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# The emergence of the Carbon Treasurer – and the need for a base case climate scenario

October 2023

Certified B Corporation

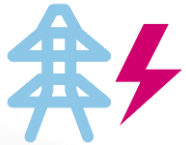
Baringa is a certified B Corp™ with high standards of social and environmental performance, transparency and accountability.

# Governments, energy companies and financial services companies choose Baringa to advise them on transition

**Trusted by governments..**

Baringa supports COP26's Energy Transition Council on net zero solutions for developing countries

**Deep experience in supporting governments on transition policy…**



**…the energy sector…**

Our market reports cover 50 countries and are relied upon by over 300 investors to support over £200bn of investment in transition over the last five years

**…commercial expertise in transition, from power, gas, hydrogen and batteries through to transport and real estate…**

**…and financial services clients**

Baringa developed the globally-leading transition model that now supports our strategic partnership with BlackRock, and is used by FS clients with over $40 trillion of assets

**…and practical experience of embedding transition into your decision-making**

FT FINANCIAL TIMES
statista
UK'S LEADING MANAGEMENT CONSULTANTS 2023

**This is why the FT has named Baringa the No.1 Consultancy for Energy, Utilities and Environment for the last five years in a row**

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# Banks need to be able to demonstrate *both* that they are managing their climate risks *and* financing the transition to net zero

External change drivers

## Global regulatory priority

NGFS Central Banks and Supervisors Network for Greening the Financial System

BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM

EUROPEAN CENTRAL BANK

BANK OF ENGLAND

- Recognition of climate change as a source of major systemic risk
- Regulatory requirements on firms to manage those risks

## Investor pressure

UNEP FINANCE INITIATIVE

TCFD TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

- Recognition of climate change as a source of major financial risk
- Investor mandates incorporating sustainability and need to manage climate risk

## Economic & societal change

- Growing global political support
- Growing net zero commitments
- Mandatory TCFD disclosures
- $300tn of investment required to deliver net zero

Banks' responses

**Implement climate change risk management capability**
ICAAPs, ILAAs
IFRS 9

**Drive the transition to net zero**
"Halve financed emissions by 2030"
"Originate $1 trillion of transition finance by 2030"

 

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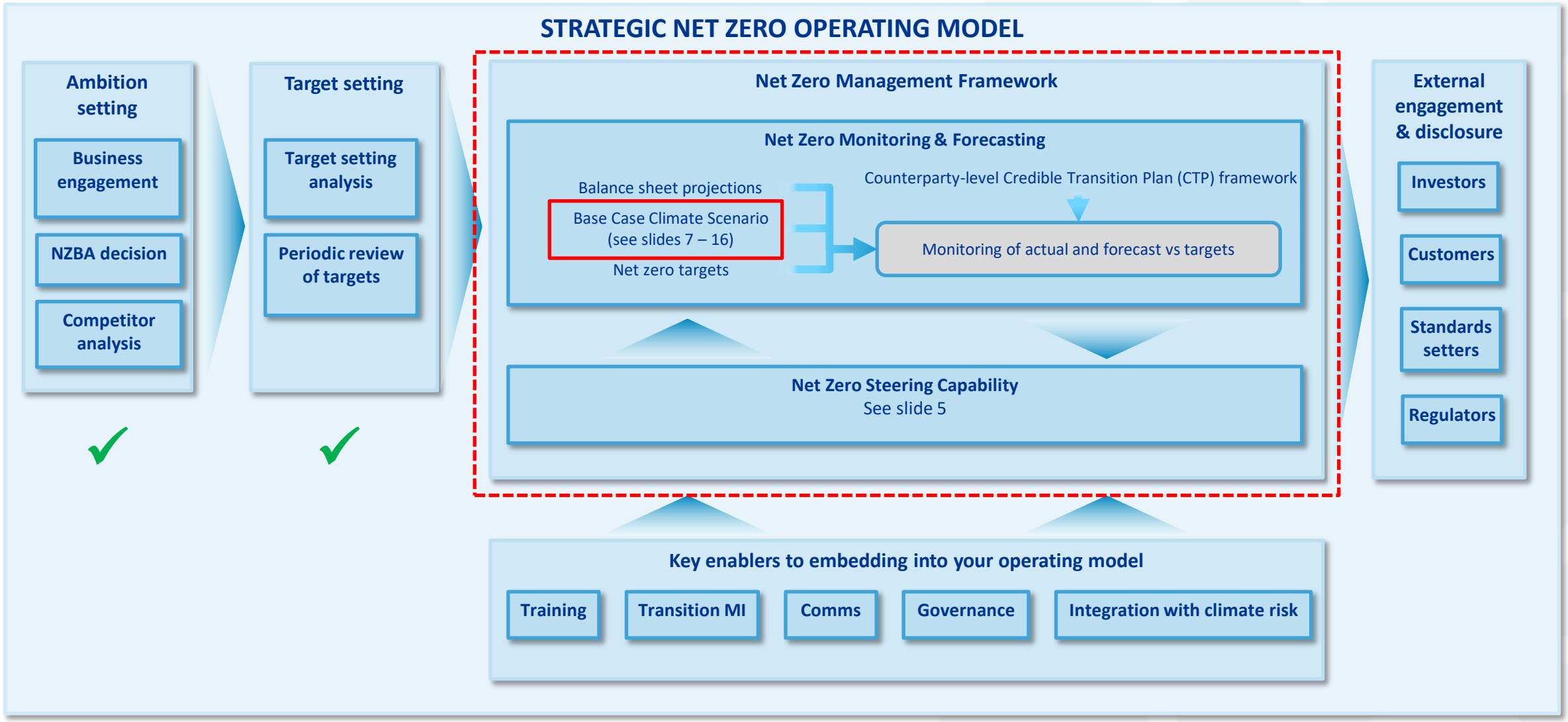
# The ability to *forecast* your financed emissions is critical if you are going to deliver on your net zero commitments



