Research Institute of Economy, Trade and Industry (RIETI)

RIETI BBL Seminar Handout

October 7, 2014

Speakers:

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http://www.rieti.go.jp/jp/index.html

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Energy, Climate Change and Environment: 2014 Insights

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IEA publication series

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New IEA publication

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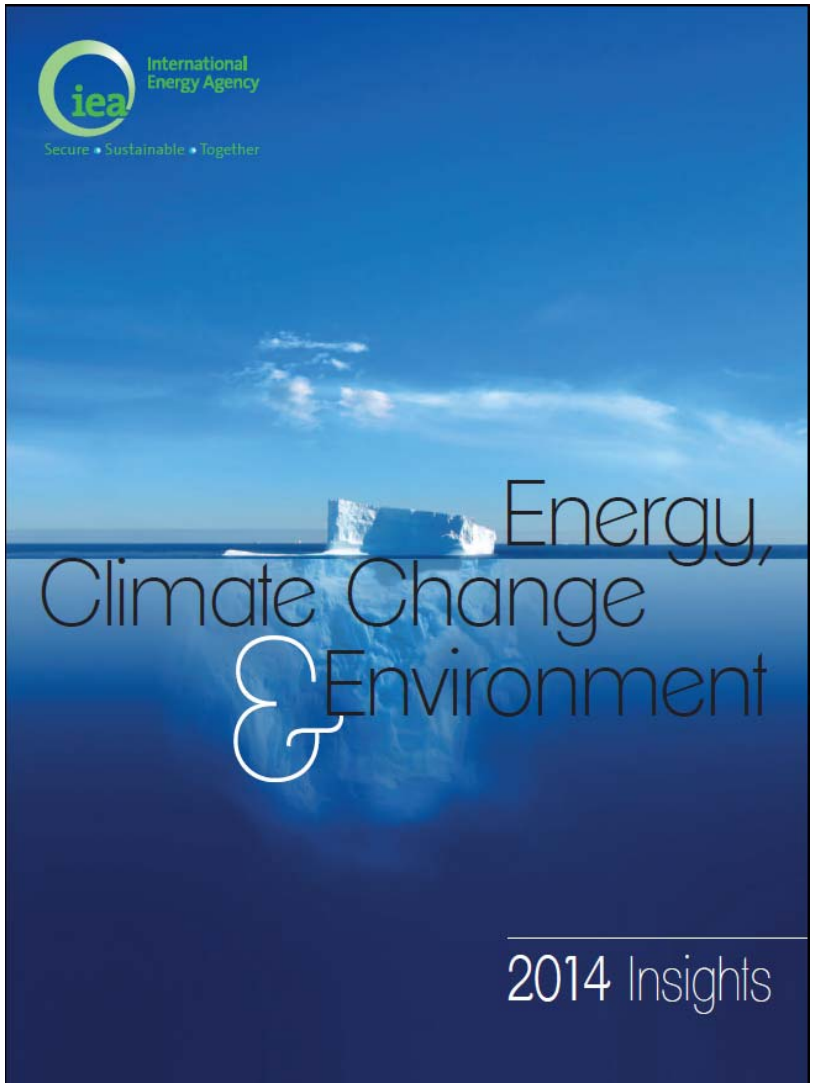
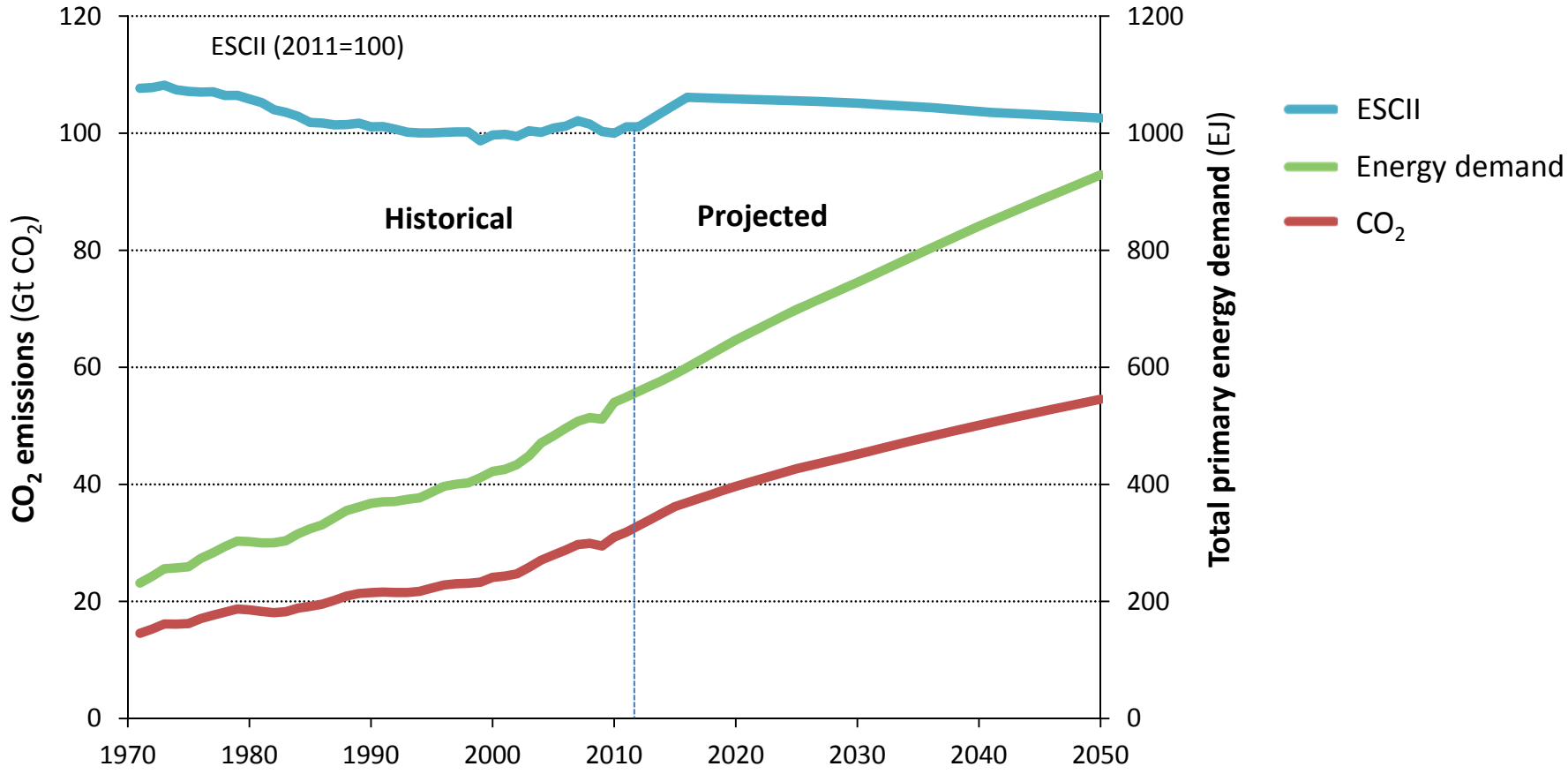


- Goes deeper into selected technical issues
- Each year chooses a special thematic focus
- Presents regional energy and emissions data

