



Centre for  
Climate Change  
Economics and Policy



Grantham Research Institute on  
Climate Change and  
the Environment

# Climate Change and Central Banks

**Nicholas Stern**

**IG Patel Professor of Economics & Government,  
Chair of the Grantham Research Institute on Climate Change and the  
Environment,  
Chair of the Centre for Climate Change Economics and Policy,  
London School of Economics and Political Science**

**President of the British Academy**

**BIS Meeting  
February 2016**

Prepared with Amar Bhattacharya, Brookings Institution with support from the  
NCE programme on financing sustainable infrastructure

# Structure

1. Why Climate Change Matters for Central Banks
  - a) What is at Stake?
  - b) New Global Agenda after Paris Climate Change Agreement.
  - c) Climate Change, Growth and Stability.
  
2. Implications for Action by Central Banks
  - a) Supporting the low-carbon transition and sustainable growth through tackling impediments in financing sustainable infrastructure.
  - b) Managing impact of climate risks on financial stability.

# Part 1: Why Climate Change Matters for Central Banks

# 1a. What is at Stake?

# Why Climate Change Matters for Central Banks: What is at Stake?

- Climate science, built on **two centuries of theory and evidence**, is very clear on causes, nature and potential magnitude of the effects.
- Physics of greenhouse gas (GHG) effect is basic: GHG molecules oscillate at a frequency which hinders escape of infra-red energy from atmosphere.
- It is about **risks**, which are **immense**, not precise prediction (powerful trends from human influence/emissions, plus randomness and oscillations). There will be large amounts of local variation.
- **CO<sub>2</sub>e concentrations now around 450ppm (Kyoto gases).**
  - **Adding CO<sub>2</sub>e 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<sub>2</sub>e over a century. Strong possibility of eventual temperature increase of more than 4°C (or even 5 °C)**

# Why Climate Change Matters for Central Banks: What is at Stake?

- **Damage from climate change intensifies as the world gets warmer:**
  - Already 1°C at upper edge of experience of Holocene period experience (10,000 years since last ice-age) during which our civilisation, with its agriculture, settlements, and surpluses developed.
  - Seeing strong effects now; yet small relative to what we risk.
  - Beyond 2°C is dangerous – risk of tipping points.
- Anything like “business-as-usual” takes us well over 3°C, probably over 4°C (above end 19<sup>th</sup> century) within a century or so.
- 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 and extreme events).
  - Potential causing **severe and sustained conflict** with migration of hundreds of millions, perhaps billions of people.
  - It will be the poorest and the most vulnerable who will be hit earliest and hardest; but it will affect us all.

# 1b. New Global Agenda after Paris Climate Change Agreement

# Why Climate Change Matters for Central Banks: New Global Agenda after Paris Climate Change Agreement

- Paris Agreement was a **turning point** and forms the basis of new, international, cooperative, long-term action on climate change—building on the broader commitment to the Sustainable Development Goals last September and financing for development in Addis last July.
- Was founded on deeper understanding of **(i) immense risks and (ii) great attractions and opportunities that lie in low-carbon, climate-resilient growth** (less congested, more efficient, faster technical progress, more biodiverse...). Latter has grown much stronger recently (see, e.g., “Better Growth, Better Climate”, NCE, September 2014).
- Was remarkable to get agreement from 195 countries on strong action (“well below” 2°C) – Bretton Woods was only 44 countries, with one dominant.
- But it is clear that commitments to date will not be sufficient to meet climate goals: Paris commitments would give 55-60 billion tonnes of carbon-dioxide equivalent in 2030 compared to 68 billion in BAU but still much higher than 40 billion tonnes that would be compatible with 2 degree scenario.

# 1c. Climate Change, Growth and Stability

# Why Climate Change Matters for Central Banks: Growth, Urgency, and a Special Moment

- Growth could be at great risk from failure to act (negligence) now. Could create an environment so hostile that past development gains are catastrophically reversed. Ratchet effects and irreversibilities (very difficult to extract greenhouse gases, and lock-in of capital stock).
- Little headroom on emissions: should peak in next few years and fall very rapidly if Paris targets to be met. Efficiency plus new energy sources should be very high priority.
- Very rapid urbanization (see below) creates huge opportunity around city design and development, particularly in developing world, but also grave danger of lock-in. Accelerating replacement of ageing infrastructure in advanced countries also provides major opportunities for rekindling growth and investing in the low-carbon growth of the future.
- Special advantages now of: (i) extraordinarily rapid technological progress (digital, materials, bio...), (ii) very low interest rates. In current macro context, public investment can: i) stabilise demand, ii) boost productivity, iii) prevent liquidity from fueling bubbles. And can foster private investment.
- **Delay is dangerous.**
- Decisive actions towards low-carbon transition can create a **virtuous cycle of growth**: increased demand in the short term; unleashing waves of Schumpeterian discovery and creativity in the medium term; and sustainable growth that can endure in the long term.

