Action on climate change: urgency, the growth opportunity of the 21st century and the role of finance

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Structure

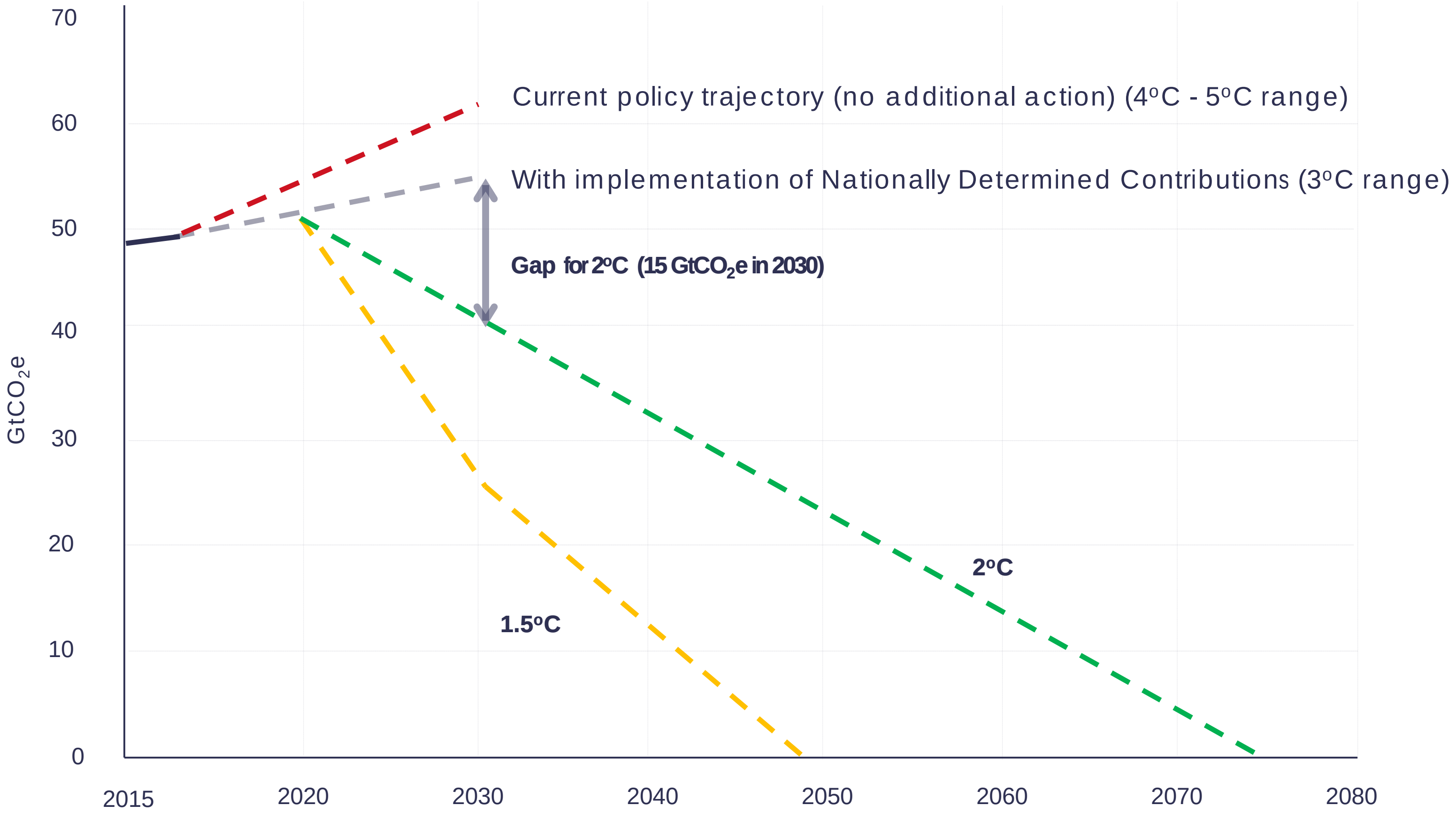
- **The global agenda, urgency and scale**
- Sustainable growth in a changing world
- Driving change; sectors and countries; policy and finance

In the era of international cooperation, we have seen extraordinary achievement along many dimensions of development