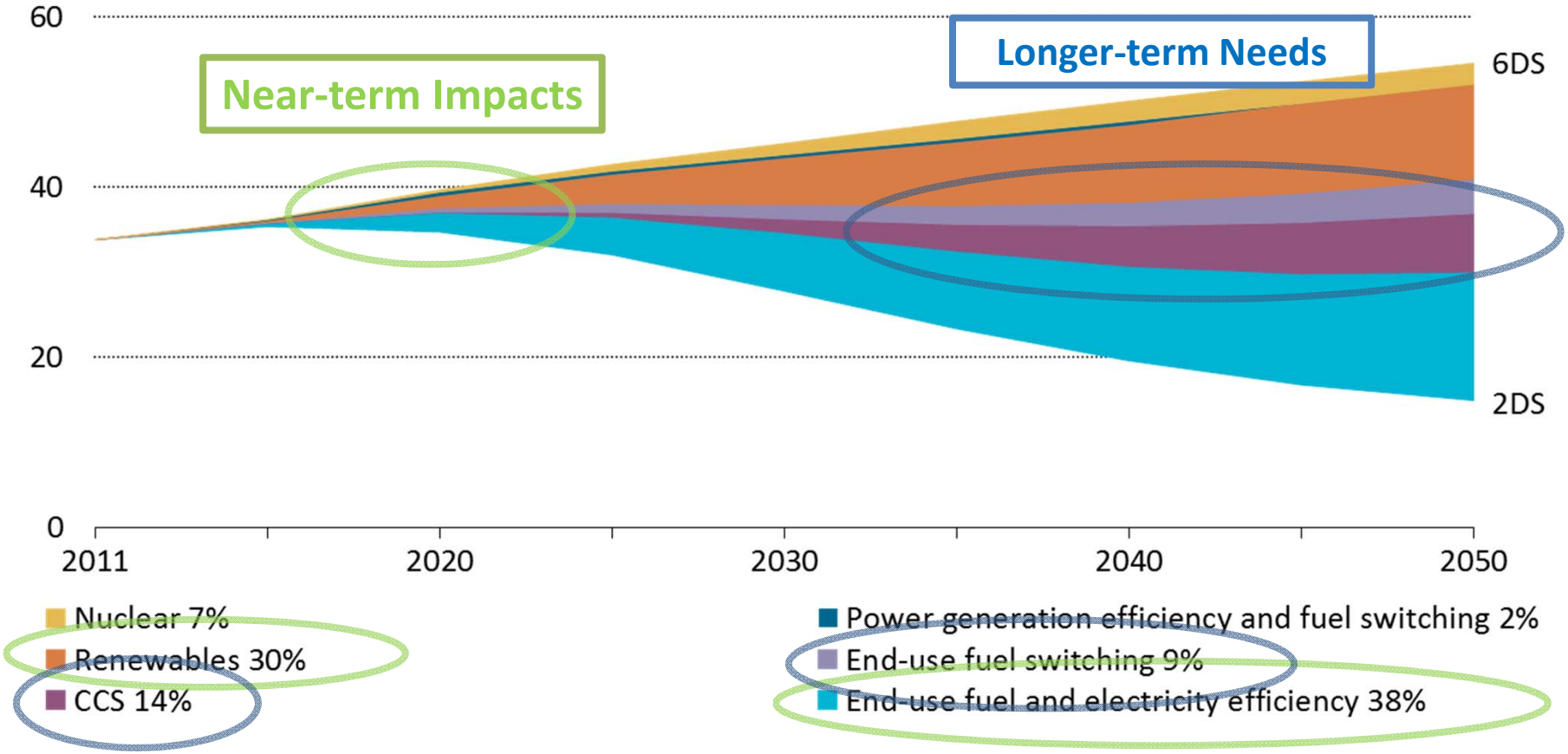
The emissions context

Global energy demand, energy CO2, and ESCII (CO2 intensity of global energy supply) in the 6DS scenario



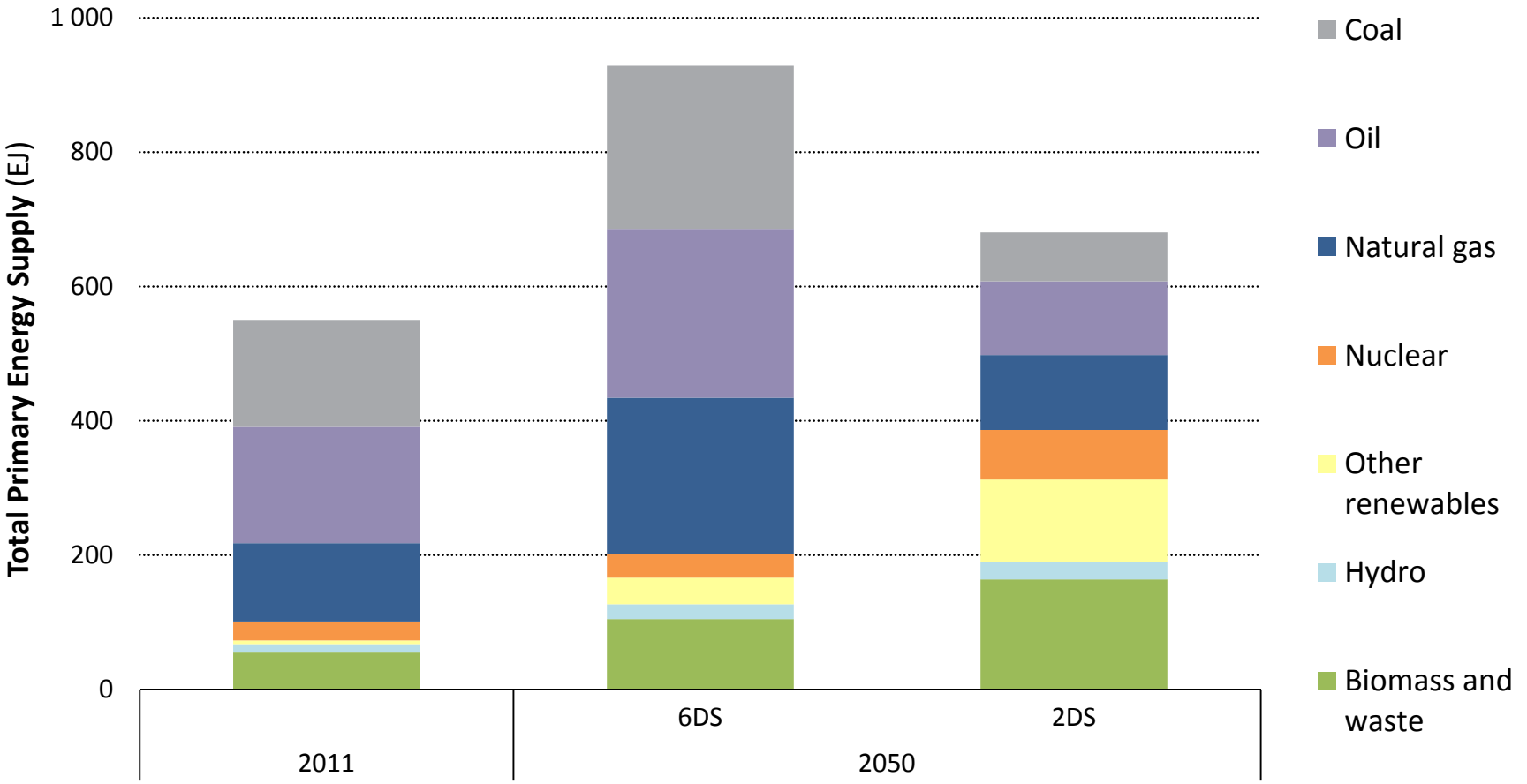
The emissions challenge

Getting to the 2DS will rely heavily on energy efficiency and renewables initially, but all technologies play a role.



