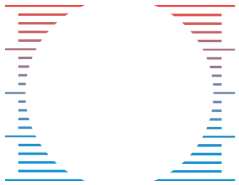

Centre for
Climate Change
Economics and Policy

Grantham Research Institute on
Climate Change and
the Environment

WHY ARE WE WAITING?
THE LOGIC, URGENCY, AND PROMISE OF TACKLING CLIMATE CHANGE

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THE GRANTHAM FOUNDATION
FOR THE PROTECTION OF THE ENVIRONMENT

LSE THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

The Challenges for the World

The two defining challenges of our century:

Managing climate change and overcoming poverty

- If we fail to manage climate change: we will create an environment so hostile that lives and livelihoods will be destroyed.
- If we try to manage climate change in ways which put barriers to overcoming poverty: we will not have the coalition we need to manage climate change.

If we fail on one, we fail on the other

Structure

1. **Logic: climate science and the need to act**
2. **Urgency: the scale of change, risks, and dangers of delay**
3. **Promise: attraction of transition to low-carbon path**
4. **Road to Paris: a new approach for 2015**

Climate change starts and ends with humans

- Understanding the relevant processes:
  - Human activity to emissions of greenhouse gases (GHGs);
  - Emissions ('**flows**') to increased concentrations ('**stocks**'). Ratchet effect because CO_2 long-lived and difficult to extract;
  - Increased concentrations to increased temperatures and climate change;
  - Climate change to human impacts.
- All links in the chain subject to uncertainty.

The science shapes economics and politics

- The structure of the science embodies four major difficulties for understanding, analysing and setting public policy:
  - **Immense scale,**
  - **Large risk/uncertainty,**
  - **Long lags,**
  - **'Publicness' of the causes and effects**
- Key implications for economics and analysis: about management of immense risk.

The science is robust and GHG concentration rising rapidly

Climate science is built on two centuries' of theory and evidence

- 1820s: **Joseph Fourier** recognized the atmosphere was trapping heat.
- 1860s: **John Tyndall** discovered the gases that were doing so – the GHGs.
- End of 19th century: **Svante Arrhenius** provided calculations of the effect.
- 1940s: **Walter Elsasser** explained that GHG molecules oscillate at a frequency that interferes with the escape of infrared radiation.

CO_2e concentrations now around 450ppm (Kyoto gases).

- **Adding CO_2e at a rate of over 2.5ppm per year** (likely to accelerate with little or weak action).
- This is up from 0.5ppm per year 1930-1950, 1ppm 1950-1970 and 2ppm 1970-1990.

Inaction could take us to 750ppm CO_2e over a century. Strong possibility of **eventual temperature increase of more than 4°C (or more than 5°C)**

The risks are unprecedented for humankind

Damage from climate change intensifies as the world gets warmer:

- Already 0.8°C at edge of experience of Holocene and civilisation.
- Seeing strong effects now; yet small relative to what we risk.
- Beyond 2°C is dangerous – risk of tipping points.

Temperature increase of 4 or 5°C or more not seen for tens of millions of years (homo sapiens, 250,000 years):

- Likely be **enormously destructive**.
- **The reasons we live where we do, would be redrawn** (too much or too little water).
- Potential causing **severe and sustained conflict** with migration of hundreds of millions, perhaps billions of people.