# Banks are developing net zero steering mechanisms – or levers – that operate at multiple levels

| | Steering mechanisms | Description | Transaction | Client | Sector | Bank-wide | Whole system |
|---|---|---|---|---|---|---|---|
| Risk and Pricing | **Sector carbon budget (incl. what-if analysis)** | Managing a carbon emissions budget through each transaction with clear processes and escalation routes | | | | | |
| | **Internal Carbon Pricing** | Assigning internal costs to each ton of carbon used, which can be factored into investment decisions | | | | | |
| | **Carbon-adjusted Capital Attribution** | Integrating emissions into existing capital attribution framework - adjusting amount of capital require based on emissions contribution | | | | | |
| | **Carbon-adjusted Hurdle Rate** | Adjusted internal hurdle rate to be lower for greener deal | | | | | |
| | **Risk Appetite Limits (soft and hard limits)** | Range of numerical thresholds aim to contain the risk exposures | | | | | |
| Strategic | **Portfolio Management** | Analysis of clients in the portfolio and decisioning to drive towards target | | | | | |
| | **Client Engagement** | Supporting clients through their transition journey | | | | | |
| | **Sustainable Finance targets** | To encourage support of low-carbon solutions | | | | | |
| | **Partnerships** | Supporting clients through their transition journey through third party partnerships to bring additional capabilities | | | | | |
| | **Net Zero Recovery Plan** | Actions to remediate divergences from your external targets | | | | | |
| | **Government Engagement** | Engaging with government to advocate for policies that will accelerate decarbonisation | | | | | |
| | **Industry Engagement** | Engaging with industry bodies to influence best practice for decarbonisation across the industry | | | | | |

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# “Which levers should I pull?  And how hard should I pull them?”

 

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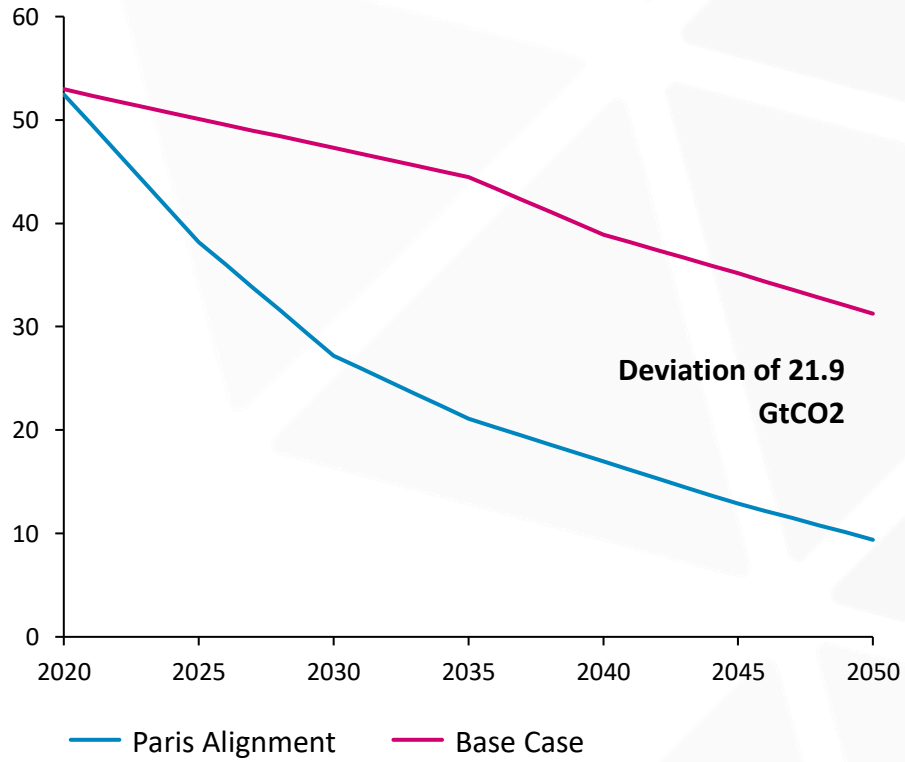
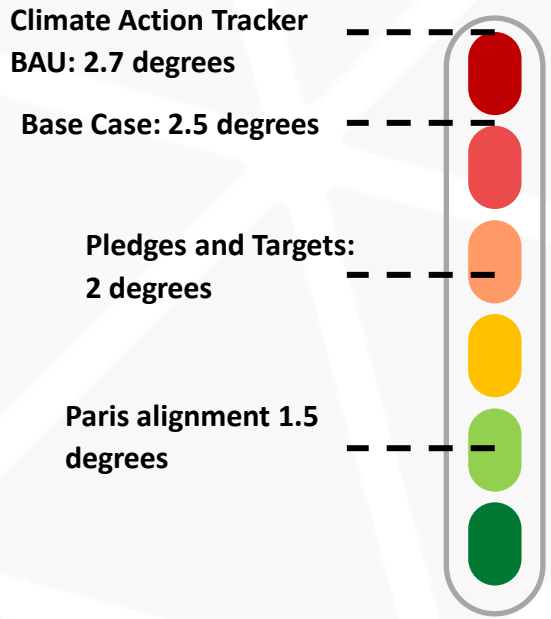
# Global emissions will exceed 1.5 degree Paris-aligned emissions by 21.9Gt CO2 in 2050, setting us on a 2.5 degree pathway

Global GHG emissions out until 2050 fail to meet regional targets and significantly miss Paris aligned requirements for a 1.5 degree 2050. At its worst, the deviation from the Paris Accord reaches 70% in 2050, signalling global efforts towards net zero are grossly underestimating the challenge at hand.