Different energy futures…

The 2DS will require energy conservation and also significant transformation of the global energy mix.



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A cleaner energy mix

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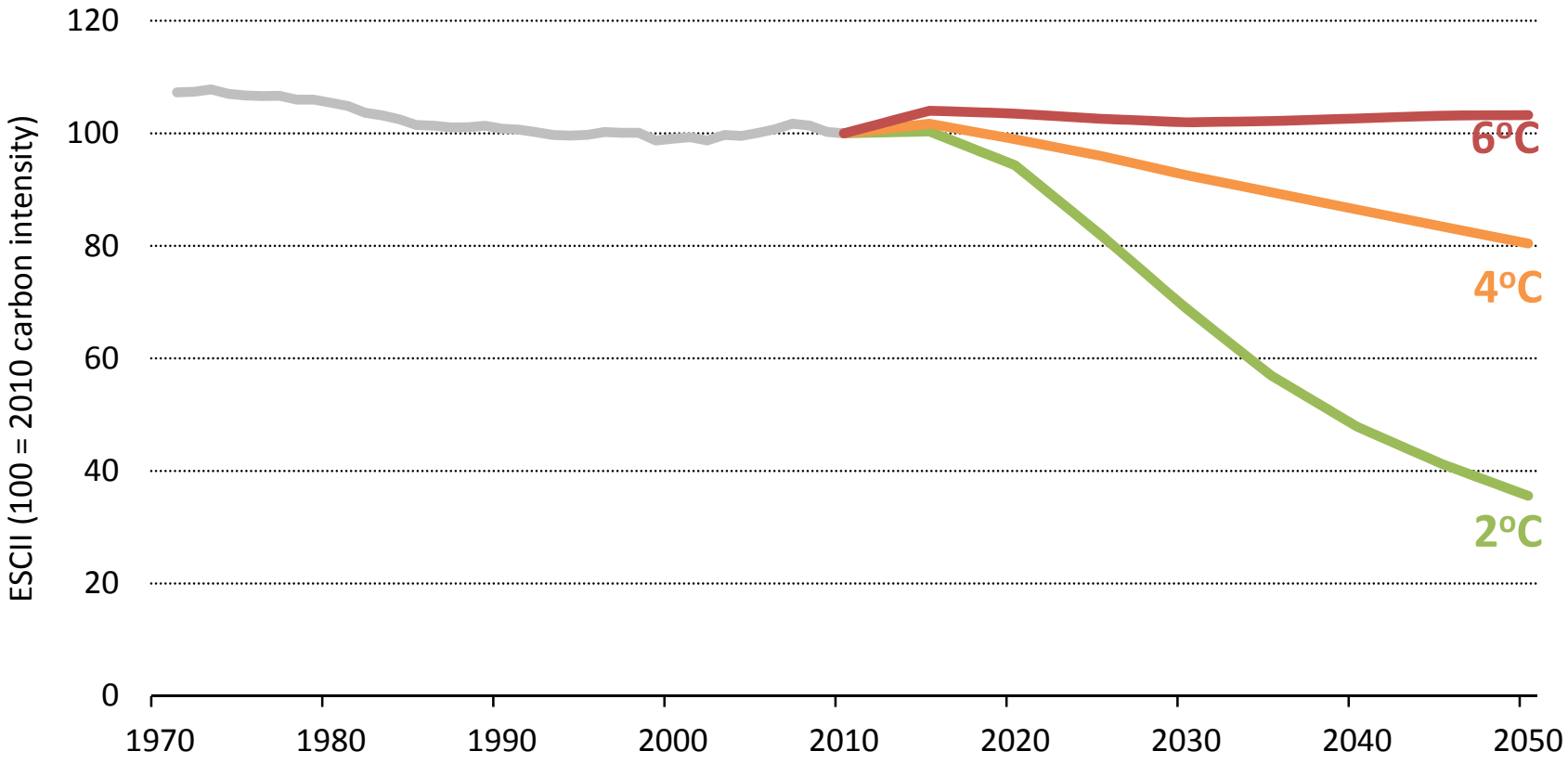
The carbon intensity of energy supply will need to decrease rapidly in the future.



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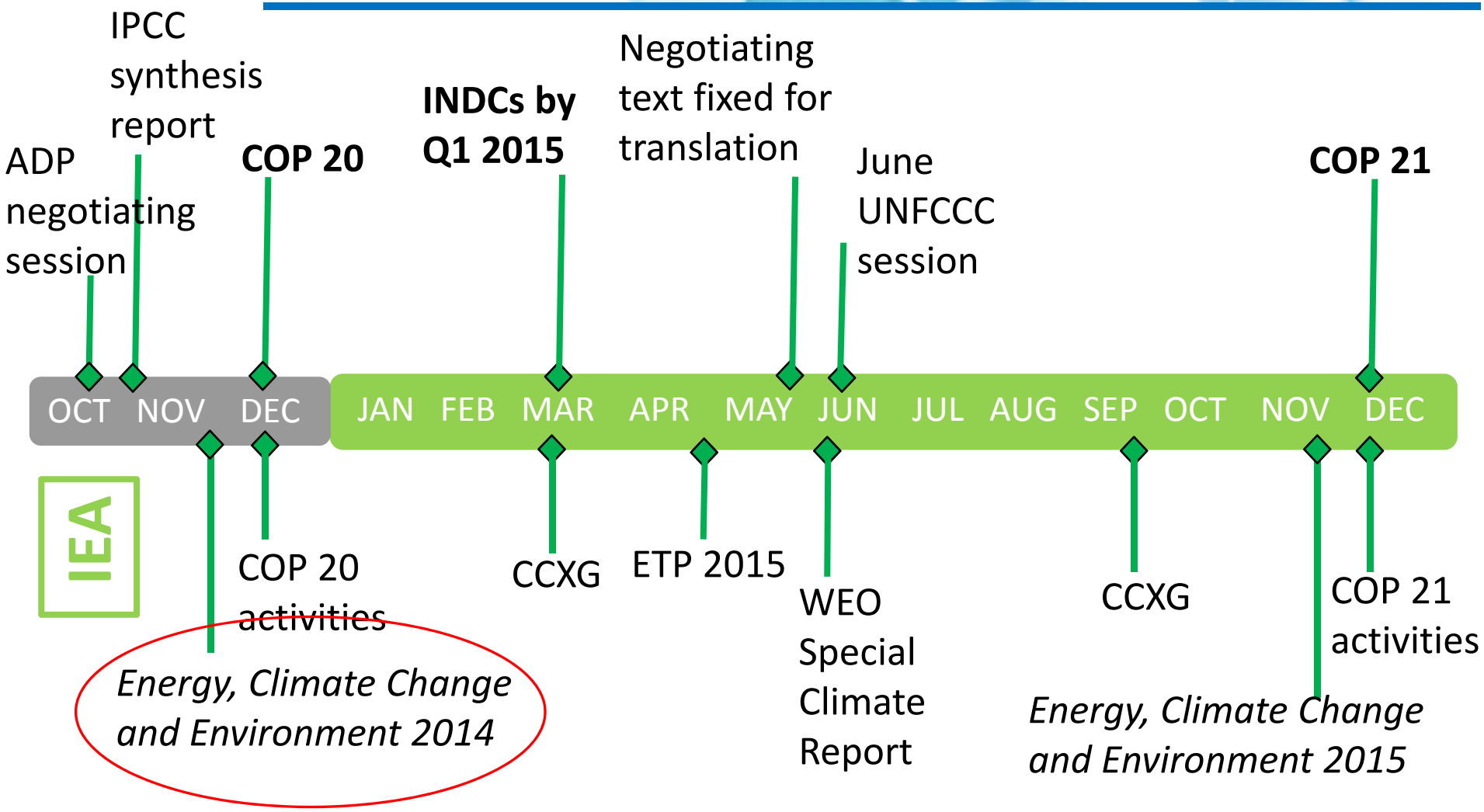
14 months to Paris