# Why Climate Change Matters for Central Banks: Climate Change and Stability

*“Shifts in our climate bring potentially profound implications for insurers, financial stability, and the economy”*

Mark Carney, Speech at Lloyd’s of London  
29 September 2015

- Three broad channels through which climate change can effect financial stability (Bank of England, 2015):
  - **Physical Risks:** damage from climate and weather-related events could damage property or disrupt trade.
  - **Liability Risks:** impacts that could arise if parties who have suffered loss and damage from the effects of climate change seek compensation from those they hold responsible.
  - **Transition Risks:** financial risks from the structural economic adjustment to a low-carbon economy could result in re-pricing of a range of assets and commodities.

# Why Climate Change Matters for Central Banks: Risks to Stability - Mispricing on Grand Scale

- Climate risk has important but not immediately tangible implications for financial stability and long-term growth (“the tragedy of the horizon”).
- Main near-term concern is managing the **transition risk** as it has an immediate impact and once it starts, could proceed very rapidly.
- Scale of potential impact is evident through the global carbon budget. In one estimate of the carbon budget required to limit temperature to a reasonable chance of 2°C above pre-industrial levels, approximately 80% of proven fossil fuel reserves could be unusable without abatement (Carbon Tracker, 2012).
- Cannot consistently believe both of (i) reserves are sensibly priced ii) world will deliver on commitment to stay below 2°C. Major risks that markets are, or will become, **grossly mispriced**. Risks are not “in the market”.
- Fossil-fuel companies also make up a large share of pensions portfolios and benchmark stock market indices (e.g. 19% of FTSE 100 companies are in natural resource and extraction sectors; and a further 11% by value are in power utilities, chemicals, construction and industrial goods sectors, but taken together these sectors account for less than 5% of UK GDP).

# Why Climate Change Matters for Central Banks: Policy and the (overloaded?) Central Bank Agenda

- Central banks agenda under macro theories of 1980s and 1990s concerned with inflation and managing oscillations.
- Now also strong focus on dangers of financial instability and on restoring growth. Some concern that they are being asked to shoulder responsibilities that should lie elsewhere (e.g. fiscal plus structural reform).
- Yet, dangers of, and responses to dangers of climate change **are about stability and growth**, and require global co-operation (as seen in Paris). Again others must play their part.
- Market failures around climate change: (i) GHG externalities; (ii) publicness of R&D (acute urgency here); (iii) capital markets (short-termism, risk management); (iv) networks (finance, transport, urban design, recycling, broadband, electricity grids) ; (v) information (riskiness of firms and financial institutions, labelling, production/consumption alternatives ) ; and (vi) “co-benefits” (associated with pollution, congestion, biodiversity, forests ).
- Central banking directly linked with (iii), (iv) (through scale and co-ordination effects), (v), and through capital markets with (ii).

# Part 2: Implications for Action by Central Banks

## 2a. Supporting the low-carbon transition and sustainable growth through tackling impediments in financing sustainable infrastructure

# Implications for Action by Central Banks: The Role of Sustainable Infrastructure in Growth and Sustainable Development

- World today faces three central challenges: resuscitating growth (weak economic recovery and risks of long-term stagnation); eliminating poverty and achieving the Sustainable Development Goals; and securing the future of the planet.
- **Delivering on sustainable infrastructure is at the centre of all three challenges.** More than 60% of carbon emissions emanate from investments in and use of infrastructure.
- The next two decades will be of fundamental importance to the world. World **urban population** will grow from around **3.5 billion today** to around **6.5 billion in 2050**. Long-lasting investments on scale will need to be made in our cities, energy and water systems and in transport systems.
- Scale of the challenge is very large because of pervasive infrastructure deficits and the transformation in the global economy (growing weight of and larger investment needs in emerging markets and developing countries because of urbanization and structural change).

# Implications for Action by Central Banks: Infrastructure – Scale, Urgency, Rewards/risks

- Total infrastructure investment needs over next 20 years estimated to be on the order of **\$75 - \$85 trillion, equivalent to much more than the current existing stock**. About 70% of these investments will be in emerging markets and developing countries. But also need to replace ageing infrastructure in advanced economies.
- How these investments are made will have an enduring impact on growth, development and climate. If these investments are made on the patterns of the past, our cities and economic activity will become more congested, more polluted and more wasteful undermining the quality of life and the sustainability of growth.
- Cannot overemphasize the importance of **urgency** of action because we are **exhausting the carbon budget consistent** with the 2°C target and great dangers of **technological lock-in**. Inaction today raises the risks and costs of climate impact and necessitates more stringent actions in the future.
- Risks of delay much greater than anything that could be associated with moving quickly.

# Implications for Action by Central Banks: Fostering and Financing Infrastructure – Improving Policy, Reducing Cost

- To unlock sustainable infrastructure, we must tackle the fundamental impediments that are holding back the quantity and quality of investment.
- In addition to addressing the **fundamental price distortions** (fossil fuel subsidies and lack of carbon and pollution pricing), public policy should strengthen investment frameworks and **reduce government-induced policy risks**. This is for finance and other ministries.
- Availability and costs of long-term financing for infrastructure in emerging markets and developing countries are in many cases **prohibitive and tilt incentives against sustainability**. In India or Brazil, for example, often in region of 8 or 9% real at project level.
- Boosting sustainable infrastructure is not largely or mainly about subsidies but about **overcoming market and institutional failures**, and fostering change.
- Central Banks cannot do everything but do have a key role to play especially with respect to the financing framework.

