UNIVERSIDAD PONTIFICIA
ICAI ICADE
COMILLAS
MADRID

CÁTEDRA BP DE ENERGÍA Y SOSTENIBILIDAD

2015 BP Madrid Forum on Energy and Sustainability

"Making energy efficiency happen: The pending challenges"

Madrid, 29-30 September 2015

UNIVERSIDAD PONTIFICIA ICAI ICADE COMILLAS MADRID

CÁTEDRA BP DE ENERGÍA Y SOSTENIBILIDAD

bp

2015 MADRID FORUM ON ENERGY & SUSTAINABILITY
BP Chair on Energy & Sustainability
Universidad Pontificia Comillas de Madrid

Making energy efficiency happen
The pending challenges

Ignacio Pérez Arriaga

Director of the BP Chair on Energy & Sustainability

Madrid, 29-30 September 2015

A permanent concern of these Forums

- Promote a **sustainable energy model**
  - Guaranteed access to the diverse forms of modern energy that allow the **satisfaction of the needs of all people at an affordable price**, now and in the foreseeable future.
  - **A transition to a future competitive low-carbon economy** is needed to stabilize GHG concentration at levels such that the implications of climate change could be kept under “reasonable” limits

Previous BP Madrid Forums *(1 of 2)*

- **2004**: Energy, sustainable development & European competitiveness
- **2005**: Towards a sustainable energy model: Our short-term challenges
- **2006**: Towards a global climate change strategy: The EU ETS & beyond
- **2007**: Global climate strategies beyond 2012: The route ahead *(jointly with Florence School of Regulation, European University Institute)*

Previous BP Madrid Forums *(2 of 2)*

- **2008**: Promoting investment in low-carbon energy technologies *(back-to-back with the Center for European Policy Studies, CEPS, High Level Seminar on Positive incentives for climate action)*
- **2009**: Sustainable transportation policies
- **2011**: What really matters in security of energy supply?
- **2012**: A sustainable framework for biofuels in Europe
- **2013**: The future of gas markets in Europe
- **2014**: The sustainability and competitiveness of oil refining in Europe

The 2015 Forum

Making energy efficiency happen: The pending challenges

The objectives

Objectives of the 2015 Forum *(1 of 2)*

- **Understand the challenges** in making energy efficiency happen
  - **Identify the current challenges** that energy efficiency faces, particularly in Europe,
  - so that we can **come up with recommendations** for policy makers in order to achieve a successful level of energy savings.

Objectives of the 2015 Forum *(2 of 2)*

- This requires careful **policy & regulatory analysis**
  - Analyze the **strong & weak points of energy efficiency policies**, mostly in the European framework,
  - In particular, examine the **role of information**, **financing**, & the particular challenges posed by **liberalized markets.**