IEA messages for COP 20 in Lima

- Short term action pays off: emissions can be kept on a 2C pathway to 2020
- Energy sector decarbonisation actions are not solely driven by emissions goals
- Power sector decarbonisation is particularly critical in the period 2020 to 2030
- Action on investment and technology is needed now to set the conditions for long-term energy sector transition
- The energy sector needs to prepare for the impacts of climate change

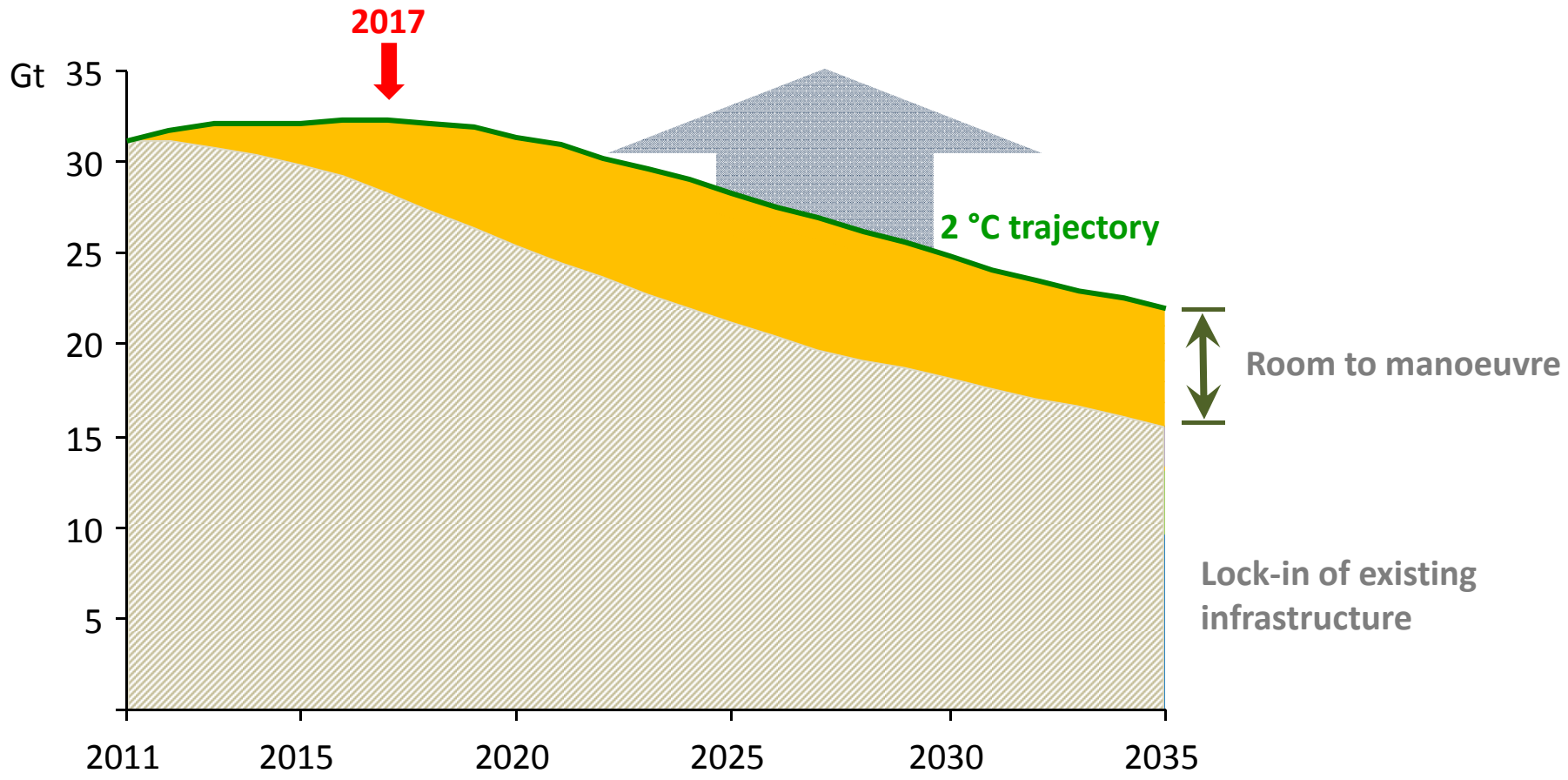
Outline of *ECCE: 2014 Insights*

- Policies and actions to "unlock" existing high-emissions assets
- The new landscape of emissions trading systems
- Energy metrics: A useful tool for tracking decarbonisation progress
- The air pollution-GHG emissions nexus: implications for the energy sector (this year's special focus)
- Trends in energy and emissions data

Chapter 1:

Policies and actions to "unlock" high-emissions assets

“Lock-in” of 2 degree emissions



Planned fossil fuel infrastructure through 2017 will generate all energy emissions under 2DS through 2035

"Un-locking" high emission assets

Unlocking action	Policy Options		
	Direct regulations	**Supply/demand balances**	**Price**
Retirement of coal plant	- ownership decision - lifetime limits - phase-out	- fleet-wide emissions performance standard - Renewables regulation - demand reductions	- fuel tax changes - carbon pricing - preferential renewables tariffs
Change dispatch of existing power plant fleet	- "clean-first" dispatch - priority dispatch of renewables	- fleet-wide emissions performance standard	- fuel tax changes carbon pricing - removal of fossil fuel subsidies
Efficiency retrofit of coal plant	- targets for plant retrofit rates	- fleet-wide emissions performance standard	- carbon pricing - removal of fossil fuel subsidies
Retrofit of coal plant for CCS	- regulated lifetime limits - CCS mandates	- CCS trading schemes - fleet-wide emissions performance standard	- carbon pricing - preferential tariffs for CCS generation