Dimension	Indicator	1960	2015	Source
Income	GDP per capita (constant 2010 US$)	3,737	10,636	World Bank, 2018
Health	Life Expectancy (years)	52.5	72	World Bank, 2018
	Infant mortality (per 1000 births)	103	31	
Education	Literacy Rate (% of people ages 15 and above)	61%	86%	World Bank, 2018
	Average years of education	3.2	7.7 (2010)	OECD, 2014
Poverty	Share of population living on less than US$1.90 per day	42% (1981)	10%	World Bank, 2018
Population	Billions of people	3.0	7.3	UN Population Division, 2018

The scale and nature of growth has put intense pressure on the environment and global commons: from 1950 to now world population has roughly trebled; GDP/capita gone up by a factor of 4; output by a factor of 12. Largely fossil-fuelled.

Currently a large gap between current COP21 NDCs and what is required to reach the Paris temperature targets



Source: Stylised trajectories based on UNEP (2018)

The challenge is now to <u>accelerate action</u> to 2030 to close the gap. Requires immediate action across whole economy. Must peak emissions in next few years and go to "net zero" in next 50-60 years.

The science of climate change is clear; the impacts of failure could be devastating; difference between 1.5°C and 2°C strongly significant

	1.5°C	2°C
Extreme Heat (Global pop. exposed to severe heat at least once every 5 years)	14%	37%
Frequency of rainfall extremes (land)	17%	36%
Average drought length (months)	2	4

Source: IPCC (2018) and WRI (2018)

Differences between 1.5°C and 2°C are major. Differences from 2°C to 2.5°C, and then to 3°C likely still bigger. Current Paris COP21 plans for 2030 look like paths headed for 3°C and above over the next century or so.

Have not seen temperatures above 3°C for around 3 million years; hundreds of millions, perhaps billions, would have to move. Risks of severe and extended conflict. Note that 3 million years ago CO_2 concentrations were similar levels to now, and sea levels were 10 – 20m higher (Foster et al., 2017).

Climate change is an immense risk, decisions made now are critical in establishing low-carbon development, growth and poverty reduction

Change in the next decades

15 years	Infrastructure	2x	Investment of approximately US$ 90 trillion.
20 years	GDP	2x	Growth of approximately 3% per annum. Led by emerging and developing countries.
40 years	Urban Population	2x	Urban population will double in 40 years, Towns and cities shaped in the next 20.

At the same time
(to meet Paris targets)

1.5°C	~50%	Decrease GHG emissions from ~50 to ~ 25 Gt CO_2e by 2030
or		
2°C	~20%	Decrease GHG emissions from ~50 to ~40 Gt CO_2e by 2030

The next decade is critical. Choices made on infrastructure and capital now will either lock us in to high emissions, or set us on a low-carbon growth path which can be sustainable and inclusive.

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The growth story of the 21st century: strong, sustainable, inclusive

5 - 10 years

Investment in sustainable infrastructure can boost shorter-run demand and growth, sharpen supply, reduce poverty and support sustainable development.

5 - 10 years

Investment in sustainable infrastructure and human capital can foster health and well-being for all.

>10 years

Spur innovation, creativity and growth in the medium term, unleash new waves of innovation and discovery.

>20 years

Low-carbon is the only feasible longer-run growth on offer; high carbon growth self destructs.

Foundations of the 21st century growth story

- Moving beyond the standard economic models in which growth is shaped largely by physical capital, human capital, and the technology of their composition.

- 21st century growth story will be based on balanced accumulation of several types of capital, on structural change towards the service sector, on higher quality outputs and inputs, and on labour and resource efficiency and productivity.

- It should capture the possibilities of very rapid technological change, cost reduction and diffusion in the next two decades.

- It should embody increasing returns to scale in production and discovery.

- Could we/should we have anticipated changes of last dozen years? Costs of renewables (down by a factor of more than ten), digital management (iPhone only 11 years old), EVs, new materials etc.

- Advances will in large measure be driven by strong, credible policy, institutional change, city design/planning etc.

- There is immense investment potential and strong savings. Need sound policy to transform opportunities into real projects/programmes. Need right kind of finance on the right scale at the right time.