## Forecasted base case vs Paris aligned required annual global GHG emissions



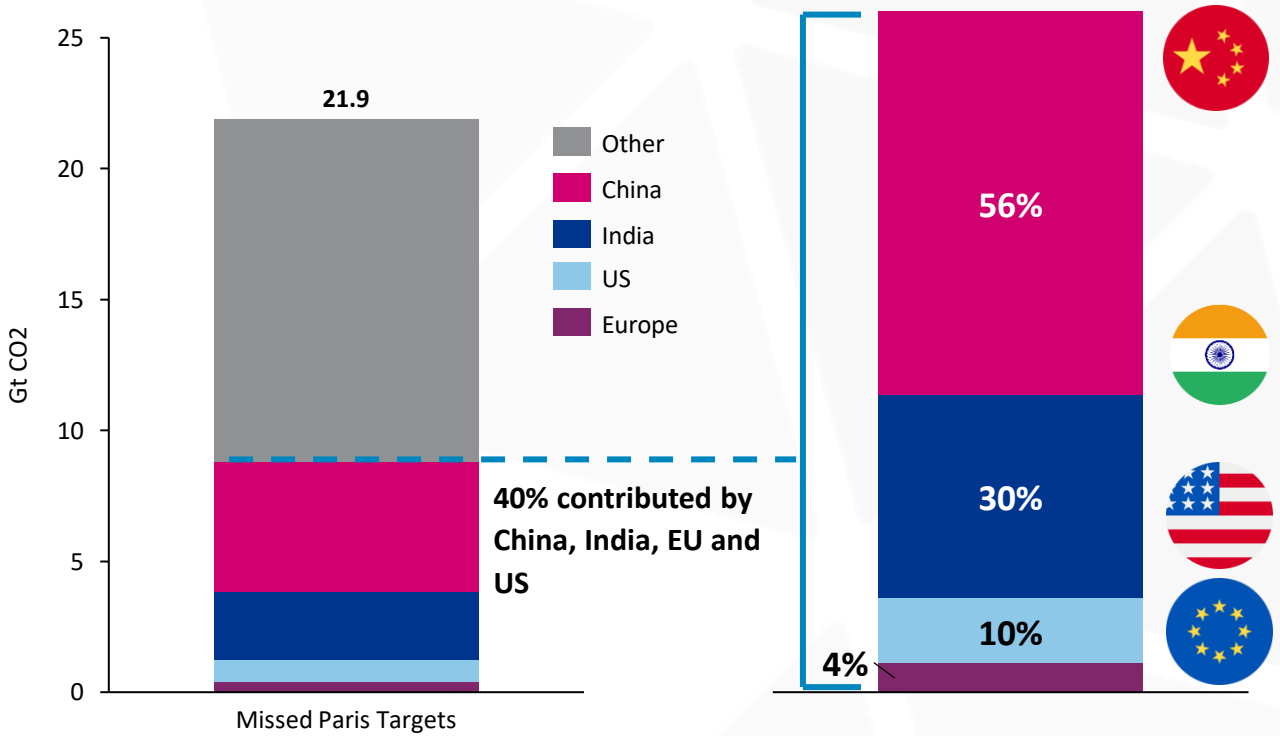

 

# The “Big 4 Emitters” make up 40% of the overshoot, driven primarily by China and India

Of the excess 21.9Gt CO2 emitted in 2050, 40% is found to be from 4 major economies: China, India, US and the EU.

Of this 40%, China comprises over half of the emissions, with India following at c.30%. The US still holds a relatively large portion at 10% while the EU contributes <5% within these 4 regions.