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The energy trilemma

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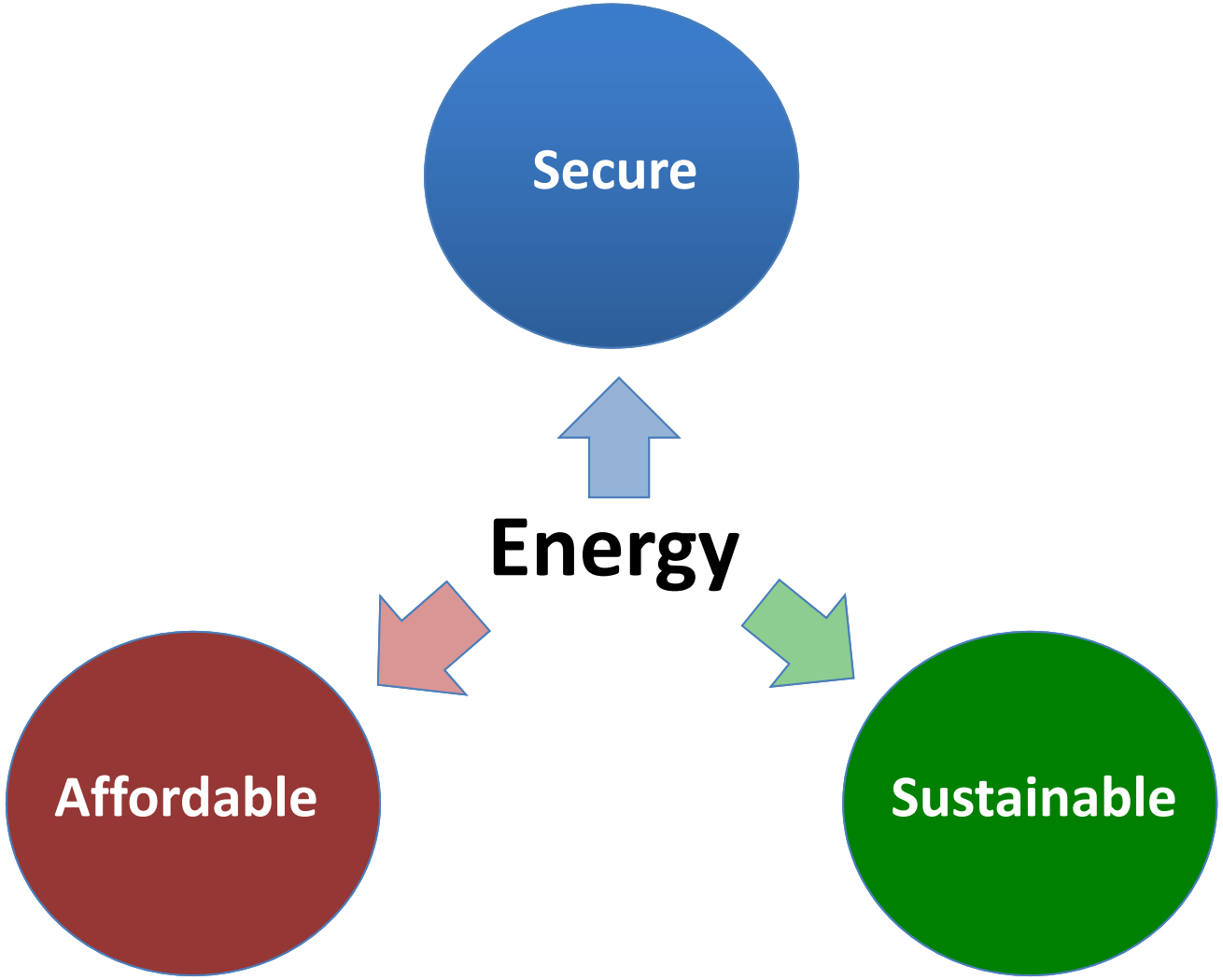

Chapter 2:

The new landscape of emissions trading systems

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Current status of ETSs worldwide

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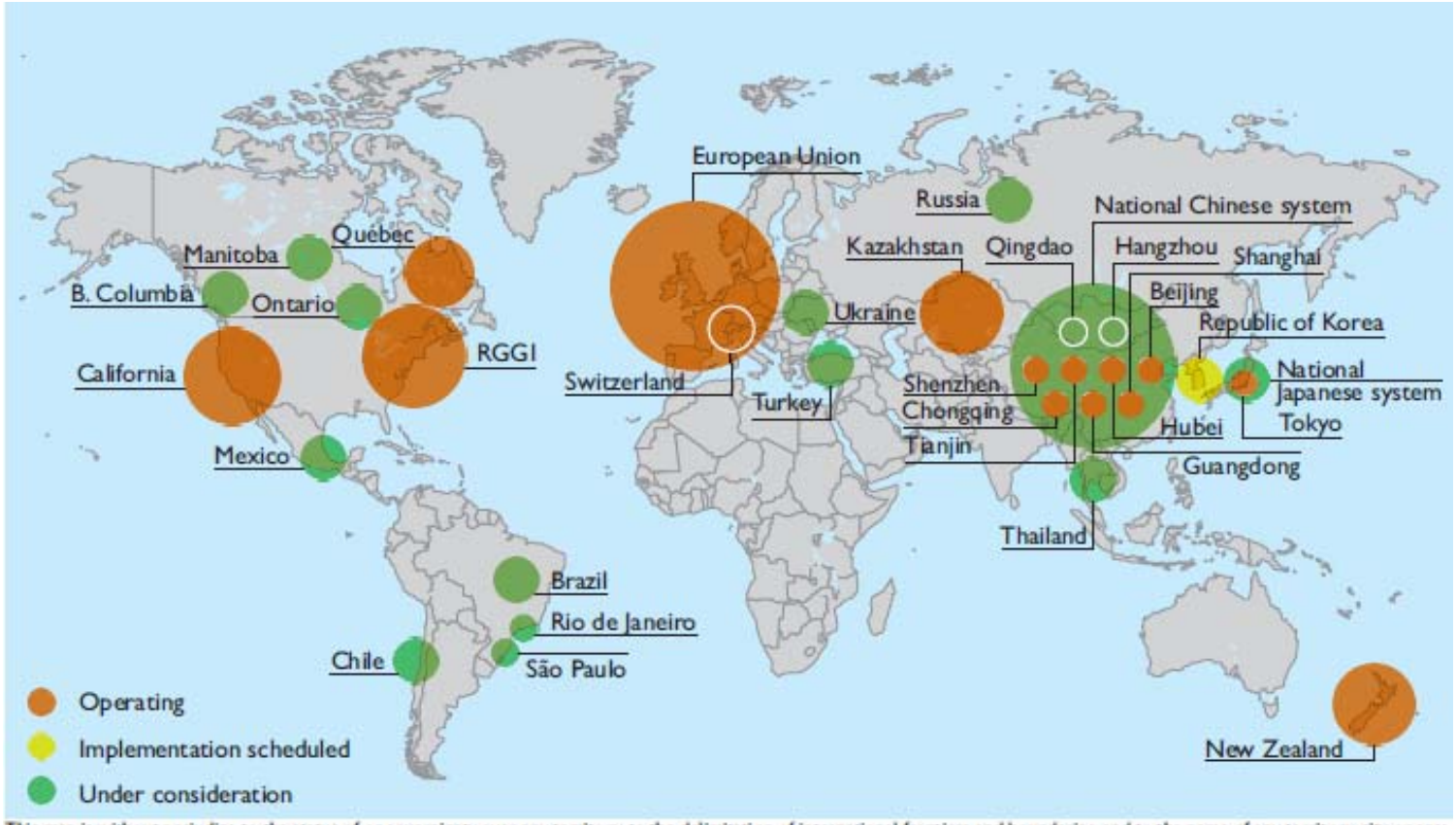


This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries, and to the name of any territory, city or area.

Interaction between ETSs and the energy sector

Key issues include:

- The challenges of implementing an ETS in energy systems of a more regulated nature
- The need to understand and address the impact of carbon prices on electricity prices
- The importance of incorporating policy flexibility to respond to external influences such as other energy and climate policies

Some conclusions from recent ETS experience

- ETSs may be implemented in highly regulated electricity systems, though additional measures may be needed to ensure propagation of the carbon price signal.