Structure

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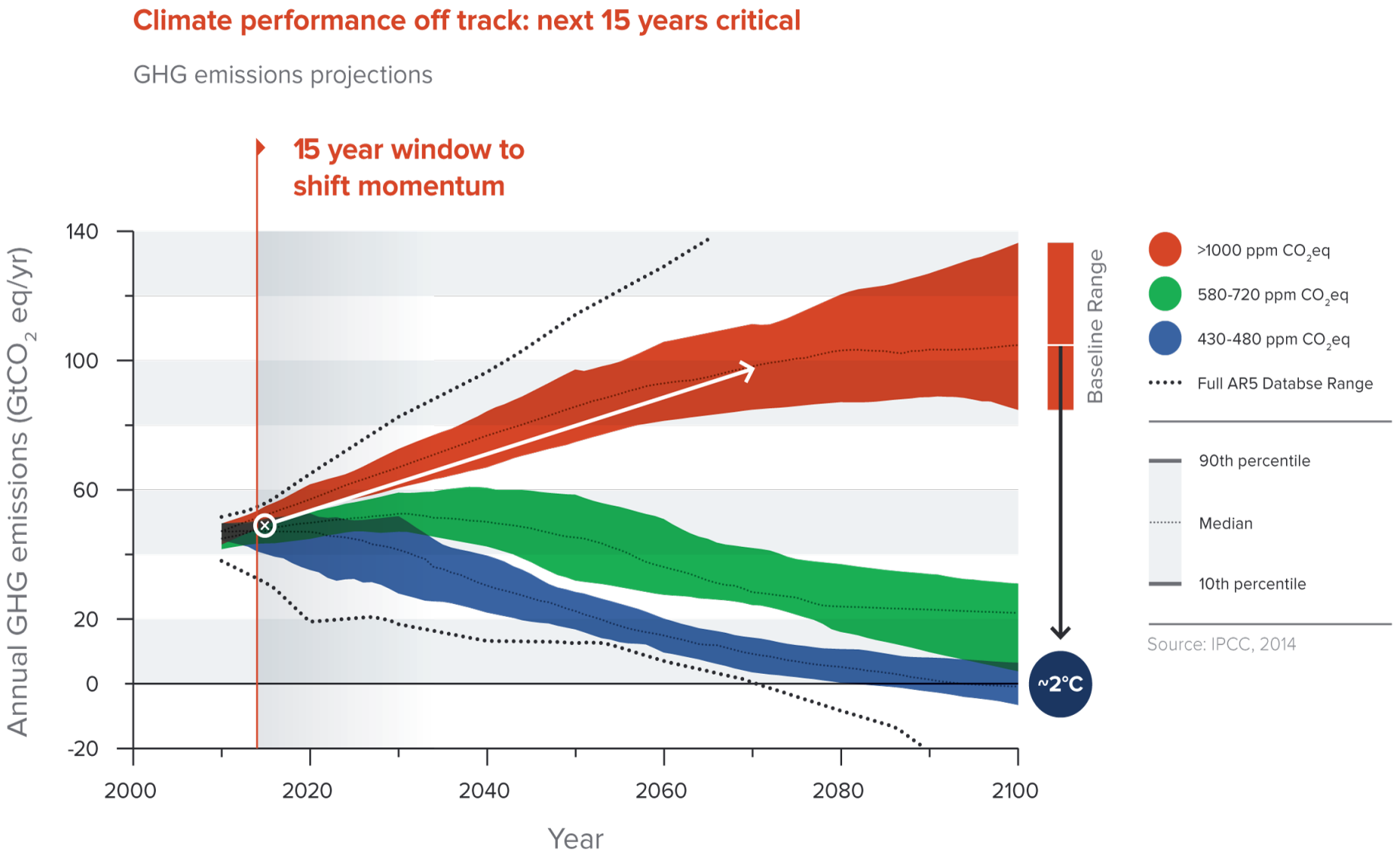
Dangers of delay

- Uncertainty and 'publicness' of the causes might suggest delay to learn more.
- That would be **a profound mistake for two reasons:**
  - "Ratchet effect" from flows of GHGs to concentrations.
  - Much of infrastructure and capital investment results in technological "lock-in".
- Delay increases the risk and cost.
- Would need to undertake radical, rapid and expensive decarbonisation in 2 or 3 decades time, **resulting in the scrapping of vast amounts of 'locked-in' capital**. Politically feasible?