## Excess GHG emissions forecast 2050

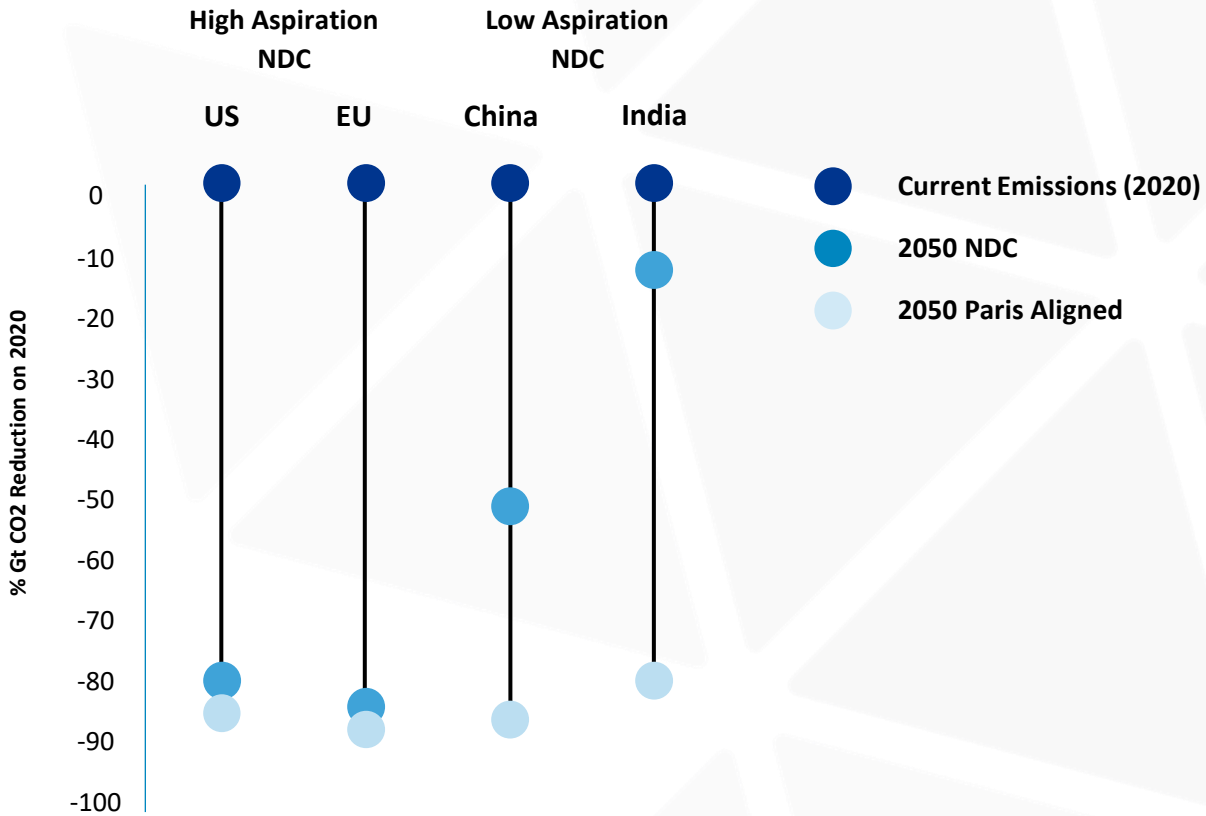


# This emissions overshoot is partly because the targets set by these major emitters (especially China and India) are insufficient to meet Paris requirements…

Diverging ambitions of emissions targets between developed and emerging markets reveals a clear distinction in their efforts to align with a 1.5 degree scenario.

The US and EU targets deviate from Paris respectively by 17% and 12%. This is dwarfed by India and China's 78% and 70% deviation.

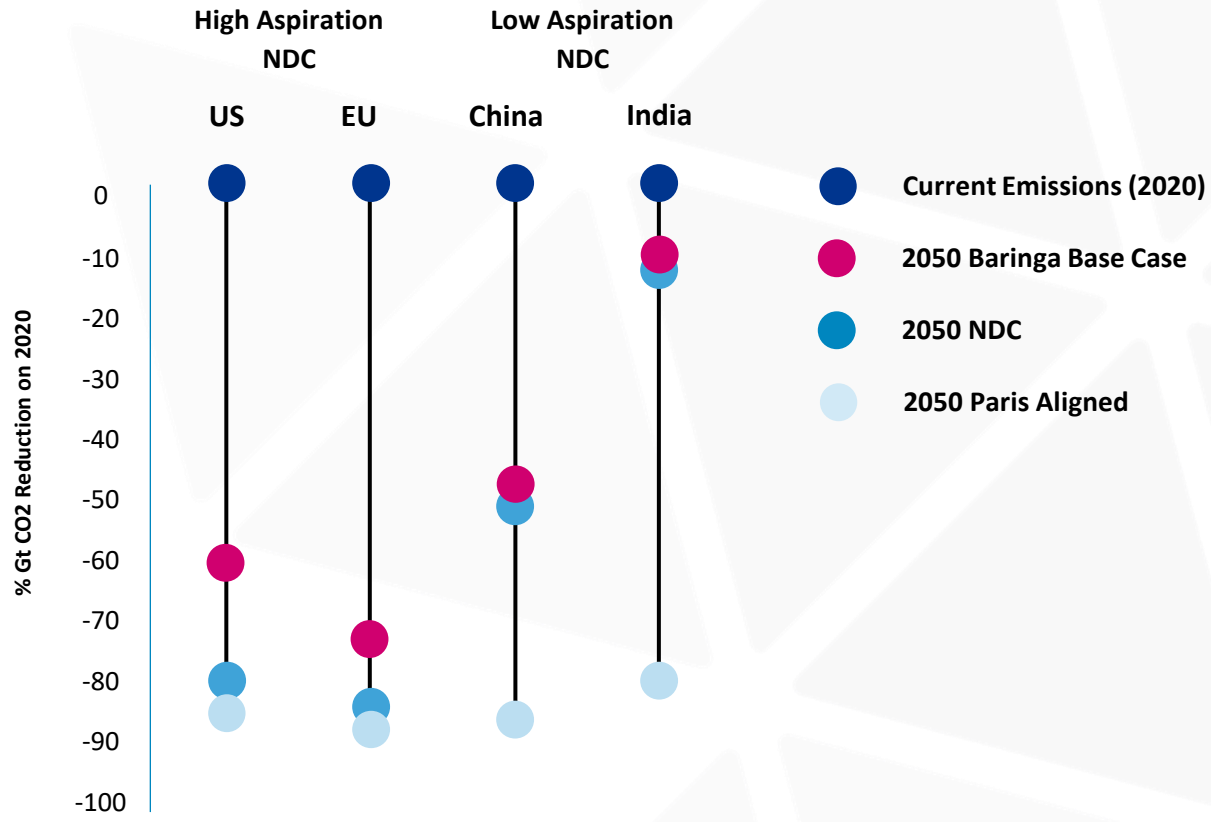


# …and partly due to insufficient near-term practical support (Credibility) and long-term political stability (Durability) to deliver the targets – mainly in the US and EU

With their more ambitious targets, the EU and the US are projected to miss their emissions targets by 66% and 58% respectively.