The 2015 Forum

Making energy efficiency happen: The pending challenges

The context

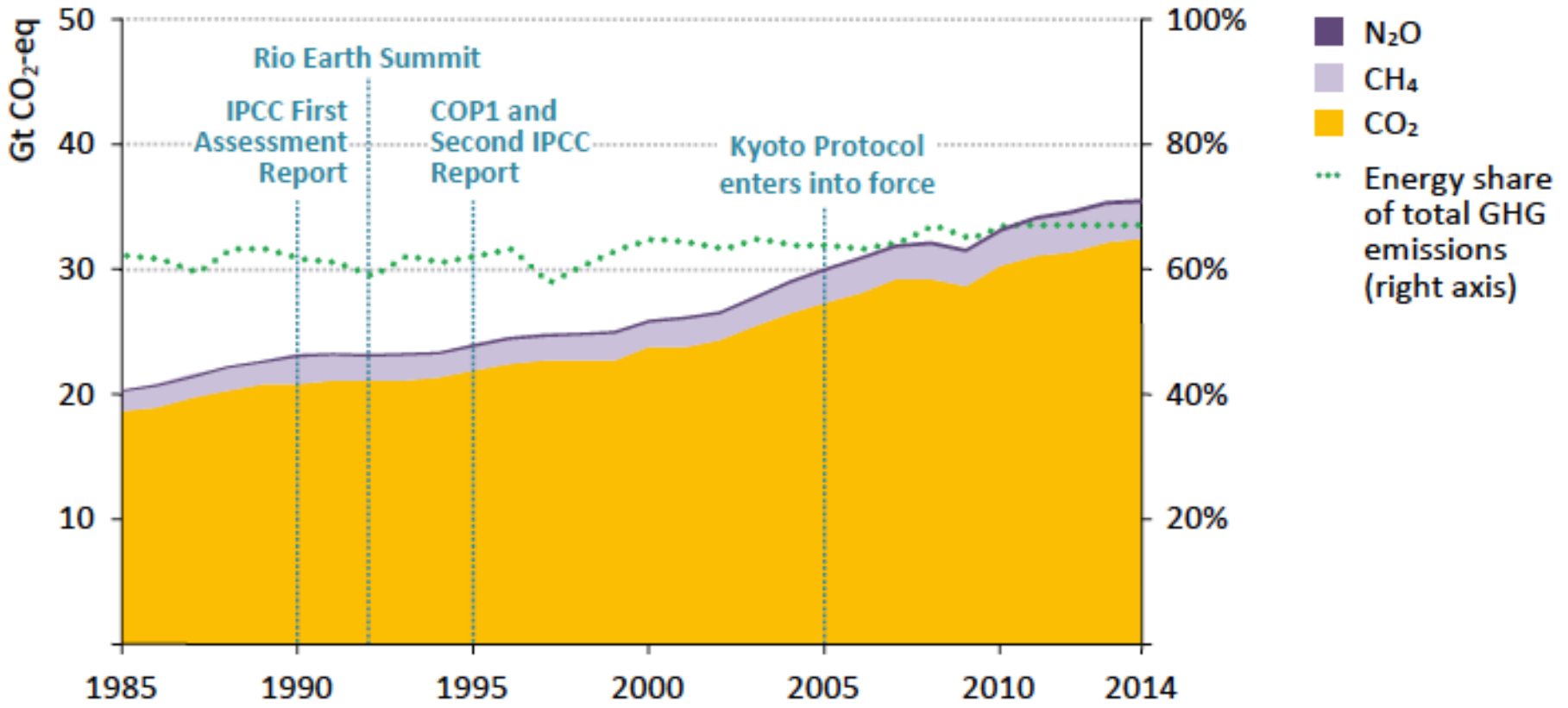
The global context

- **“Energy production and use account for two thirds of the world’s greenhouse-gas (GHG) emissions**,

  meaning that the pledges made at COP21 must bring deep cuts in these emissions, while yet sustaining the **growth** of the world economy, boosting **energy security** around the world and **bringing modern energy** to the billions who lack it today”.

Source: IEA WEO-2015, Special Report on Energy and Climate Change

Figure 1.3 ▷ Global anthropogenic energy-related greenhouse-gas emissions by type



Notes: CO_2 = carbon dioxide, CH_4 = methane, N_2O = nitrous oxide. CH_4 has a global warming potential of 28 to 30 times that of CO_2, while the global warming potential of N_2O is 265 higher than that of CO_2.

Sources: IEA and EC/PBL (2014).

The global context *(some good news)*

- The global **economy grew** by around 3% in 2014 but energy-related carbon dioxide (CO**2**) **emissions stayed flat**,

  the first time in at least 40 years that such an outcome has occurred outside economic crisis.