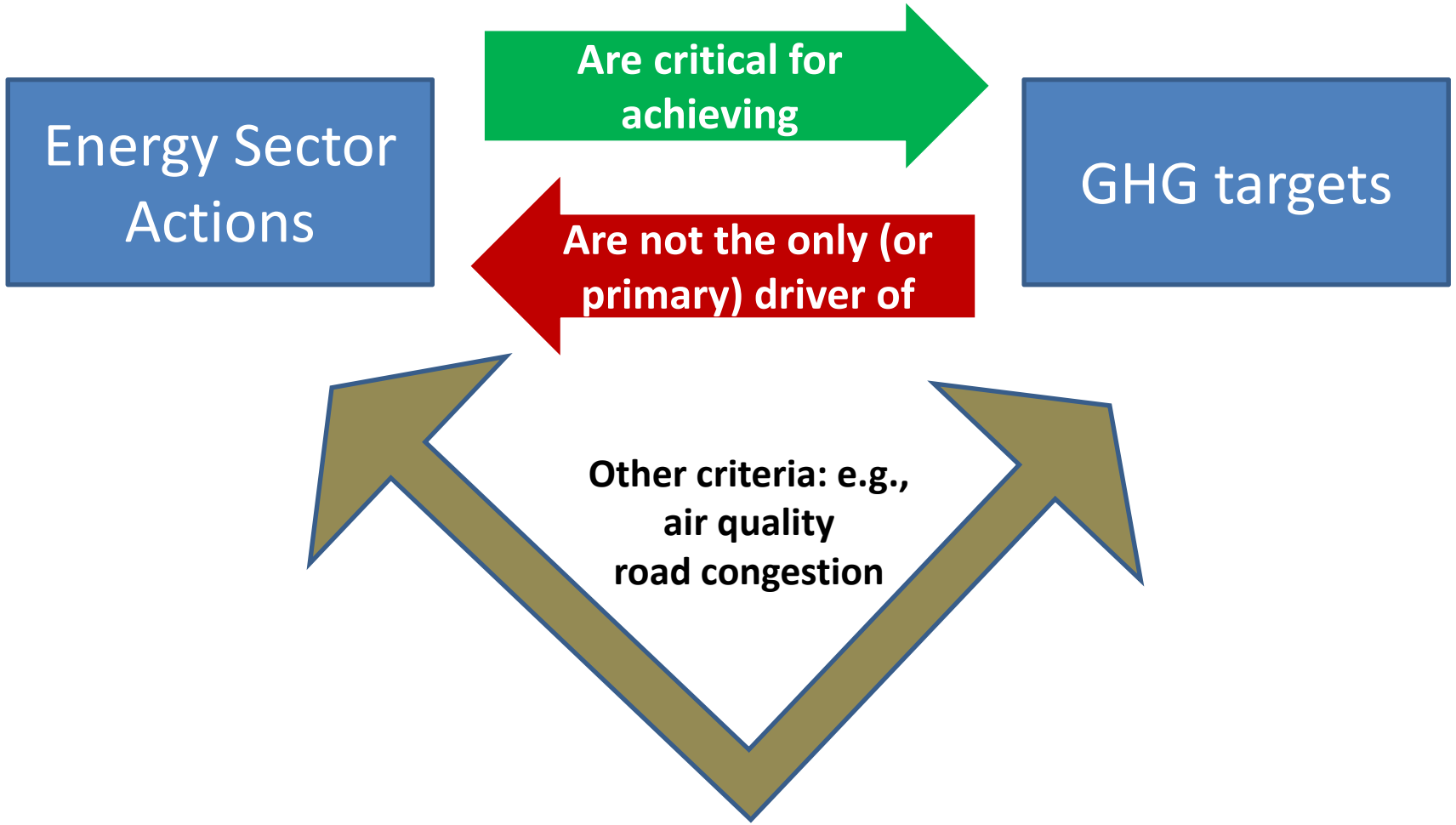
- Compensating those groups affected by rising electricity prices (driven by the carbon price) may achieve better outcomes than preventing the price rise.

- Improved integration of ETSs and complementary energy policies can ensure each set of policies meets its their respective objectives.

Chapter 3:

Metrics for tracking progress in energy sector decarbonisation

Other criteria can drive energy sector actions



Typology of metrics

Type I metrics

- Total annual GHG emissions
- GHG per unit of GDP
- GHG per unit of energy supply

SHORT-TERM

GHG goals

Non- GHG goals

LONG-TERM

Type II metrics

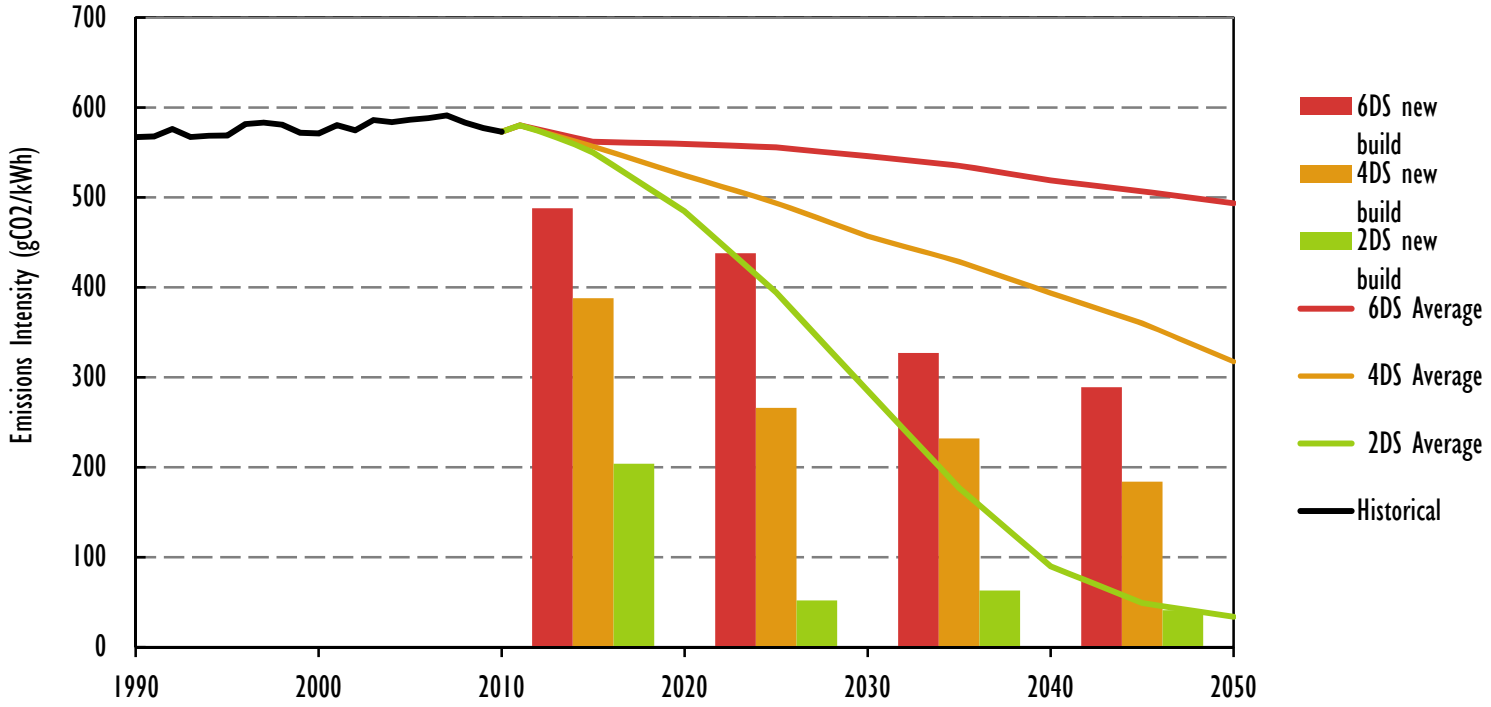
- Energy efficiency
- Renewable energy
- Low-carbon energy deployment goals

Type III metrics

- Tracking R&D of key technologies
- Emissions intensity of new electricity investment

Type I and Type III metrics for the electricity sector

To achieve the 2DS, the average emissions intensity of new generation must be lower than that of natural gas before 2020, and only 10% of today's levels after 2020.