In the near-term, this is because they lack the operational maturity, government support, supply chain stability and microeconomics required to support their transitions.




| | US | EU | China | India |
|---|---|---|---|---|
| Baringa Credibility Score | 3.2 | 3.5 | 4.3 | 3.4 |
| Baringa Durability Score | 0.9 | 1.6 | 0.0 | 0.3 |

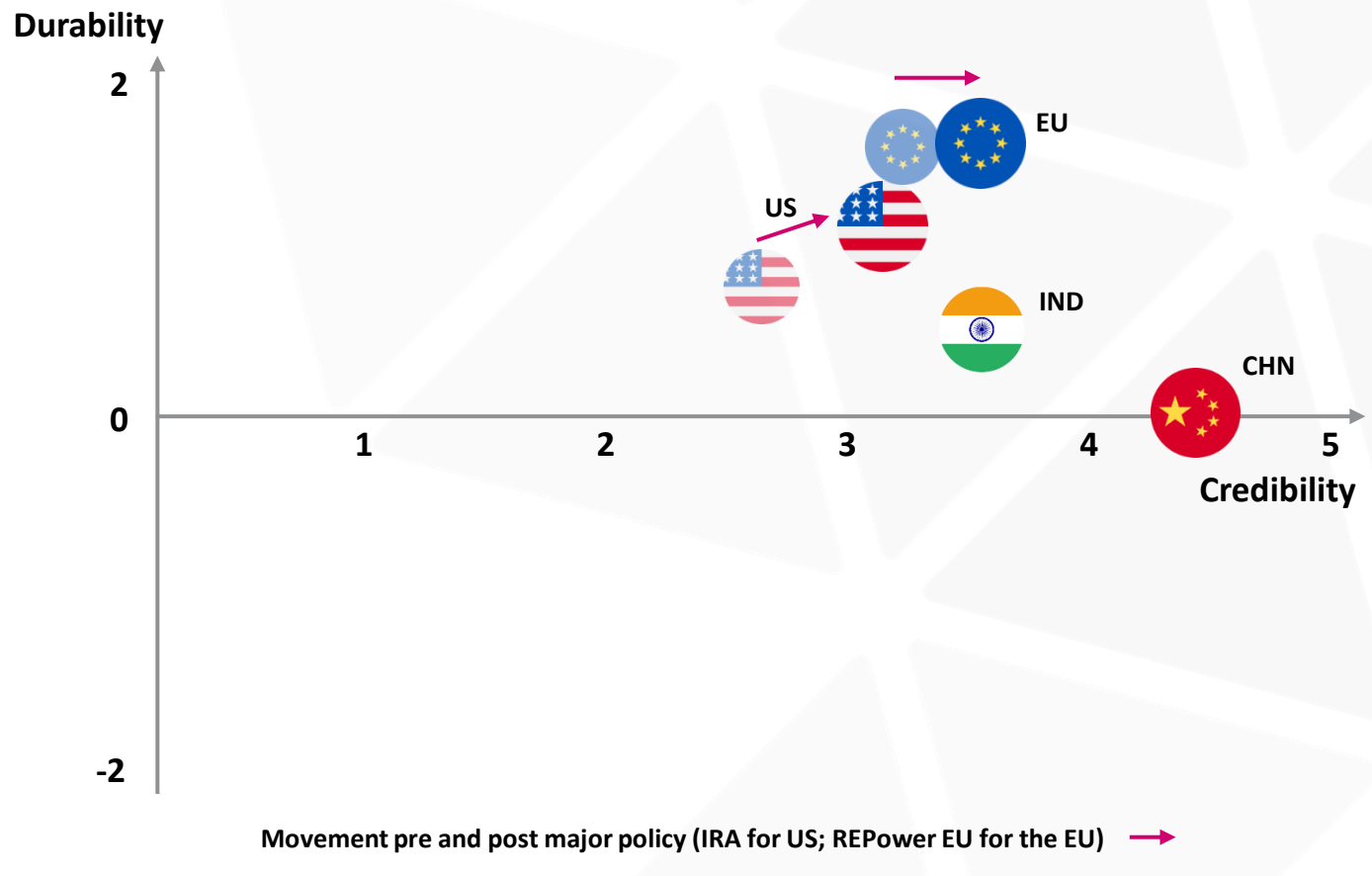
 

# The Inflation Reduction Act in the US, and REPower EU in the EU have partly addressed the policy gaps required to deliver on their targets

The IRA and REPower EU both addressed significant policy gaps, with the result that their national credibility scores (an aggregate of their sector credibility scores) increased.

The IRA was passed by Congress and would therefore have to be voted on again to be repealed, providing greater political stability to the US transition (ie an improvement in the US Durability score).