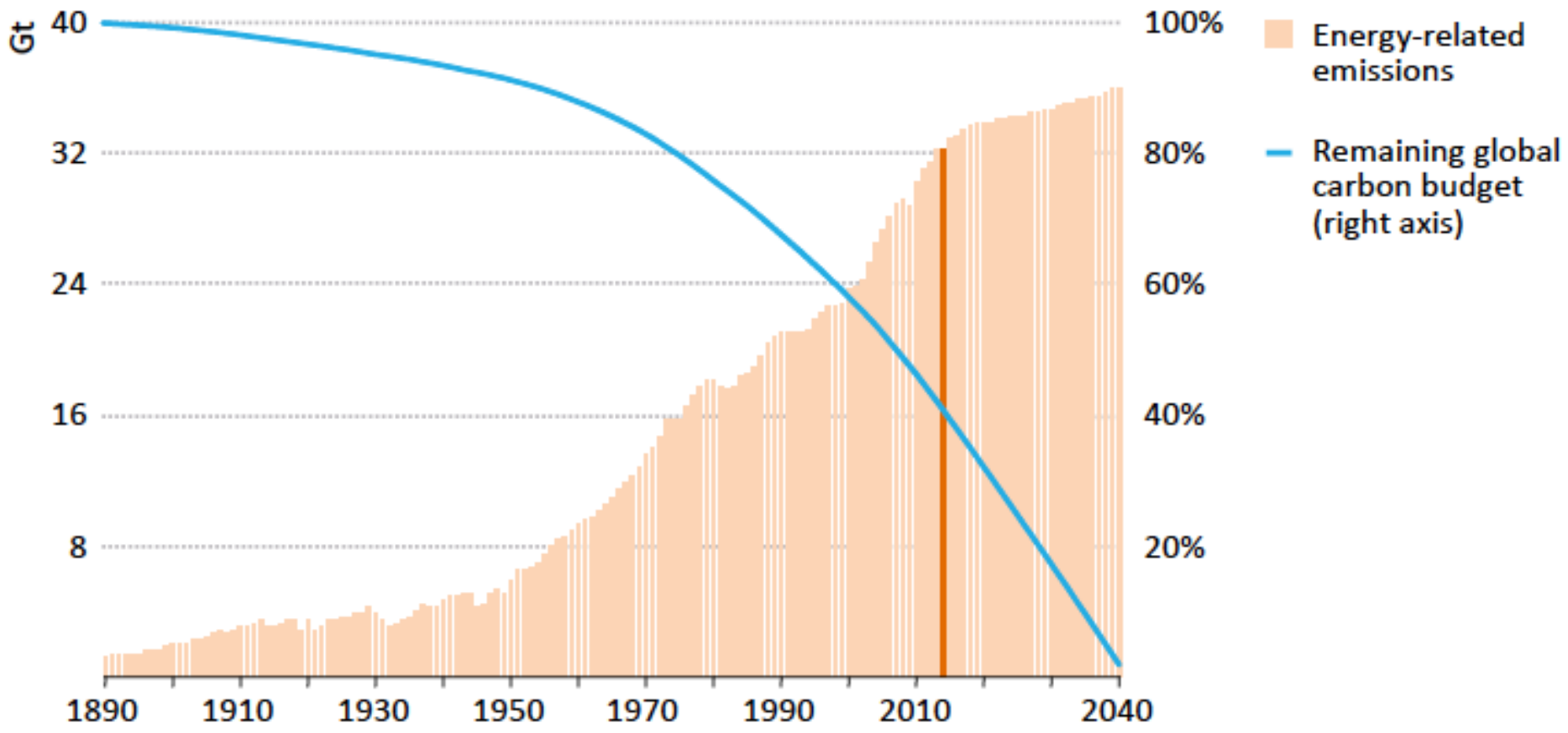
- The **energy intensity of the global economy dropped** by 2.3% in 2014, more than double the average rate of fall over the last decade,

  a result stemming from improved energy efficiency and structural changes in some economies, such as China

The global context *(the bad news)*

- Growth in global energy-related GHG emissions slows, but **there is no peak by 2030** in the INDC *(Intended Nationally Determined Contributions)* Scenario
- With INDCs submitted & planned so far, **the world's estimated remaining carbon budget consistent with a 50% chance of keeping the rise in temperature below 2 ° C is consumed by around 2040** – eight months later than is projected in the absence of INDCs.

Figure 2.3 ▷ Global energy-related CO_2 emissions in the INDC Scenario and remaining carbon budget for a >50% chance of keeping to 2 °C



Sources: IPCC and IEA data; IEA analysis.