Chapter 4:

The air pollution-GHG emissions nexus: Implications for the energy sector

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Concerns about local air quality are rising

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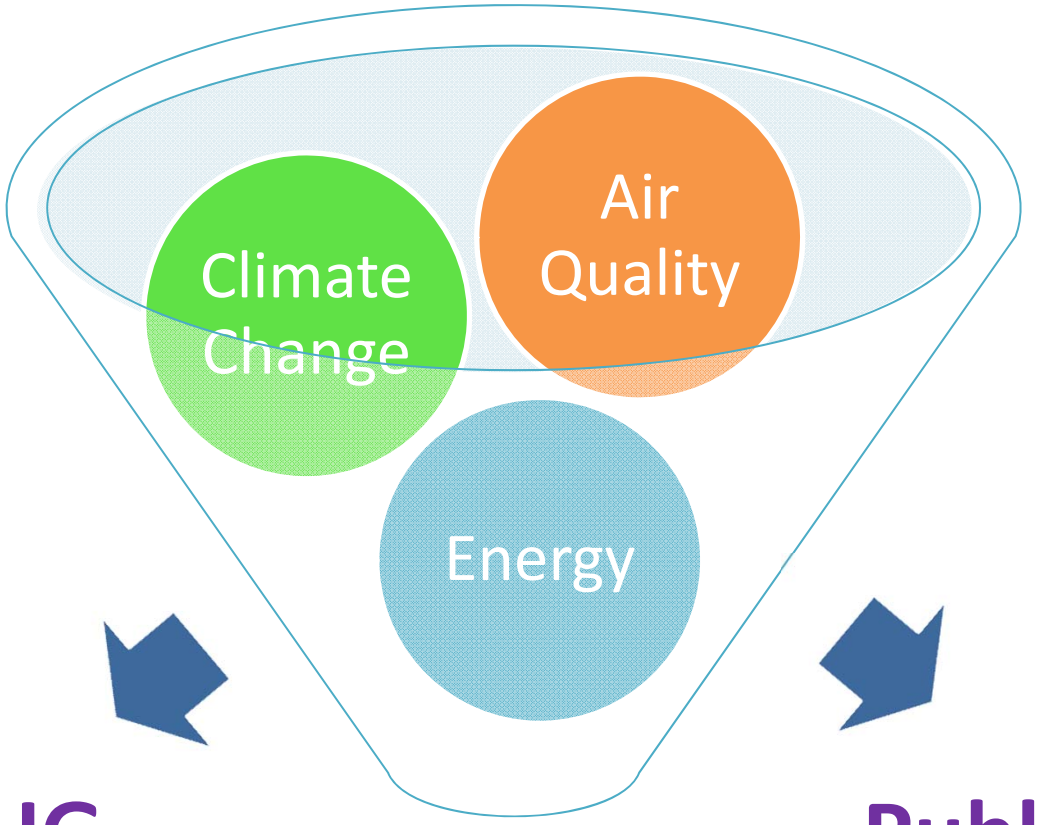
Air pollution control and GHG emissions linkages



GHG abatement

Public health benefits

The air pollution-GHG emissions nexus

Individual sections examine:

- GHG co-benefits of air quality controls of large stationary sources
- China's air quality constraints: Implications for GHG mitigation in power and key industry sectors
- The regulatory approach to climate policy in the United States

Plant-level compliance options and impacts on GHG emissions

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Air pollutants controlled

• SO_2 • NO_x • Primary PM/black carbon • CO • Hg (mercury)

Plant-level compliance options

- Retrofit for pollution control
- Improve operating efficiency
- Fuel switching
- Plant closure

Impacts on other pollutants

- GHG emissions co-benefits

Regional experience

European Union

- Large Combustion Plant (LCP) Directive
- Integrated Pollution Prevention and Control (IPPC) Directive

Canada

- Air quality regulation and multi-pollutant objectives
- Caps on mercury emissions for each province

United States

- Cross-State Air Pollution Rule (CSAPR) or “Transport Rule”
- Mercury and Air Toxics Standards (MATS)

East Asia

- **Japan** has some of the cleanest and most efficient coal plants in the world, and most are installed with flue gas technologies for SO_2 and NO_x.

- **South Korea** is gradually moving towards a more efficient power fleet by upgrading and replacing the existing plants with the new and more efficient ones.

- **China** currently has the fastest installation rate of flue-gas desulphurisation (FGD) and selective catalytic reduction (SCR) anywhere in the world.

Importance of multi-pollutant approach

Reduction in pollutant emissions	Ozone	Sulphate	PM2.5	Acid deposition	Mercury	CO_2 /global warming
SO_2	⇩	🡻	🡻	🡻	⇩	⇧
NOx	🡻	⇩⇧	🡻	🡻	⇧	⇧
Primary PM – black C			🡻			🡻
CO	⇩	⇩	⇩	⇩		
Hg		⇩	⇩		🡻	⇩
CO_2	⇩	⇩	⇩	⇩	⇩	🡻

China case study

Heavily industrialised growth model

=> air quality concerns in major urban areas

Short-term measures:

- Beijing Olympics (2008)
- Shanghai World Expo (2010)

Severe air pollution episodes

- e.g., Beijing in January 2013

China: key national pollution control regulations

Five-Year Plans

- Pollution control mandates
- Closure of small, inefficient power plants
- Energy/carbon intensity targets

"War on Pollution" policies

- PM2.5, PM10

Air Pollution Prevention and Control Action Plan

- PM, SOx, NOx
- Coal cap policies
- Additional forced retirements

Regional measures: Beijing

- Keep coal use below 65% of TPES by 2015
- Cap coal consumption at 10 Mt by 2017 (a 13 Mt reduction)
- Reduce power capacity by one-third
- Ban construction of new oil refining, steel, cement and thermal power plants
- Reduce cement production by 50%
- Upgrade 300 polluting firms in 2014

Some strategic considerations

- China's air pollution controls can lead to significant GHG reductions, provided that they are structured to achieve these dual objectives

- Areas for consideration:

  - Emissions shifting to unregulated/remote regions

  - Ambitious syngas developments are significantly more energy- and carbon-intensive

- Continued improvement of air quality statistics, accounting, and enforcement measures will be needed

The emerging contours of the US regulatory approach

Electric power

Industry

Transportation

Regulating GHGs from electric power plants

GHG standards for new power plants

- Uniform national standards for coal and gas
- Coal units would need CCS; NGCC meets the standard already