**Baringa Credibility & Durability Assessment (Overall Country Rating)**



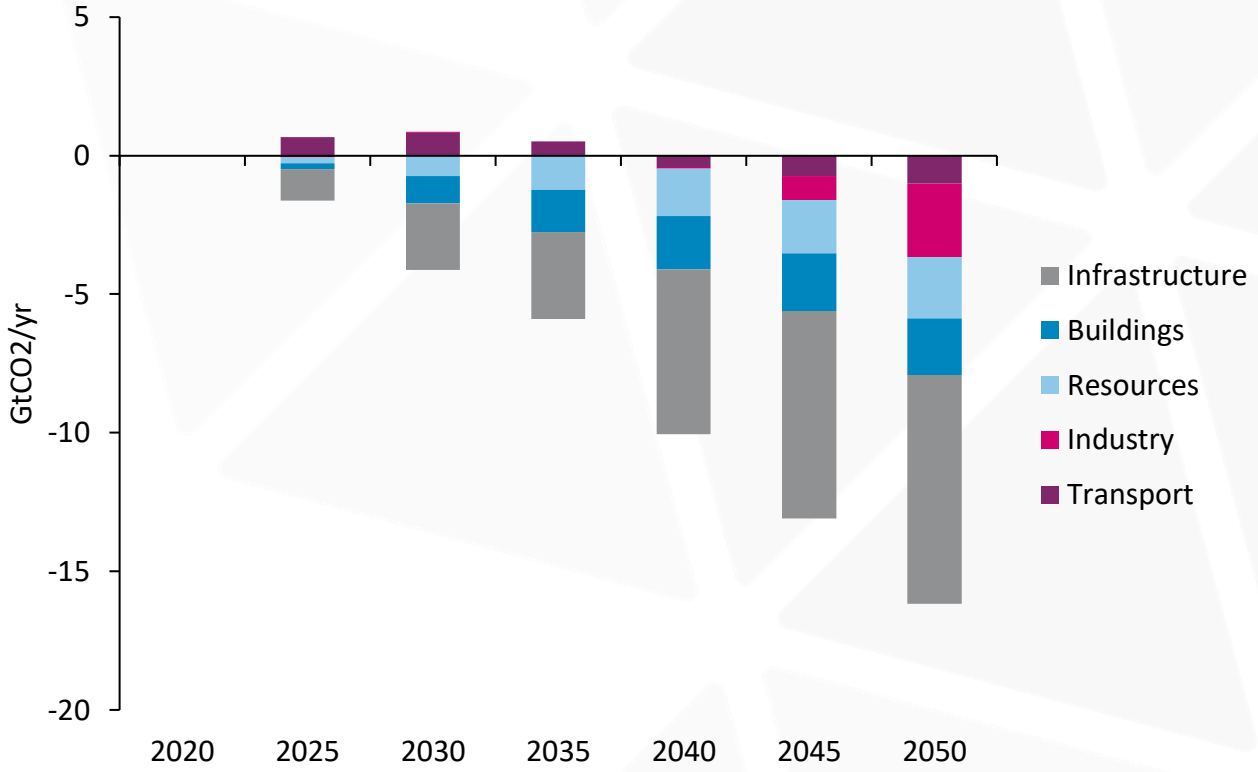
# Globally, the power sector leads the emissions reductions, while transport proves challenging to decarbonise at scale

The decline in sector emissions is propelled by power (62%) and buildings (72%), as these are the most cost-effective areas for countries to decarbonise.

Industry and transport, however, remain laggards, with their emissions falling by 29% and 19% by 2050.

This can be explained by supply-side difficulties to decarbonise these sectors, making it an onerous task for developers and governments alike to materially reduce emissions.

**Energy CO2 reduction compared to base year – by sector**



# Despite similar growth in absolute renewables capacity in all four regions this decade, much higher investment is required in the US, EU and China than in India

Renewable capacity accelerates rapidly through to 2050, presenting significant investment opportunities across all regions.

In the 2020s, however, CapEx requirements in the US, EU and China much higher than those in India. This is the result of India having far less existing capacity that is due to retire and be replaced this decade; India's comparatively low labour costs; and that it deploys a lot more biomass, which is comparatively cheap

## Renewables Capacity Growth

| | Growth 2020-30 (GW) | CAPEX Req. 2020-2030 ($bn) | Growth 2020-50 (GW) |
|---|---|---|---|
|  | 560 ▲ | $ 404 | 2,030 ▲▲ |
|  | 660 ▲▲ | $ 353 | 1,090 ▲ |
|  | 760 ▲▲▲ | $ 426 | 3,420 ▲▲▲ |
|  | 590 ▲ | $ 121 | 2,540 ▲▲▲ |

# It is important to package up your Base Case Climate Scenario with both rich narrative and detailed data to enable broad buy-in

## Base Case Reports

### Global narrative

- Global macro-economic, geopolitical, technological and emissions projections
- An overall global and regional narrative with metrics that put country results into context

### Country reports

- Detailed report for each country to which you subscribe
- Detailed Credibility and Durability analysis at both country- and sector-level
- Detailed projections of technology deployment across power, resources, transport, industry and buildings
- Technology CapEx projections to support market sizing and strategy formation

## Supporting data cube

### Model output / variables

- Supporting data cube in .csv, .xml or .json file formats.
- 100s variables per country, covering all key sectors
- Credibility & Durability scores and all underlying metrics
- House view projection data

# You will need an extensive set of metrics in the data cube to support embedding of the Base Case across all functions and business lines

