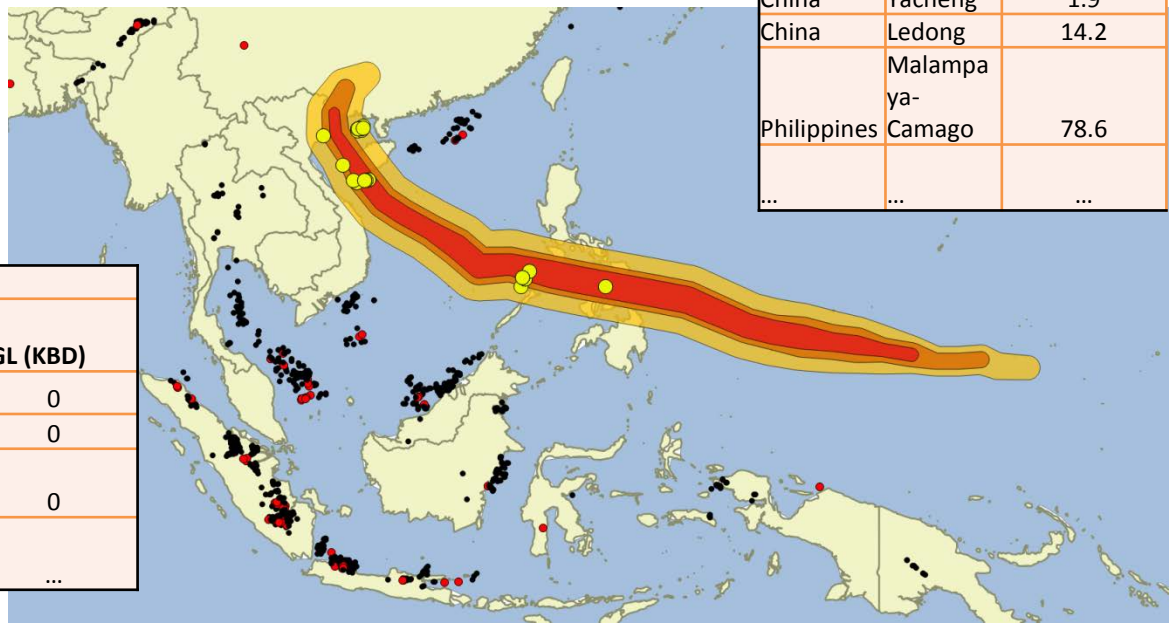


IEA activities

2. Data and modelling (cont.)

Emergency : Developing an analytical tool that makes real-time assessments of the potential impact of natural hazards on energy infrastructure.

AFFECTED GAS PRODUCTION		
COUNTRY	ASSET	CRUDE (KBDOE)
China	Yacheng	1.9
China	Ledong	14.2
Philippines	Malampaya-Camago	78.6
…	…	…

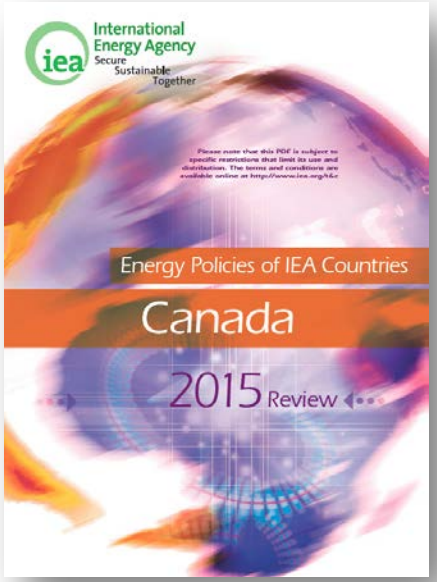


AFFECTED OIL PRODUCTION				
COUNTRY	ASSET	CRUDE (KB/D)	CONDENSATE (KBD)	NGL (KBD)
China	Weizhou	2.5	0	0
China	Ledong	0	1.2	0
Philippines	Malampaya-Camago	0	7.0	0
…	…	…	…	…