What to do to hold warming below 2°C?
On the Road to Paris: Identifying the gap

- Current pledges look around 55–60 $GtCO_2e$ per annum in 2030 (e.g. *Boyd et al*). An improvement on BAU (ca. 65–68).
- But **far higher** than emissions path for 50:50 chance of 2°C: around 40 Gt which still requires very strong action later.
  - Or ca. 35 Gt in 2030 with no negative emissions technologies.
- Necessary path:
  - **zero emissions from electricity** around mid-century.
  - **zero total emissions by the end of century**.
  - **Possibly net negative** in **major sectors** well **before end of century**.
- Can burn (uncaptured) less than half of established hydrocarbon reserves and retain a reasonable chance of holding to 2°C.

Why the next 15 years are critical



Source: New Climate Economy http://newclimateeconomy.report/overview/

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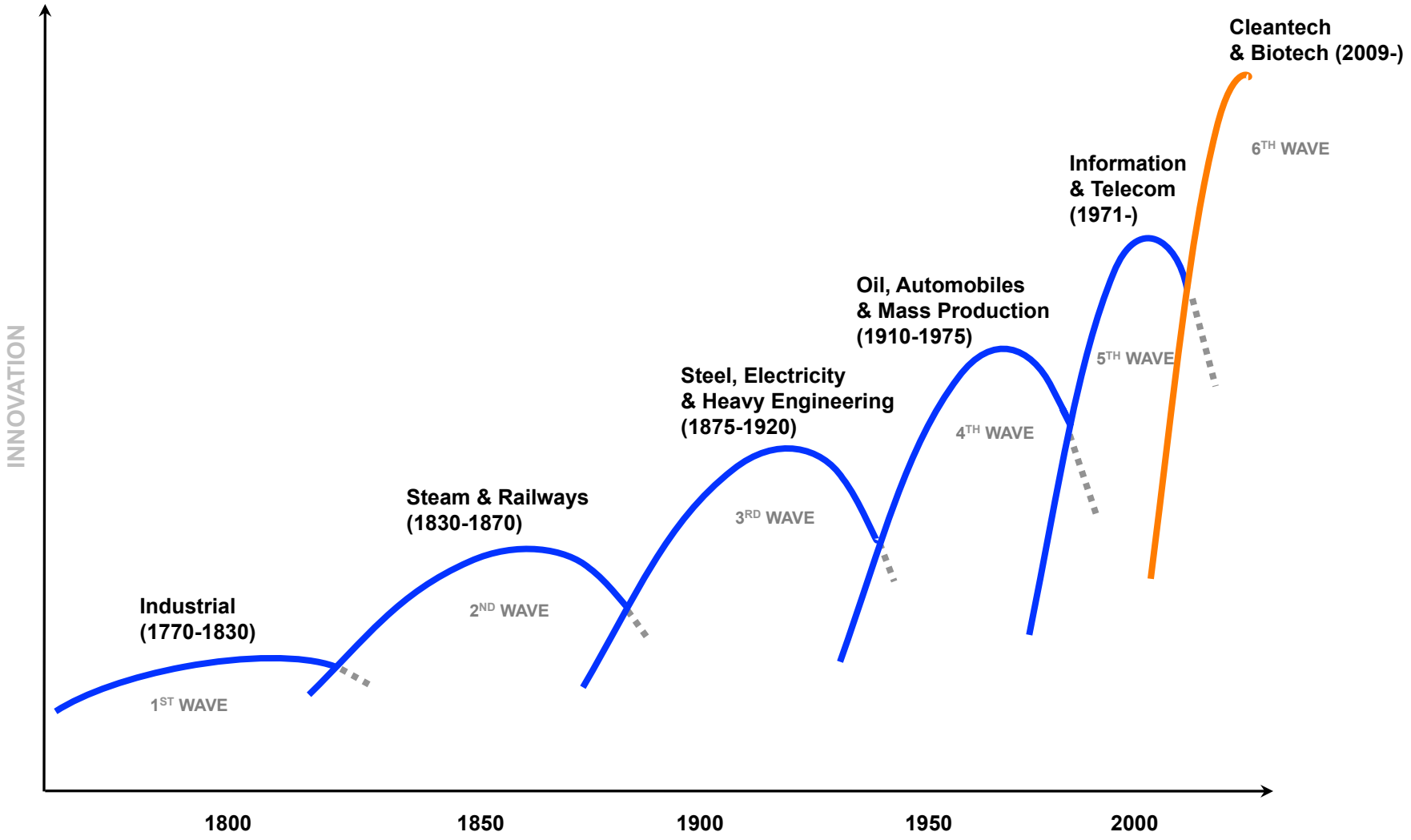
Scale and nature of response needs to be rapid and strong