## Spot metrics for monitoring purposes

### Power Generation

#### Factors driving Credibility & Durability assessment

| Credibility | Input Variables | |
|---|---|---|
| **Operational Maturity** | Renewable energy capacity (number) in target date | % of satisfaction with country's infrastructure |
| | % of previous renewable energy targets achieved | Average time between power outages |
| | % of infrastructure projects delivered on time | GW in interconnection queues |
| **Government support** | Funding directed towards increasing electricity generation through renewables | Restricted companies domiciled |
| | Funding as a % of financed system cost | Time limit on availability of financial support |
| | Accessibility of support – eligibility for local governments, corporations & individuals | |
| **Supply chain feasibility** | Imports as a % of consumption for critical minerals for wind and solar | % annual growth in wind and solar |
| | % dependence on imports for solar modules | % annual employment growth in wind and solar |
| **Micro-economics** | Profitability band | Projected system financing costs |

| Durability | Assessment of commitment |
|---|---|
| **Breadth** | Political opposition |
| | Labour Groups |
| | Corporate Organizations |
| | Financial Institutions |
| | Industrial Groups |
| **Depth** | How strong the support/opposition to the transition/climate policies is across the incumbent administration |

#### Credibility & Durability scores

**Output**

Scores for each lens

1 2 3 4 5

Weak Decarbonisation Policy — Strong Decarbonisation Policy

**Output**

Scores for each lens

-2 -1 0 1 2

Strong Rollback Risk (Flaky) — Strong Decarbonisation Momentum (Sticky)

Industry | Buildings | Transport

## Projected metrics for use in forward-looking strategy and risk analysis

### Power Generation

| Output Variable | Sub-variable / granularity | Unit |
|---|---|---|
| **Price** | Carbon, Oil, Gas | $ |
| **GHG Emissions** | CO2 | MtCO2 / yr |
| **Emission Intensity** | CO2 | tCO2/ MWh |
| **Energy Demand** | Oil, Gas, Coal, Biomass, Solar, Wind, Nuclear, Hydro, Geothermal | TWh/ yr |
| **Technology capacity** | Coal, Coal CCS, Oil, Natural Gas, Nuclear, Hydro, Biomass, Biomass CCS, Solar, On shore wind, Offshore wind, Battery Storage Power, Battery Storage Volume, Pumped storage power, Pumped storage volume | GW |
| **Technology Capacity additions** | Coal, Coal CCS, Oil, Natural Gas, Nuclear, Hydro, Biomass, Biomass CCS, Solar, On shore wind, Offshore wind, Battery Storage Power, Battery Storage Volume, Pumped storage power, Pumped storage volume | GW/ yr |
| **Technology production** | Coal, Coal CCS, Oil, Natural gas, Natural gas CCS, Nuclear, Hydro, Biomass, Biomass CCS, Solar, Onshore wind, Offshore wind | TWh/ yr |
| **Technology Cost** | Coal, Coal CCS, Oil, Natural gas, Natural gas, CCS, Nuclear, Hydro, Biomass, Biomass CCS, Solar, Onshore wind, Offshore wind | $/ kW |
| **System cost** | Investment | Billion $/ yr |

Industry | Buildings | Transportation, CCS, Hydrogen, Resources...

# We have brought together three separate capabilities to build our Base Case

***The key conceptual components…***

| 1 | 2 | 3 |
|---|---|---|
| **Political and policy risk assessment** | **Transition modelling** | **Macroeconomic model integration** |
| Assess the real-world deliverability of a country's sector-level climate policies | Internally coherent transition scenario expansion | Generate impacts on macroeconomic variables |

***How we approached them…***

| Baringa | Baringa BLACKROCK | NIESR |
|---|---|---|
| ▲ Implementation of our "Credibility & Durability" framework<br>▲ Leveraging our global market reports, covering major markets for power, gas, hydrogen and batteries | ▲ Leverages the Baringa-developed Global Transition Model that now forms the basis of our partnership with BlackRock | ▲ Partnership with National Institute of Economic & Social Research, using their NiGEM macroeconomic model (used by the NGFS to build their scenarios) |

***Our resourcing approach…***

| | | |
|---|---|---|
| ▲ 12 months' investment in Credibility & Durability methodology development<br>▲ Permanent policy analysis capability, for 15 countries: c 3 FTE to support quarterly refresh<br>▲ 50+ FTEs in our Market Reports business forecasting power markets, supply chains and transition technology pathways | ▲ Full build of Integrated Assessment Model (IAM) incl. continuous improvements over last 15+ years<br>▲ Combined Baringa/BlackRock team of 12 FTEs to maintain the Global Transition Model | ▲ Experience with integration of output from IAM into macroeconomic model (carbon price, oil & gas demand, etc.) |

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# Example short-term scenario built around a base case: A global green subsidy trade war

*"The global green subsidy trade war intensifies, resulting in export controls, significant impact to global trade and inflation… which leads to deepening energy price stress and global recession"*

**Global green subsidy wars and breakdown in international co-operation**

Advanced economies deploy competing climate **subsidies**, leading to breakdowns in **global trade and investments flows**.

P.01

**COP28**

*Lack of global consensus on transition, feeding bilateral measures*

As the climate subsidy trade war deepens, advanced economies apply stringent **carbon prices** to insensitive markets, and border **carbon adjustments tariffs** to protect from carbon leakage.