The global context

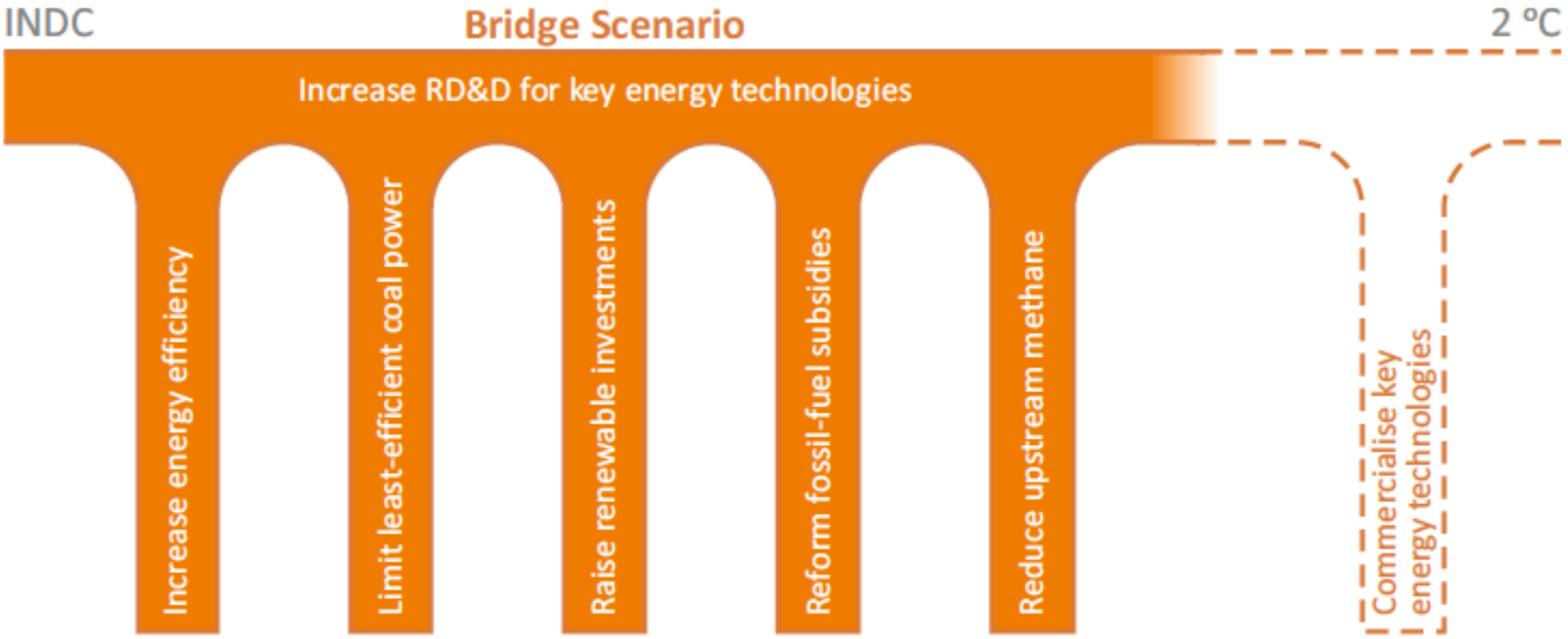
- The **IEA proposes a bridging strategy** that could deliver a peak in global energy-related emissions by 2020.
- The peak can be achieved **relying solely on proven technologies and policies**, without changing the economic and development prospects of any region, and is presented in a "**Bridge Scenario**".

The global context

- The **Bridge Scenario** consists of **5 measures**:
  - Increase **energy efficiency** in industry, buildings & transport sectors
  - Reduce the use of least-efficient **coal-fired power plants** & ban their construction.
  - Increase investment in **renewable energy** technologies in the power sector from $270 billion in 2014 to $400 billion in 2030.
  - Gradual phase out of **fossil-fuel subsidies** to end-users by 2030.
  - Reduce **methane emissions** in oil and gas production.