If world **emissions are to be cut by factor of 2.5** (50 Gt (2014) → below 20 (2050)) and world **output grows by a factor of 3** (3% growth p.a. to 2050), then **emissions/output must be cut by a factor of 7 or 8**.

- Requires strong action **in all regions** of world, **in all economic sectors**.
- The transition to **low-carbon growth represents a very attractive path**: could, if economic history is a guide, stimulate dynamic, innovative and creative growth.
- Will need **substantial investments** and will involve some **dislocation**.
- A new **energy-industrial revolution**.

Waves of innovation



Source: DONG Energy (2009); diagram based on Merrill Lynch (2008) drawing on Perez (2002) (schematic not precise quantitative vertical axis).

Understanding the critical insights since Copenhagen (I)

1. **Greater understanding of how economic growth, development, and climate responsibility are intertwined.**
   - Growth and development complement and support climate action (see e.g. NCE "Better Growth, Better Climate", 2014)
   - Portraying them in conflict misunderstands development and the opportunities of a low-carbon transition → an 'artificial horse race'
2. **More intense understanding of the dangers of delay**.
   - Economies are transforming.
   - Next two decades fundamental. Long-lasting investments are being made in urbanisation and energy systems.
   - Our cities will grow from 3.5bn to ca. 6.5bn by 2050. They could be more congested, more polluted, more wasteful → patterns of the past. But can be difficult.
   - Continuing structural change and inadequate management of cities and energy intensifies the danger of delay.

Understanding the critical insights since Copenhagen (II)

3. **The damages from fossil fuels (beyond climate) immense and more apparent.**
   - Air pollution destroying many millions of lives and livelihoods per year.
   - Because of the unpriced costs associated to using fossil fuels, the (direct and indirect) subsidies cost taxpayers and governments trillions of dollars per year.
   - China air is equivalent to 40 cigarettes/day, kills 4000/ day (Berkeley Earth 2015); India worse; Germany, Korea, and indeed most countries have severe problems.

Translating new understanding into dialogue for COP21

i. Focusing attention on the urgency in accelerating the transition to low-carbon economy.

- Emphasise importance of SDGs (New York, September) and the finance of the necessary investments (Addis Ababa, July).
- Vital that these investments promote (rather than derail) sustainable development.
- $100bn per year important commitment by rich countries to support transition in developing economies set in the context of the trillions per annum in infrastructure over the next two decades.