Strong investment in sustainable infrastructure will accelerate growth which is sustainable and inclusive; delivering the SDGs

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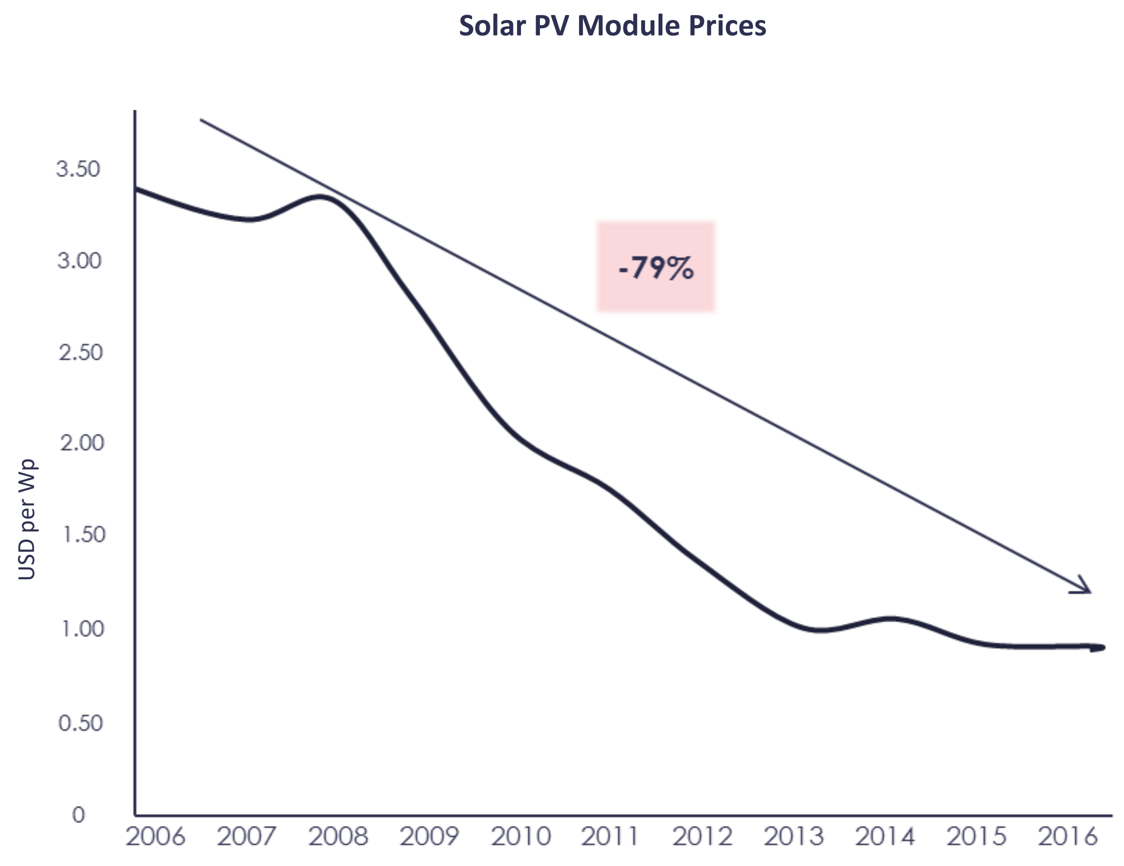
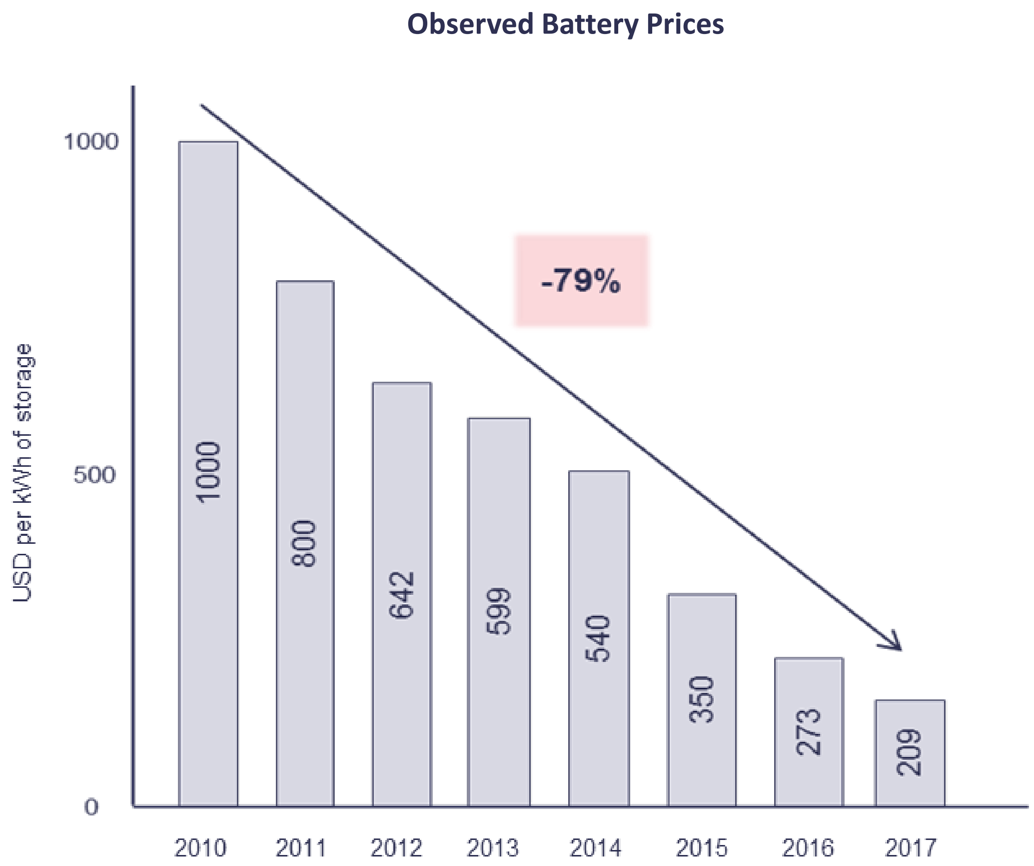
The notion “costs of action” is being transformed by rapid technological advances and cost reductions