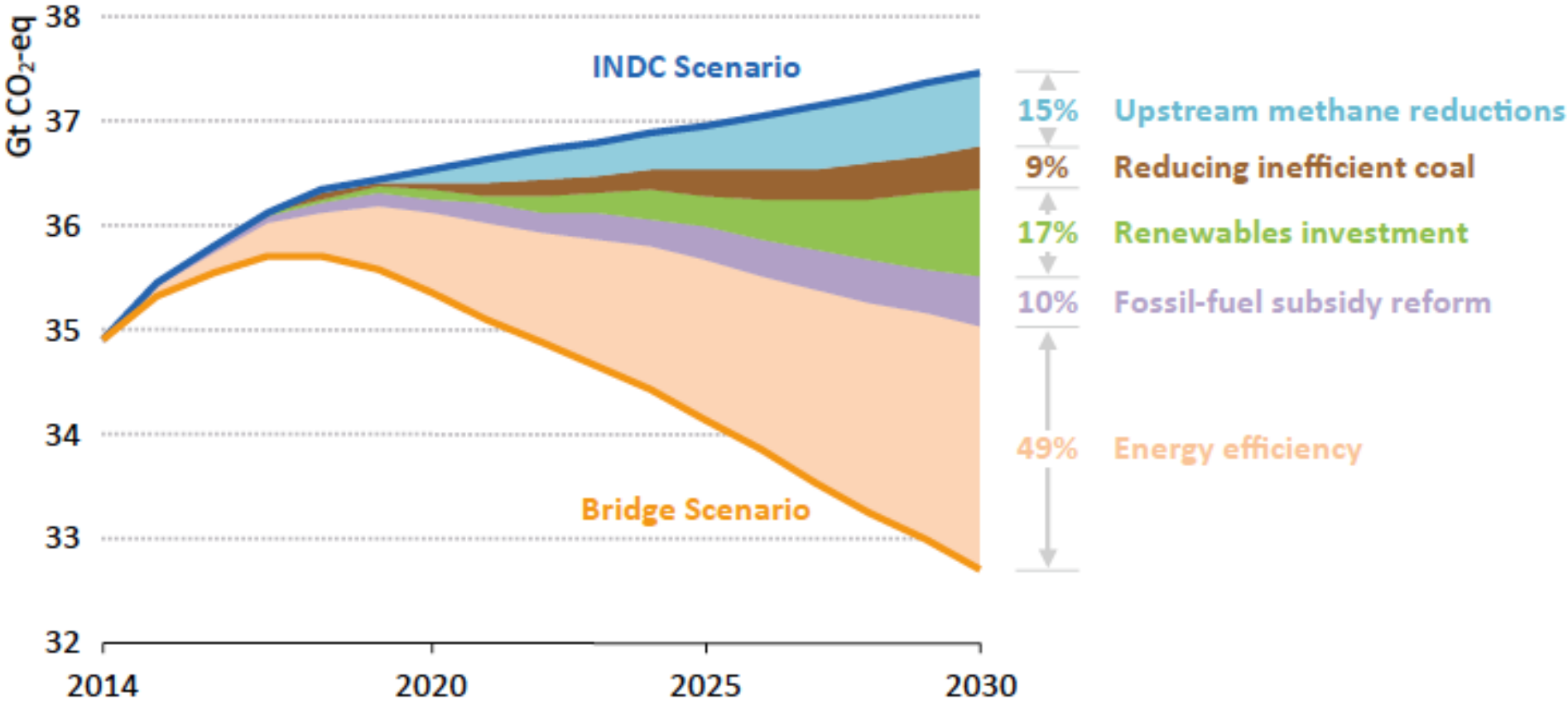
The 5 IEA measures

Figure 3.1 ▷ On the road to 2 °C: policy pillars of the Bridge Scenario



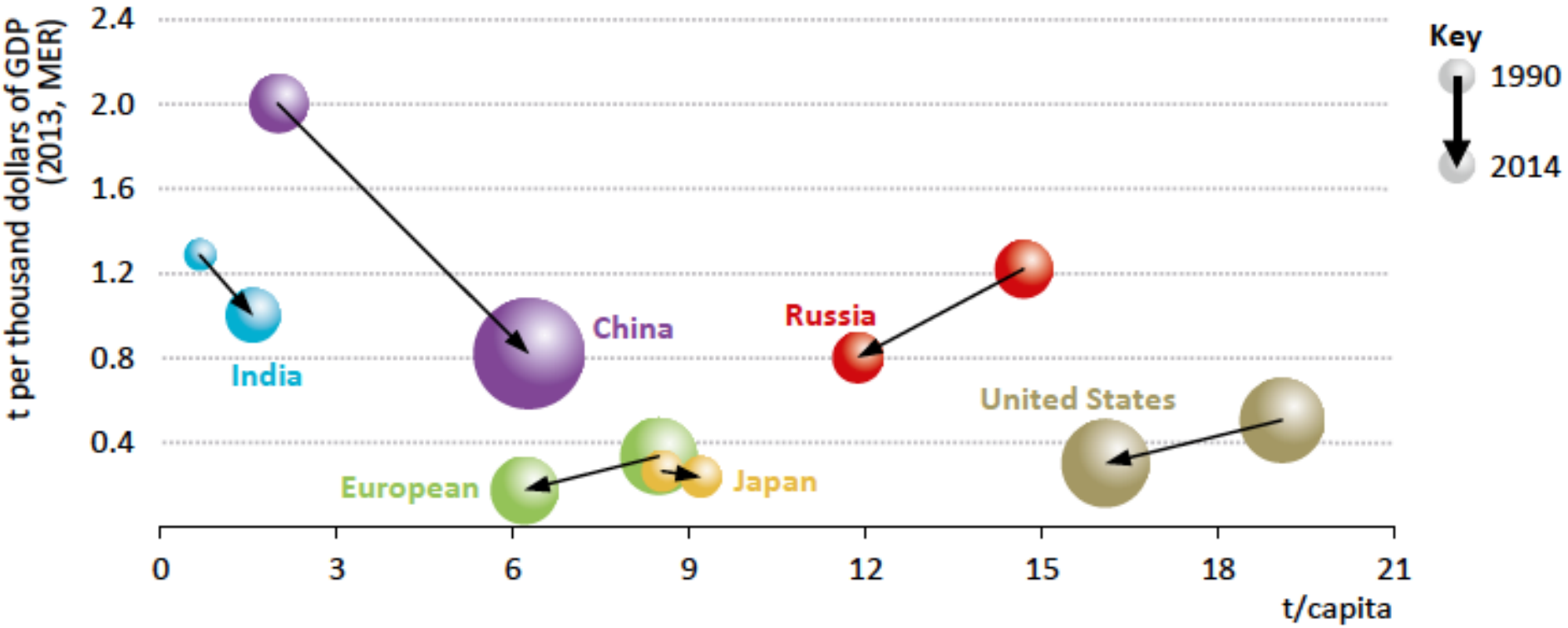
The crucial role of energy efficiency

Figure 3.2 ▷ Global energy-related GHG emissions reduction by policy measure in the Bridge Scenario relative to the INDC Scenario



Evolution of CO2 intensity & per capita

Figure 1.7 ▷ Energy-related CO_2 emissions per capita and CO_2 intensity by selected region



Notes: Bubble area indicates total annual energy-related CO_2 emissions. MER = market exchange rate.