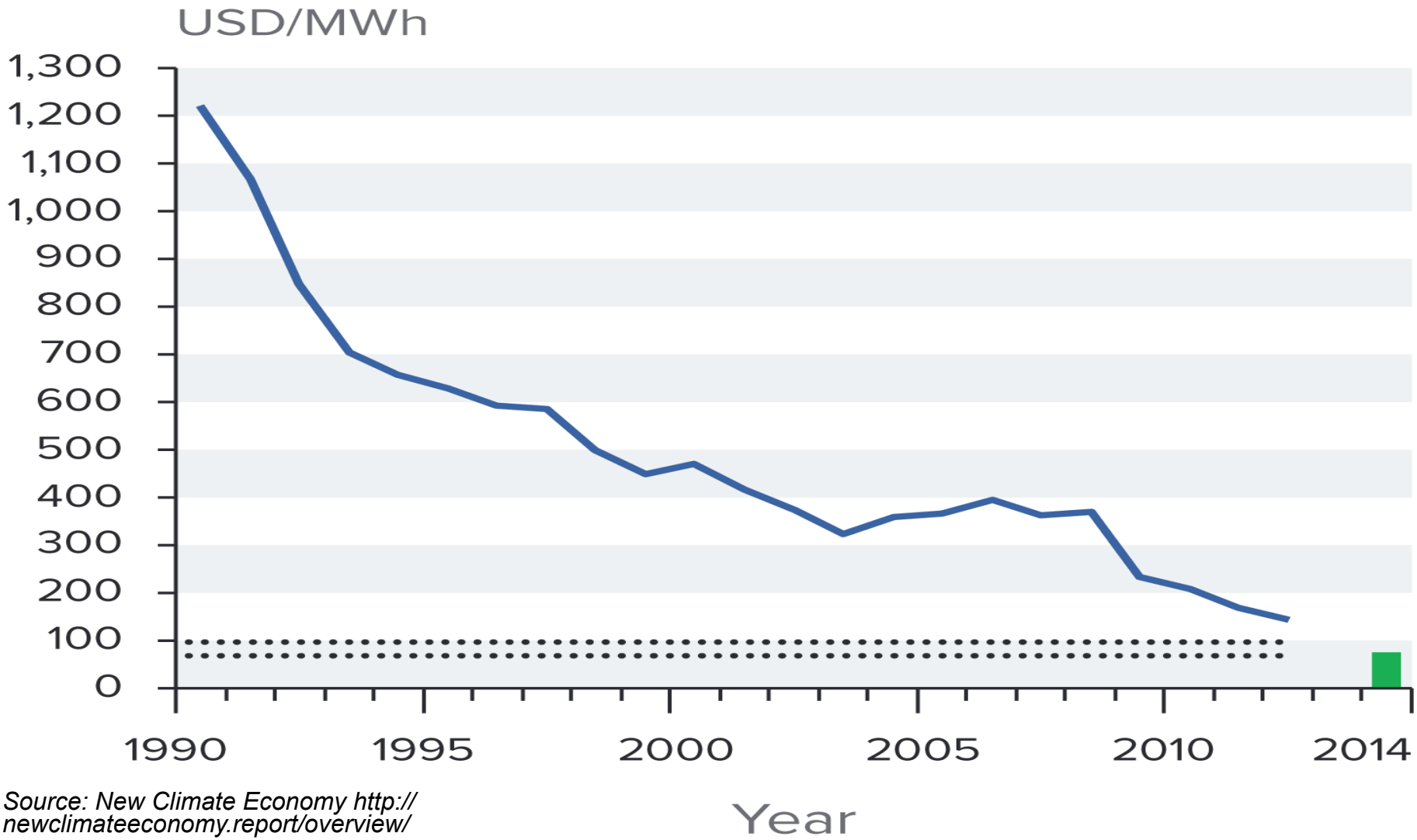
ii. Unlocking the enormous opportunities from low-carbon economy.

- We lose many or most of these opportunities if we hesitate.
- There is much we can do now that is in our self-interest, in each country. (See next four slides).
- We must coordinate and collaborate to realise the powerful collective interest.