Source: EIA, 2017



Source: Bloomberg New Energy Finance, 2017

Renewables with storage now competitive in many parts of the world.
Capital costs for renewables continue to fall much faster than those for conventional technologies.

It is now technically possible to decarbonise all sectors (including hard-to-abate), at reasonable cost, to reach net-zero emissions in time for Paris commitments; combine three routes

Route	Decarbonisation option	Example
1	Reducing demand for carbon-intensive products and services (model shifts/logistics; resource efficiency)	A more resource efficient economy can reduce CO2 emissions from four major sectors (plastics, steel, aluminium and cement) by 40% globally. Includes circular economy.
2	Improving energy efficiency across the economy	A combination of greater logistics efficiency and modal shift (trucking to rail, short haul aviation to high speed rail) could lead to 20% reduction in CO2 emissions
3	Deploying a range of decarbonisation technologies across sectors: • Increase electrification using renewable energy sources • Deployment of CCS for industrial sectors • Use of alternative fuel sources where cost effective and sustainable (biomass and hydrogen)	Increase electrification to account for ~65% of final energy demand, supplied by: • 85 – 90% from renewable energy • 10 – 15% biomass or fossil fuels (with CCS)

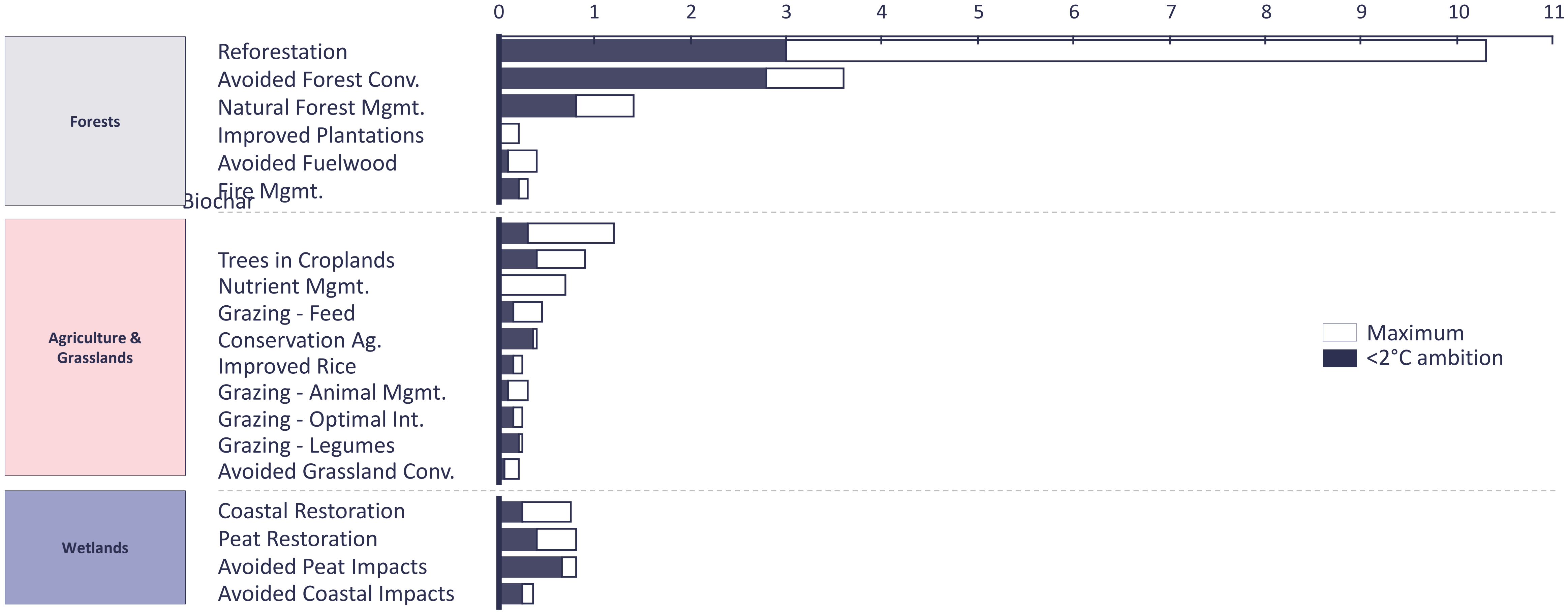
Source: Energy Transition Commission (2018)

Cities are at the core

- Cities are home to more than half the world's 7+ billion population. Produce **approximately 75% of the global GDP and account for a similar amount of total GHG emissions**.
- The **global urban area will roughly double in next two decades** (Seto et al., 2011). By 2050, an extra 3 billion people could live in cities: 65-75% of the world population. Will have to expand infrastructure strongly.
- The **shape and functioning of many cities are being defined in coming decade;** how this is done is critical to integrating considerations of resource efficiency, energy, transport, waste management, pollution….