A more “local” context: EU, USA, Spain

Energy efficiency promotion in the USA

- EE policy in USA is promoted through a variety of channels
  - Federal & State minimum efficiency standards
  - Building energy codes
  - National labeling program
  - Tax credits and grants
  - Ratepayer-funded incentive programs

Energy efficiency promotion in the USA

Some sources of information:

- Broad review of EE policy at different levels (federal, state, local): http://www.nrel.gov/docs/fy10osti/46532.pdf
- Spending projections and review of policy trends for ratepayer programs: https://emp.lbl.gov/sites/all/files/lbnl-5803e.pdf

Energy efficiency promotion in the USA

The majority of direct investment flows through ratepayer-funded **utility efficiency programs**

- These programs provide a mix of direct rebates, low interest loans, and technical assistance
- Total spending by US utilities on EE recently estimated at $5b in 2010, nearly $7b in 2011, & projected to grow to $8-12b by 2020
  - Note that the annual budget of the DOE's Weatherization Assistance Program, one of the largest federal programs providing direct investment, averages around $250 million - less than 5% of total utility spending.

Energy efficiency promotion in the USA

- Ratepayer program funding is **concentrated in a few states** (CA, northwest & northeast)
- Spending is **driven by state policies of Energy Efficiency standards** (EERS), which require utilities to reach certain service targets & allow them to recoup the funding through customer rates
- The future of ratepayer-funded EE looks bright as it is considered the **cheapest means of compliance with the EPA's new regulations** on greenhouse gases

Energy efficiency promotion in the EU

- Successive **targets** (non-binding)
  - 2016: reduce final energy use in sectors outside EU-ETS by 9% from early 2000s
  - 2020: reduce primary energy use by 20% from baseline projections
  - 2030: EU-wide 27% reduction

Energy efficiency promotion in the EU

- **Legal instruments**
  - Energy Efficiency Directive 2012/27/EC (EED)
    - Indicative national energy saving targets, mandatory energy saving targets for end-use providers, national assessment of heating & cooling systems, improvements in metering & billing, etc.
  - Energy Performance of Buildings Directive (EPBD, 2010/31/EU)
  - Directive Establishing a Framework for Setting Ecodesign Requirements for Energy-related Products (Ecodesign, 2009/125/EC) & the Energy Labelling Directive (2010/30/EU)
  - Diverse regulations for efficiency & emissions of vehicles

Spain: Basic energy efficiency data

Key data (2014 estimated)

Energy supply per capita: 2.5 toe (IEA average: 4.4 toe), -24.4% since 2004

Energy intensity: 0.09 toe/USD 1 000 PPP (IEA average: 0.13 toe/USD 1 000 PPP), -23.1% since 2004