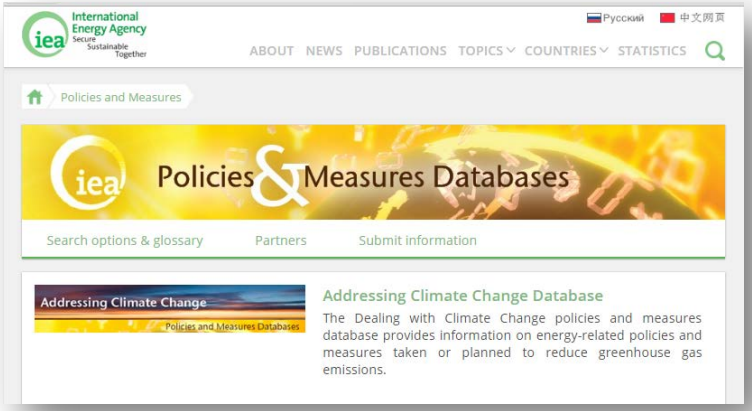
IEA activities

3. Research stocktaking on impacts, vulnerability, resilience policies

- In-depth country reviews, e.g. US 2014, Canada 2015, Mexico 2016



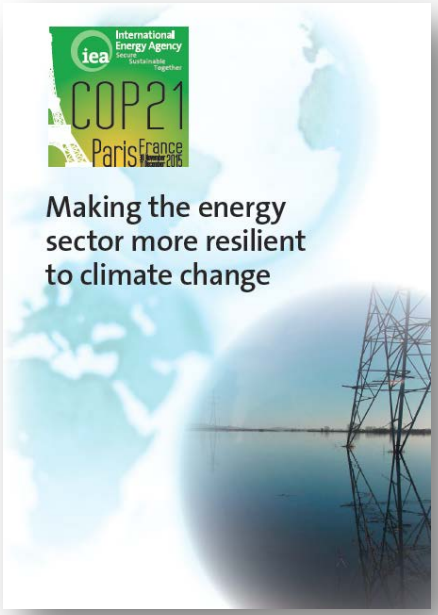
- Policy and Measures (PAMs) database

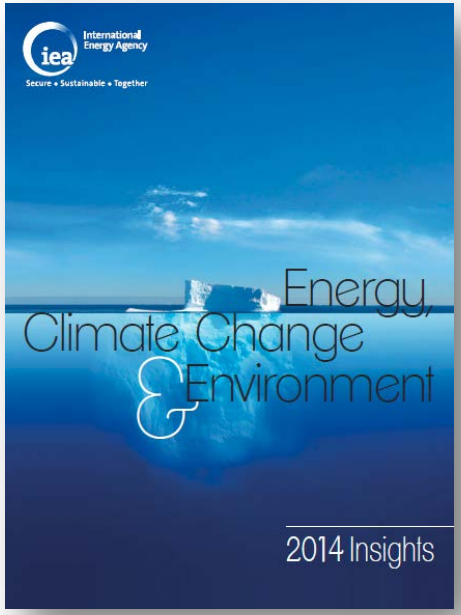


IEA activities

4. Policy analysis

- Resilience brochure for COP 21
- Chapter in the upcoming *Energy, Climate Change and Environment 2016*





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OECD Survey: Getting the Policies Right for Climate-Resilient Infrastructure

- **Scope**
  - National-level action in OECD countries
  - Making energy, transport, water infrastructure resilient
- **State of progress**
  - Draft survey of current practices based on a review of grey literature presented and Expert Workshop held at OECD in February
  - Infrastructure project case studies in **Canada**, the Netherlands, Sweden and the **USA** ongoing
- **Upcoming paper due end 2016**
  - Synthesis paper building a framework for government action