# Implications for Action by Central Banks :

## Managing Risk in Infrastructure Finance – Enabling Markets, Instruments and Players

- Effect of financial system regulations on low-carbon investment
  - Basel III requirements could be negatively affecting access to low-carbon finance. This is because increased liquidity requirements are most likely causing a reallocation away from providing long-term credit (typical requirement for long-term, low-carbon infrastructure) to more liquid, shorter-term assets (Campiglio, 2014)
  - Environmental stress testing including the impact of climate change on portfolio risk
- Very large needs for upfront debt financing in emerging markets and developing countries at reasonable cost. Vital need for expanded role of **multilateral development banks** and more effective deployment of risk mitigation instruments. Presence of MDBs reduces risks, brings relevant instruments, and encourages participation of other financial institutions. Role also for national development banks.
- Examine how to augment financing from **institutional investors, especially once projects reach operational phase, through bond take-outs and new equity infusions**. At present these pools of financing lack a long-term orientation, very small proportion targeted to infrastructure, and less than 1 percent to green financing.
- Support the redeployment of private investment through developing market standards and guidelines (e.g. green bonds, disclosure, Equator Principles).
- **Development banks at early stages and institutional investors at later stages are mutually enforcing.**

# Implications for Action by Central Banks: Growth, Timing, and Scale; Overall Policy Summary

- The transition to the low-carbon economy in the context of urban development and technological change presents **huge investment opportunities**: infrastructure alone requires \$4-6 trillion p.a. over next two decades.
- Should try to make **all investment sustainable/green** from now on: sustainable/green should be everywhere; not some minor subset.
- **There is no shortage of world savings but major obstacles in transforming investment opportunities into real investment demand** and major difficulties in bringing forward the right kind and scale of finance at the right time.
- This requires **strong government policy in finance ministries, cities**, energy and environment ministries; but also key role for central banks around financial systems and institutions.
- **The presence of an MDB** or a national development bank brings extra confidence in policy, skills and the appropriate mix of equity, long-term loans and other kinds of finance.
- Mobilising both long-term debt finance and the large pool of **institutional investor assets** for low-carbon infrastructure can boost confidence and mutually reinforce.

# Implications for Action by Central Banks: Enabling Green Instruments

- Green instruments can present **new and constructive opportunities** or asset class for investors to manage risk and pursue preference.
- Central banks have a key role to play in enabling green financial instruments. This could be done through:
  - **establishing green finance guidelines and frameworks** to integrate environmental and social considerations into bank lending decisions:
    - China Banking Regulatory Commission – Green Credit Guidelines (2012)
    - Bangladesh Bank – Green Banking Framework (2011)
    - Indonesian Financial Services Authority – Roadmap for Sustainable Finance in Indonesia (2014)
    - Bank of Mongolia - Mongolian Sustainable Finance Principles and Sector Guidelines (2014)
- Disclosure; Equator Principles.
- Stimulate green bond markets through **asset purchases** (Green Quantitative Easing).
- Explore relaxing liquidity requirements for private banks that create credit in favour of green investments.

## 2b. Managing impact of climate risks on financial stability.

# Implications for Action by Central Banks : Disclosure

- Requiring **full disclosure of risks** and exposure to the physical and policy risks of climate change.
  - Financial Stability Board (FSB) Task Force on Climate-related Financial Disclosure (TCFD) will consider the physical, liability and transition risks associated with climate change and what constitutes effective corporate financial disclosures.
  - France has introduced carbon reporting obligations for financial institutions: pension funds, insurance companies and institutional investors. They now have to disclose how they are managing climate risk.

“Managing climate-related risk is increasingly critical to financial stability, but it can't be done without effective disclosure. The recommendations from the Task Force will increase transparency and help to make markets more efficient, and economies more stable and resilient.” (Bloomberg, 2015)

- Critical to encourage/require firms and financial intermediaries to articulate and disclose **forward-looking** strategies in response to climate risks and changes in policy.
  - Is their strategy essentially assuming the **Paris agenda will not be implemented**, or only in half-measure and with long delay? That is very risky.
- These actions will be good for stability but also for accelerating the low-carbon transition.

# Climate Change and Central Banks: Summary Implications

- Encourage stable and **credible policy frameworks** for sustainable infrastructure (in finance ministries, etc.). Tackle **capital market imperfections** including **availability and costs of long-term debt finance** and greater flow of **long-term institutional investor assets** into sustainable infrastructure.
- **Communicate strongly:** the risks are not “in the market”.
- Help scale-up the role of **multilateral development banks and national development banks** to tackle both policy and financing constraints. Central banks can lead and shape discussion.
- Promote **green financing instruments** and markets.
- Information, **transparency, disclosure** and prudential oversight to highlight climate risks and links to financial stability.
- Crucial opportunity now to **reduce instability and foster growth** in short, medium and long-term by accelerating low-carbon transition.