Technical progress – a focus on solar

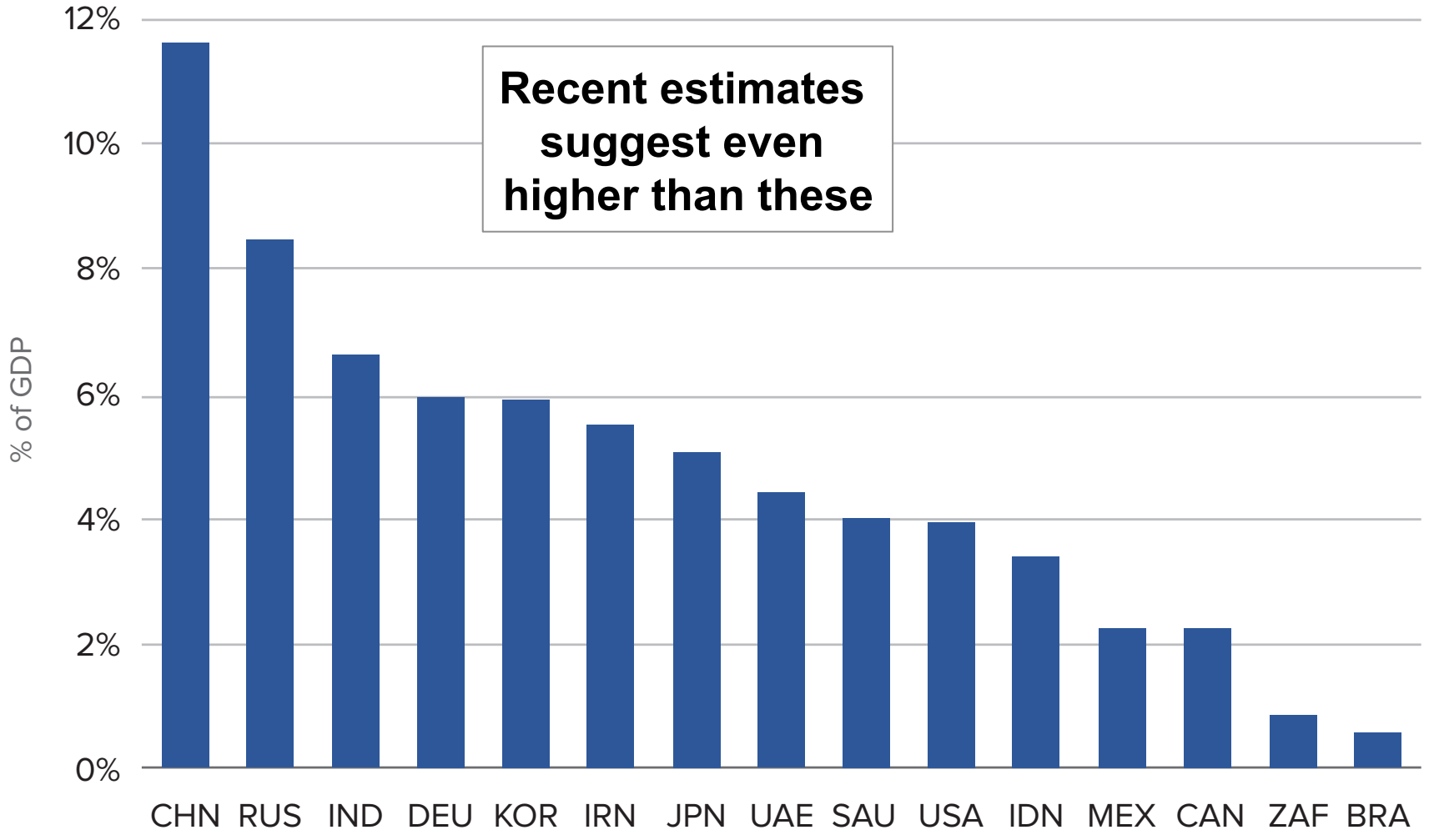
Solar PV module installed costs have fallen around 50% since 2010: currently well below $1/watt.

Delivered prices of energy now competitive generation in 79 countries.



Source: New Climate Economy http://newclimateeconomy.report/overview/

Value of the premature deaths from PM2.5 air pollution



Source: NCE estimate, based on WHO mortality data

Critical importance of infrastructure investment

- Magnitude of global investments needed over next 15 years: order of $90tn (mostly in developing economies), $6tn a year on average:
  - We need both better quality and greater scale.
  - Requires massive investments in sustainable cities, energy systems and elsewhere
- Lack of infrastructure is one of most pervasive impediments to growth and sustainable development.
  - Good infrastructure: **unshackles** and **removes constraints** to growth and inclusion. It **fosters** education and health
  - Bad infrastructure: **kills** people, leaves **unsustainable** economic burdens for future, puts **pressure** on land and natural resources
- Investing in infrastructure can boost demand, raise productivity and long-term growth.