- **Mitigation, adaptation, development are intertwined**. Current development paths are shaping future vulnerability to climate change (e.g. development on coastlines, design of infrastructure) and lock-in of high emissions infrastructure (transport, energy, waste…).
- The **direction and nature of economic development of cities matters,** and it makes sense to tackle climate risks in lockstep with urban development planning and investment decisions.

Natural climate actions can also provide substantial emission reduction potential

Climate mitigation potential 2030, Gt CO_2e/yr

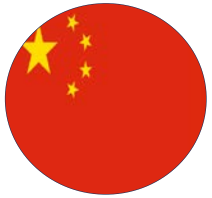


Maximum potential sequestration and avoided emissions from natural climate solutions is 23.8 $GtCO_2e$ per annum by 2030.

Source: Griscom et al (2017)

What happens in China and India in the coming decades is pivotal if we are to achieve the Paris targets

China



- Peaked coal use in 2014; energy emissions flat since then, although recent upward shift. China cut coal capacity by 500m tons since 2016 (Liu He, 2018).
- Leader in electric vehicle sales and production. In 2017 had a larger EV market than Europe and the United States combined.
- Environment and sustainability a central theme of "*Xi Jinping thought*" – 14 elements, 3 related to sustainability including thought 9: *Coexist well with nature with "energy conservation and environmental protection" policies and "contribute to global ecological safety*".

India

- Announced plans to increase RE capacity to 175 GW by 2022. Currently has one of the largest and most competitive energy auctions in the world, contracted over 10.5GW from wind and solar in 2017 alone.
- Unlikely to pursue all coal-fired stations currently planned.
- $1.4 billion to subsidise sales of electric and hybrid vehicles over next three years (Reuters, 2019).
- Aims to install 770 million LED lightbulbs by 2019, when a large order of lightbulbs were made to meet this target the price fell by 83% within 20 months (Sharwood, 2016).

Progress is strong in these two important countries, but emissions are still rising in India and, at best, plateauing in China.