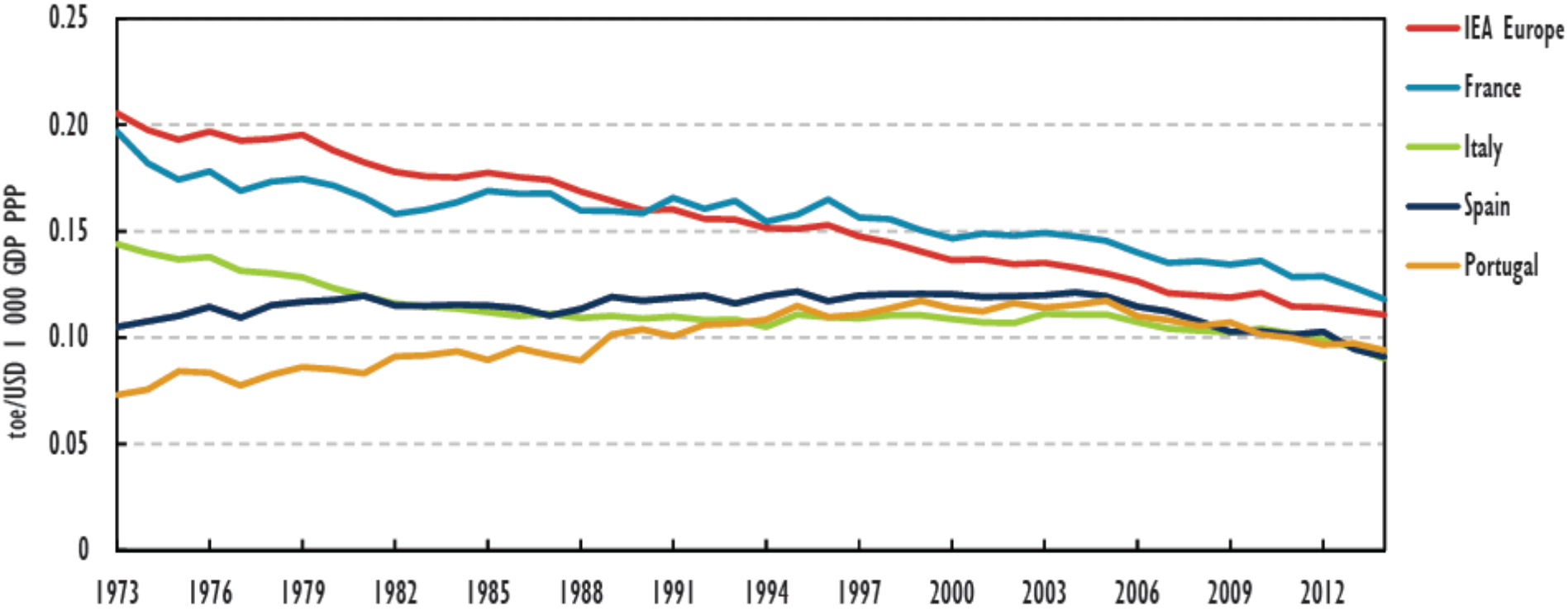
TFC (2013): 81.5 Mtoe (oil 49.0%, electricity 24.5%, natural gas 18.7%, biofuels and waste 6.2%, coal 1.3%, solar 0.3%), -15.2% since 2003

Consumption by sector (2013): transport (34.6%), industry (30.9%), residential (18.4%), commercial and other services (16.2%)

Source: IEA 2015 Spain Energy Policy Review

Energy intensity in Spain & other OCDE

Figure 4.2 Energy intensity in Spain and in other selected IEA member countries, 1973-2014



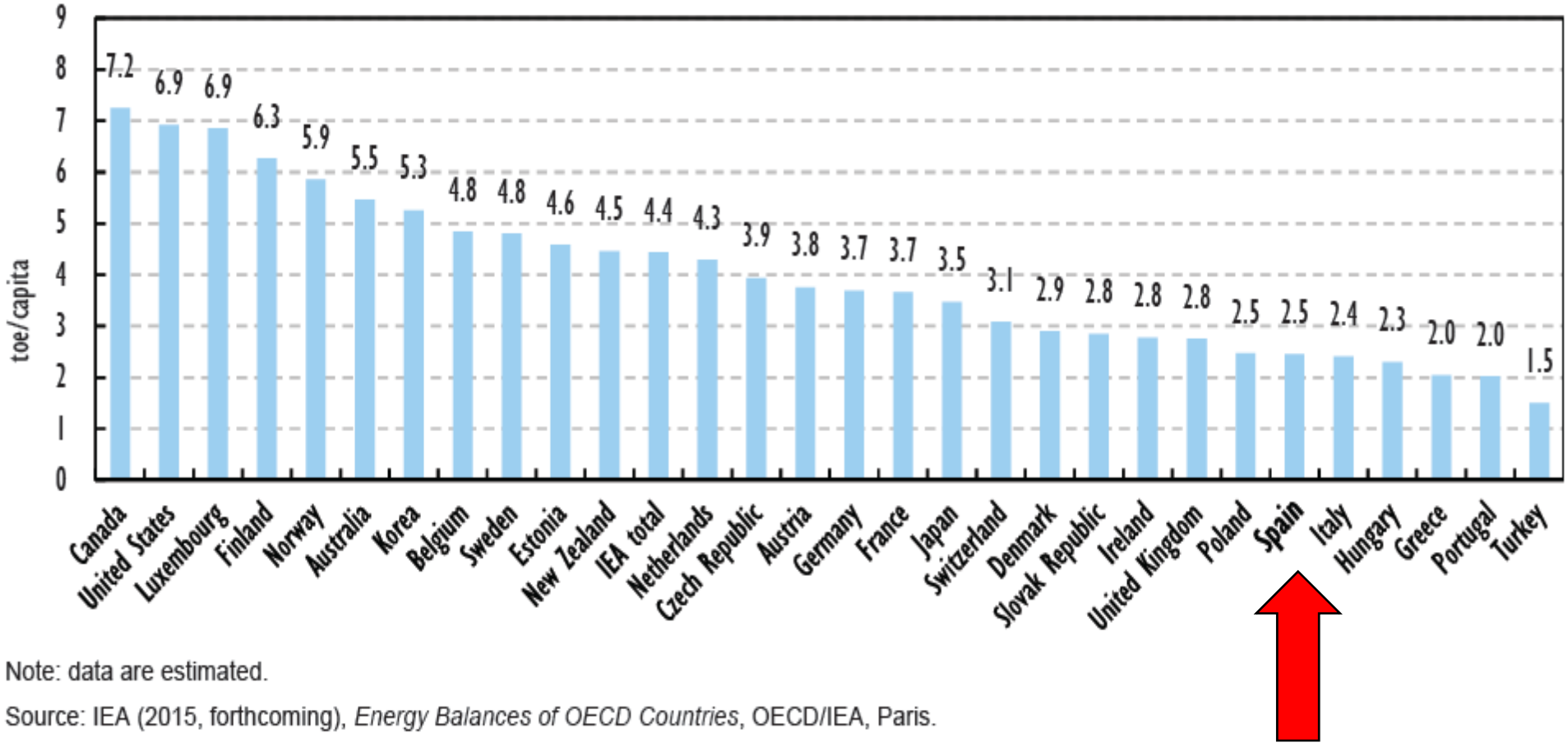
Note: data are estimated for 2014.