Unlocking sustainable infrastructure

- What is holding back the scale and quality of investment in sustainable infrastructure?

i. Government-induced policy risk

- Infrastructure investment is long-lived and largely built on incumbent policy frameworks – the right investment climate.

ii. Financial system

- We are unable to mobilize key financing sources. Institutional investors assets hold very little of their assets in infrastructure.
- We need to better identify financial risks and understand how to manage them in order to scale-up and deliver.

- Unlocking good infrastructure needs action on **both** policy **and** finance.
- Must expand capacities of development banks and to foster profitable and long-term capital, including from institutional investors.

Structure

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From Kyoto to Paris: a new approach (I)

- Shift **away** from attempt at comprehensive, legalistic, formal enforcement of **"burden-sharing**".
- Toward **dynamic, collaborative**, transitions to zero carbon embodying growth and poverty reduction & **"equitable access to sustainable development"**.
- "**Collaborative**" – implications for structure of agreement.
  - Emissions reductions ("contributions") are "nationally determined"/ non-binding; enables participation of US and BASIC countries.
  - Conduct/processes are **obligations**: to 'submit', 'revise' etc. under structured processes.
  - *Ex ante* review of contributions to build understanding.
  - Transparent MRV and ex post review (to facilitate improvement and understanding).

From Kyoto to Paris: a new approach (II)

- *"Dynamic"* – implications for structure of agreement.
  - Recognition of "**emissions gap**" and need to build ambition over time in dynamic way (as technologies, prices, politics change).
  - Structure for **upward flexibility**, e.g.:
    - Rolling 5–10 year targets and commitments, revised every 5 years.
    - Lower and upper "range" of commitments.
  - Commitments should include not just targets, but also **policies and measures**, and local institutions to implement.
  - Strong focus on MRV, examples, good practice.
  - Strong focus on **innovation and technology.**

→ A "hybrid" agreement: mix of 'ends' and 'means', binding/ centralised and non-binding/decentralised.

Implications for Paris (I): the changes since Copenhagen

- Poverty reduction, sustainable development and climate action support each other: "**Better Growth, Better Climate**"
- Much or most of the necessary action, country-by-country, is in the **vital interest of the country itself**
- The **urgency is still greater than we thought**: great danger of lock-in to high-carbon systems as our economies are transformed
- This underlines still more strongly the returns to and **importance of collaboration to generate the scale and quality of investment necessary:**
  - Finance and technology,
  - Rich countries setting strong examples, and
  - Clarity, soundness and stability of policy
- Examples will come from everywhere: we can now enter a period of extraordinary **creativity, innovation, investment and growth**

Implications for Paris (II): Identifying the gap and ramping up ambition

- Closing the gap to 2°C. Current pledges look around 55-60 $GtCO_2e$ per annum in 2030. An improvement on BAU (ca. 65-68).
- **Strong efforts needed to ramp up** ambition before and after Paris: most or many 2°C paths would be around 40 by 2030.
- Paris should **not be regarded as a one-off opportunity** to fix targets. It should be the first step of many, including regular reviews.
- Must now recognise that high emission levels over the next 20 years imply **zero carbon** by the second half of this century looks necessary (G7 Communique, Elmau, Germany 2015)
- More broadly, Paris is chance to build understanding not only of threats and **risks** but of the great **opportunities** that lie in the transition to the low-carbon economy.

Implications for Paris (III): Giving confidence for action

- **There is no horse race between economic growth and climate action**, and **richer countries must support poorer countries** in making the transition to low-carbon growth.
- By creating this understanding, Paris should provide confidence to underpin the ramping up of ambitions:
  - Review, assess and learn from experience;
  - Support finance and technology collaboration;
  - Understand that the transition to a low-carbon economy supports growth, poverty reduction and sustainable development;
  - Recognise that action on the SDGs and action on climate are part of the same story and mutually supportive;
  - Bring together and intensify efforts of international institutions (MDBs, UN, G20…).
- Not only environment or foreign ministers: Presidents, Prime Ministers, ministers of economy, finance are crucial. This is all about development.
- Then we can rise to the two defining challenges of our century – **overcoming poverty** and **managing climate change**. If we fail on one, we fail on the other.