Importance of China's 14th Five-Year Plan and the Belt and Road Initiative (BRI)

- BRI focussed on infrastructure development: transportation (road and rail), telecommunications and energy in developing regions.
- Chinese investments in BRI countries could amount to US$ 800 billion to 1.3 trillion in next ten years.
- Aim of creating the modern "silk road" to enhance trade and maintain export momentum for China.
- **If total income and emissions rose by factor of 3 in 30 years in BRI countries, they would be well over 30 GtCO_2 (China's emissions rose by factor of 3 in first decade of this century). Have to be net-zero 50 years from now for 2°C.**

Current Status*

65 countries
(Asia, Africa and Europe)

3.5 billion People
(2016)

US$ 4,100 per capita GDP
(2016 population weighted average)

3 tCO_2 per capita
(average)

11 Gt CO_2
(~25% of Global GHG emissions)

*Some rounding. Excludes China and India.

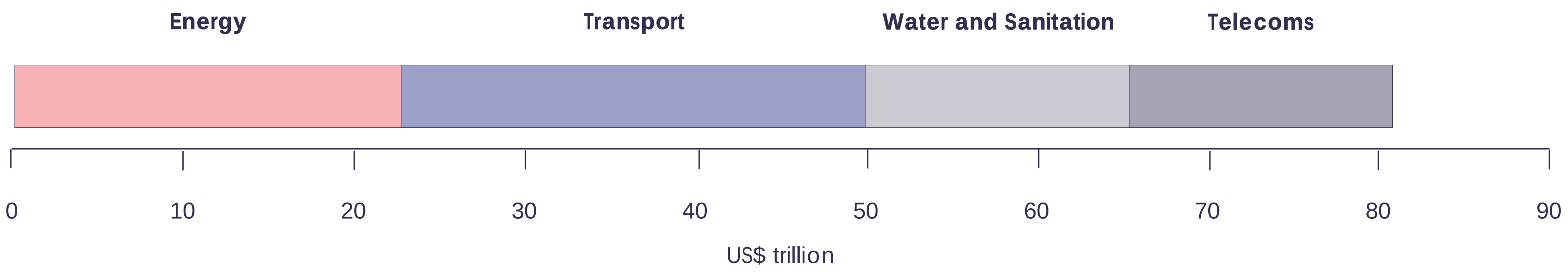
Quality and quantity of investment and shape of the transition will be determined by sound policy and clear sense of direction

Market Failure	Description	Policy Options
Greenhouse gasses (GHGs)	Negative externality because of the damage that emissions inflict on others.	Carbon tax/ cap-and-trade/ regulation of GHG emissions (standards)
Research, development and deployment (R,D&D)	Supporting innovation and dissemination.	Tax breaks, support for demonstration/deployment, publicly funded research.
Imperfection in risk/capital markets	Imperfect information assessment of risks; understanding of new projects/technologies.	Risk sharing/reduction through guarantees, long-term contracts; convening power for co-financing.
Networks	Coordination of multiple supporting networks and systems.	Investment in infrastructure to support integration of new technologies in electricity grids, public transport, broadband, recycling. Planning of cities.
Information	Lack of awareness of technologies, actions or support.	Labelling and information requirements on cars, domestic appliances, products more generally; awareness of options
Co-benefits	Consideration of benefits beyond market rewards.	Valuing ecosystems and biodiversity, recognising impacts on health

Different market failures point to the use of different instruments, but the collection should be mutually reinforcing. We have the tools to drive action.

Government-induced policy risk is the biggest deterrent to investment worldwide. Policies must be credible over time; ‘predictably flexible’.

Good policy unlocks investment demand. But its realisation requires the right kind of finance, at the right scale, at the right time



Projected cumulative infrastructure demand (2015-2030) Source: Bhattacharya et al (2016)

Note: Projections based on mid-point of range estimates. Excludes fossil fuel extraction and use, expenditure to enhance energy use efficiency, and operation and maintenance costs.

Altogether infrastructure investments that are required over the next 15 years or so are more than the current existing stock. The bulk of new infrastructure investment will be in emerging/developing countries. Incremental costs of making infrastructure sustainable are small.

Alone the public sector will not be able to raise sufficient finance for the scale of investment necessary. Unlocking the private sector will be essential. Important role for development banks.