Source: IEA (2015, forthcoming), *Energy Balances of OECD Countries*, OECD/IEA, Paris.

Source: IEA 2015 Spain Energy Policy Review

Energy consumption per capita in OCDE

Figure 4.3 TPES per capita in IEA member countries, 2014



Note: data are estimated.

Source: IEA (2015, forthcoming), *Energy Balances of OECD Countries*, OECD/IEA, Paris.

Source: IEA 2015 Spain Energy Policy Review

At stake there is more than one more technical / regulatory problem…

The global context

- *"A **transformation of the world's energy system must become a uniting vision** if the 2 ° C climate goal is to be achieved."*

  IEA, June 2015

- *"Climate change is **a problem which can no longer be left to a future generation**… we are living at a critical moment of history."*

  Pope Francis, Washington, September 2015

The context should be truly global…

A 5kW PV panel & one battery for the entire village

Uttar Pradesh, India, July 2014

Isolated rural community in Cajamarca (Peru). Example of dispersed population.
Source: Julio Eisman. Acciona Foundation. Peru Microenergia.

Isolated rural community in Cajamarca (Peru). Example of dispersed population. Electrified by Peru Microenergia. Acciona Foundation.

This brings a different perspective on energy efficiency

- Forced by scarcity, **very efficient appliances & lifestyles are emerging**
  - A 5 kW solar panel & battery providing 2 lights & a telephone charger for 200 households who contract as low as 15W each
  - Light “bulbs” 3W each
  - A radio of 1W of capacity operating at 12V
  - A TV set of 5W of capacity operating at 12V

A revolution in efficient appliances & how to use them is pending

… & it is necessary to think "out-of-the-box"

Energy “demand” is changing

- “Demand” & “consumers” are becoming a more complex mix of actual demand, embedded energy transformation & production, storage & hybrid devices: “**users & producers of energy services**”
- The preferences of these “users/producers of energy services” will be turned into mostly **automatically managed responses** by **aggregators** running all sorts of business models

The 2014 Forum

The sustainability & competitiveness of oil refining in Europe

Program

Tuesday September 29th

- ***Welcome lunch***
- *Afternoon*
  - **Introduction**
  - **Energy efficiency targets in Europe: The EE Directive and beyond**
  - **Problems with standard EE policies**
- ***Social event & dinner***

Wednesday September 30th

- *Morning*
  - **Challenges for energy efficiency in liberalized markets**
  - **The role of information in energy efficiency**
- ***Lunch***
- *Afternoon*
  - **Financing energy efficiency**
  - **PANEL: Making energy efficiency happen in Europe**
- *End of the internal session of the Forum*

Thursday October 1st

- *Morning (12:00-14:00)*
  - **Welcome**
  - **Summary** of the Internal sessions of the Forum
  - **Panel**: **Cómo impulsar la eficiencia energética en España**
- *Closing*

UNIVERSIDAD PONTIFICIA
ICAI ICADE
COMILLAS
MADRID

CÁTEDRA BP DE ENERGÍA Y SOSTENIBILIDAD

2015 BP Madrid Forum on Energy and Sustainability

"Making energy efficiency happen: The pending challenges"

Madrid, 29-30 September 2015