Additional information:
lola.vallejo@oecd.org
http://www.oecd.org/env/cc/adaptation.htm

Conclusions

- Energy sector resilience is not about energy, but about what reliable energy provides: economic activity, health, security, etc.
- Change in climate is upon us and expected to be bigger over medium term than previously anticipated – notwithstanding Paris Agreement
- Private sector actors are key – businesses, and also households; good policies and pricing matter
- Government is key as: catalyst, service provider, asset owner
- Resilience is enhanced by greater cooperation – across borders and within countries

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Thank you

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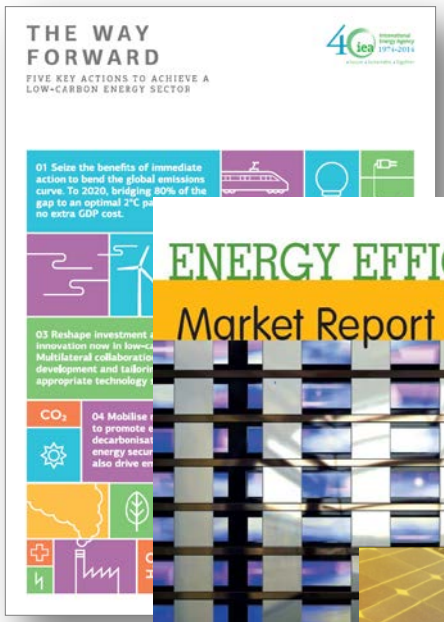

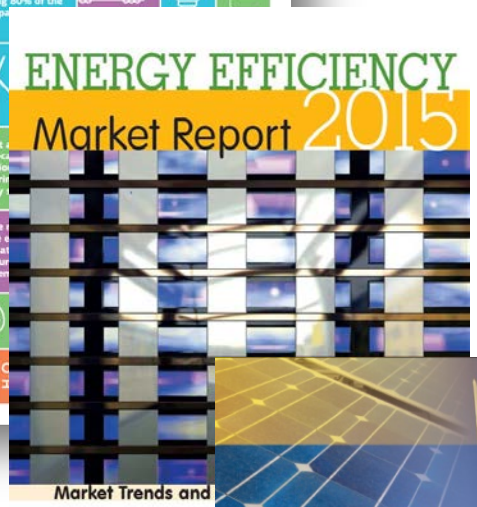

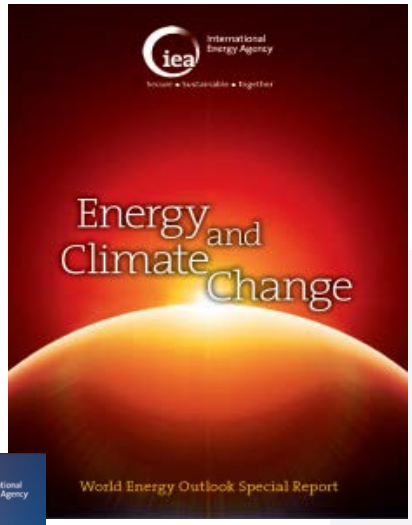

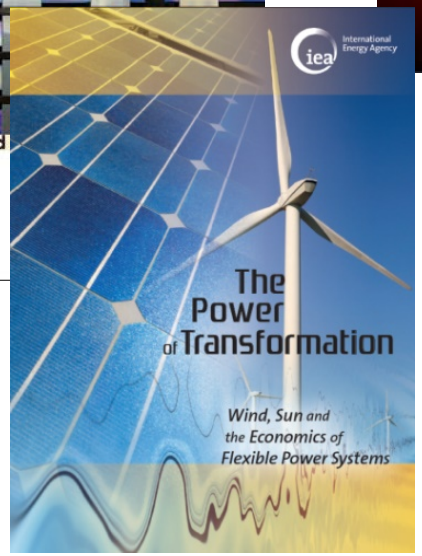

Explore the data behind ETP