Mobilising the required capital for sustainable investment requires a number of sources to work together

Private sector

Domestic Public Resources/Action	International Public Finance (MDBs and DFIs)	Domestic Investment	International Investment
Develop own sources of revenue and improve revenue collection. In addition, create the policy environment that fosters investments Redeploy fossil fuel subsidies	Use range of instruments to manage and reduce the risks of investment and lower the costs of capital. Possible use of ODA and concessional financing for high risk projects or areas where commercial returns are not high enough.	Requires enabling policies and institutions to manage and reduce risks, plus capabilities in management, technology and finance to scale. Integrate climate change into risk management procedures, including disclosure, and in investment decisions (e.g. shadow carbon price, scenarios...)	

Given the scale of investment requirements for sustainable infrastructure, and development more generally, a significant scaling up of financing is needed from all sources—domestic public, international, private—and the links between them made stronger.

Levers to accelerate the systemic change required: examples

Finance

- All the financing offered by MDBs should be sustainable from now on.
- All large institutional investors, including sovereign wealth funds, to set out plans to make their portfolios entirely sustainable
- All G7 countries to make TCFD reporting compulsory
- G7/G20 to implement the G20/EPG recommendations on the reform of the system of IFIs.
- Company pension schemes to make sustainable funds the default option.

Policies

- All countries to commit to zero-carbon electricity by 2040
- Commitments for zero unabated coal in industrial applications (cement, steel, plastics) by 2050
- Cities to set timeframes for the restriction of internal combustion engine vehicles from city centres
- Commitments to invest more in research and development to enable net-zero emissions (alternative fuels, battery storage, CCS...)
- Radical reduction in waste, including energy, food. Circular economy

Have to identify tipping points for action. Need actions that can create change on urgency and scale necessary.

How the zero-carbon transition is managed will be central to building the consensus for strong, sustainable action

Life-long learning	Support local skills and investment	Re-locate public sector services	Social protection measures
Offer education and training to support life-long learning	Support new skills and entrepreneurship through finance. Collaboration between local government, universities, business	Locate public services/activities in affected areas to boost local economies (shift government employment hubs)	Boost social protection measures for the most vulnerable members of society (lump sum transfers, welfare support, housing subsidies...)

Carbon pricing revenues should play a key role to support the transition. Potential to utilise a mix of options to promote policy goals and objectives (R&D, budgets of poor households, international climate funds...), including the just transition.

A 'just transition' is about more than managing a zero-carbon transition. There are other large changes in economic structures: shift to services, labour-saving technologies, globalisation... all have to be managed together.
The global financial crisis has made these problems more severe. The zero-carbon transition has real employment opportunities.

"Unlocking the inclusive growth story of the 21st century" (NCE, 2018)

Energy

- Raising revenue by pricing carbon and eliminating fossil fuel subsidies
- Saving energy through greater energy productivity
- Supporting energy access through distributed renewable energy

Cities

- Well managed densification to revitalise cities
- Sustainable and affordable housing for urban poor
- Shared, electric, low carbon transport

Food and land use

- Avoiding deforestation and degradation of forests
- Scaling up landscape restoration
- Implementing climate-smart agricultural approaches
- Supporting better food consumption patterns and reducing waste

Water

- Sustainable and equitable water allocation
- Target investment in resilient water and sanitation infrastructure

Industry, Innovation and Transport

- Focus on energy efficiency, resource efficiency, and decarbonisation in heavy industry
- Reduce emissions from the plastics value chain
- Develop low-carbon solutions for heavy-duty transport
- Increased support for innovation and deployment

Source: New Climate Economy, 2018

By 2030

Generate over
65 million
additional low-carbon jobs

Make available
US$ 2.8 trillion
from carbon pricing revenues and removing fossil fuel subsidies

Avoid
700,000
premature deaths from air pollution

Seen remarkable progress in technology in last dozen years (renewables, EV, digital management, materials...); momentum is building but rapid acceleration needed.

Can it be done? Three forces present us with a special opportunity to deliver at scale

%

Historically **low interest rates and no shortage of global savings.**
Search for growth.

Rapid technological change and falls in cost
(digital, materials, biotech…)

International agreements have **provided political direction** and evidence that collaboration is possible and will continue

Opportunities exist now to finance the transition with low interest rates; excess global savings and new, changing technology.

Seizing the opportunity requires a radical change. Most of what we currently do will have to be done differently (technologies, institutions, business models, city planning processes, natural resource management…)

Have in our hands a much more attractive sustainable and inclusive form of growth and development; do we have the political will/capability?

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