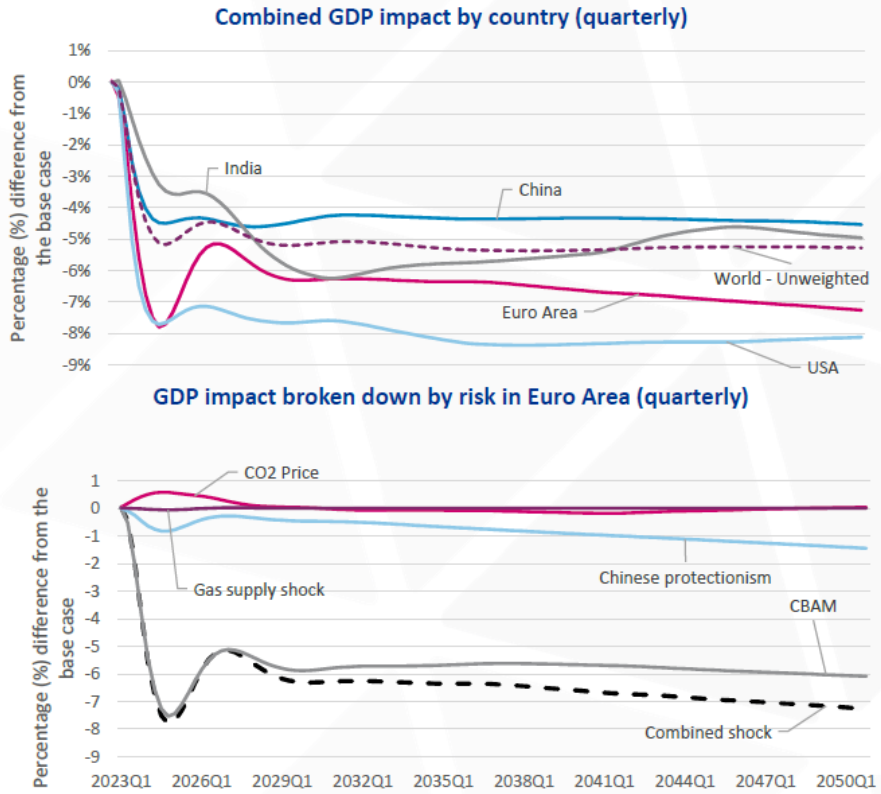
P.02

Protectionism takes hold and China implements **export controls** for minerals and finished products which are critical for the climate transition.

Lack of climate financing from the West leads developing economies to **restrict exports** of natural resources to Western markets.

P.03 P.03.1

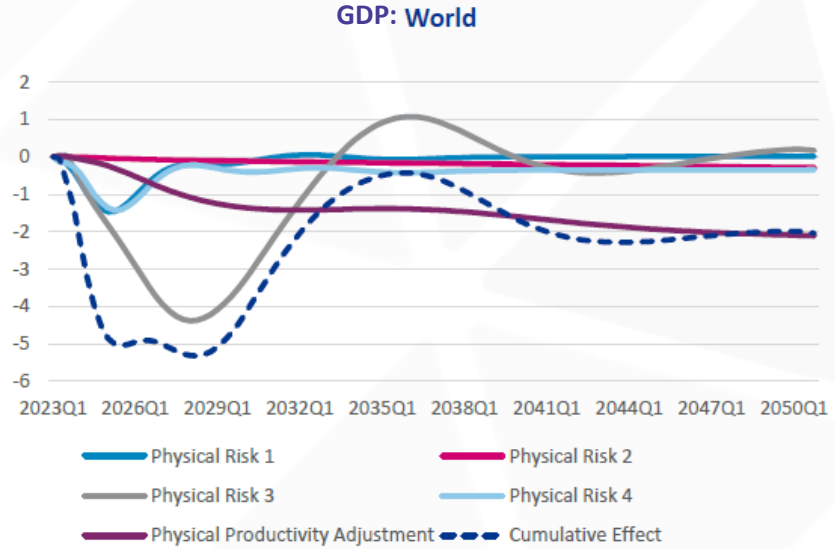
**Q3 2023** **Q4 2023**



# Example short-term scenario built around a base case: Multiple physical stresses drive second order impacts on migration and geopolitics

*"The compounding effects of water stress in Europe and Africa and extreme precipitation in Asia cause systemic resource shortages, crop failure, and significant difficulties in trade, leading to severe food crisis, further inflation, internal displacement of people and pressure on cross-border migration channels"*




**India pre-monsoon crisis**

A heat dome forms over the Indian sub-continent, the high temperatures cause loss of **productivity and increased energy consumption**

H.01

**Asia Pacific typhoon season**

Major economic hubs in Asia Pacific (Singapore, Hong Kong, China, Korea, Japan…) are impacted by severe and repeated weather events in a single Typhoon season.

EW.01

Heavy rainfall in Korea causes significant destruction to **real estate assets**, leading to **write-offs** and increases in **insurance premiums**.

**Droughts linger late into the European summer**

Prolonged drought conditions linger across Europe and in Africa.
**In Europe**, the water stress causes irrigation challenges and losses in agricultural crops. The water levels in the Rhine hit record lows and commercial traffic is badly impacted, affecting European economies and pushing up **inflation**.
**In Africa**, the lack of water leads to mass migration away from affected areas to the global north.

W.01 W.02 W.03

**Monsoon season**

The cumulation of the crop failures, in Africa and Europe due to draughts and in the Asia Pacific region due to floods and extreme weather, cause systematic food shortages.

EP.01

The flooding in Asia further damages **transport** and **storage infrastructure**, causes addition **market shocks** and **volatility**.

EP.03

In addition, extreme flooding in the Pakistan/Indian regions causes a humanitarian crisis.

**Q2 2023** **Q3 2023** **Q4 2023**

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# Q&A

 