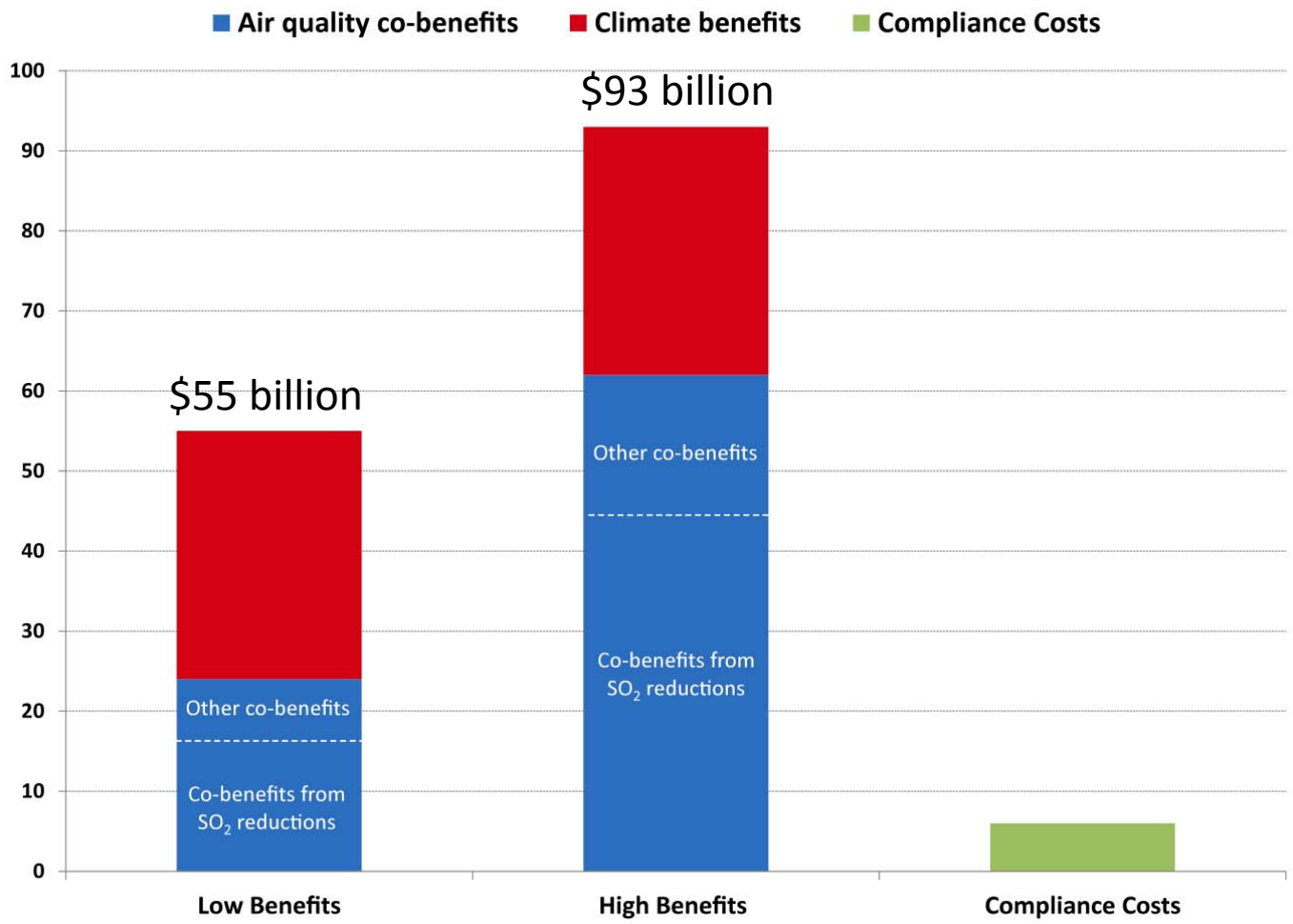
GHG standards for existing power plants

- State-specific carbon intensity goals
- Projected to reduce emissions by 30% in 2030 relative to 2005
- Built around the application of four “building blocks”
- Will allow use of market mechanisms such as cap-and trade

Some quick take-aways from the U.S. GHG regulations

- Standards for new power plants are likely to have little effect on US GHG emissions
- By 2020, power sector emissions will already have declined 13% since 2005; thus, standards expected to reduce emissions an additional 17% over the following decade
- In 2030, natural gas would be the dominant fuel (33%), but coal would still produce a significant share of electricity (31%)
- CO2 intensity of US electricity generation projected to fall 19% from its 2012 fleet-wide rate, i.e. to that of typical NGCC plant
- Mobile source rules for new cars and trucks are also important and may yield more reductions by 2030

Non-CO2 benefits are significant



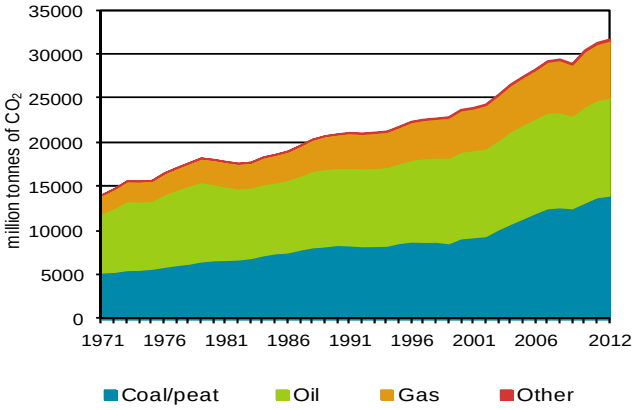
Chapter 5:

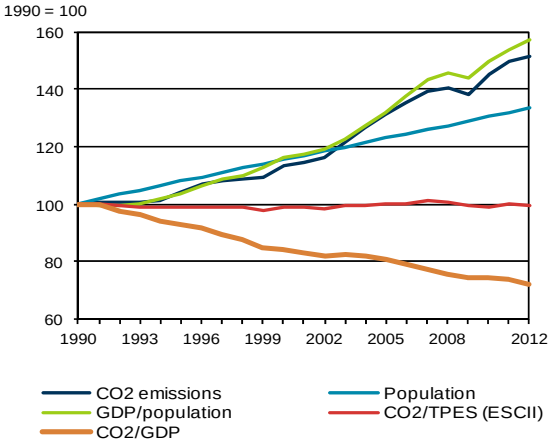
Data: Energy and Emissions Data

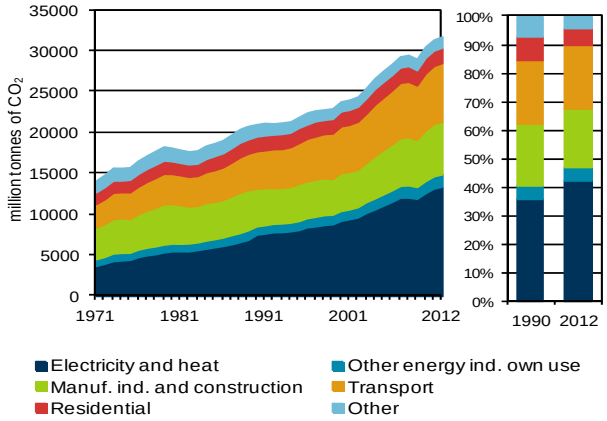
Selected indicators

Regional coverage

- World
- OECD Americas
- OECD Asia Oceania
- OECD Europe
- Africa
- Non-OECD Americas
- Middle East
- Non-OECD Europe and Eurasia
- Asia (excluding China and India)
- China
- India







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Thank you

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