

# Baringa's Climate Base Case Insights

November  
2023

## Key macro events



**Covid-19**



**Russian invasion  
of Ukraine**



**Energy  
crisis**



**Superpower  
rivalry**



**Trade  
protectionism**

The major events over the last few years have led to a strained economic and political environment across the world. Major western economies have been exposed to high levels of inflation, resulting in prolonged high interest rates and a widespread cost of living crisis. This has been compounded by greater geopolitical pressures over supply chains and capital mobility.

This adverse macro environment has increased the challenges placed on the energy transition as the world seeks to decarbonise. Baringa's climate base case provides up-to-date insight on the likely course of the energy transition across geographies and sectors to support financial institutions and energy suppliers understand our central outlook for the transition, quantify their risk of exposure and identify opportunities to deploy capital.

## Baringa's climate base case

Our base case insights draw upon a combination of over 20 years of trusted expertise from specialists in the energy and financial sector industries as well as a vast collection of qualitative and quantitative models to provide a detailed view of the global energy transition until the end of this century.



**>20 years as trusted climate advisors to governments and corporates globally**

- We are ranked as the Financial Times No.1 consultancy for Energy, Utilities and Environment for the 5th year running
- We have supported COP26's Energy Transition Council on net zero solutions for developing countries
- We advise the world's biggest corporates on transition, such as leading oil and gas companies for carbon capture, supporting clean technology firms in their development of the world's largest wind farm and advising major retailers on their long-term renewable energy strategy and execution



**Extensive practical expertise in energy modelling**

- Our quarterly power market reports span 50 countries serving over 300 investors to support key transition-related decisions
- The Climate Change Scenario Model was the basis for our long-term partnership with BlackRock



**Industry-leading credibility and durability framework**

- Our global energy perspectives insights team have developed a credibility and durability methodology to assess the strength of climate policies deployed and their likelihood of being achieved



**Leveraging economic insight for a comprehensive understanding of the net zero pathway**

- Our partnership with the National Institute of Economic and Social Research (NIESR) has enabled us to use their macroeconomic modelling tool, NiGEM, to better understand the economic implications of our base case and a net zero pathway at a global and regional level

## Baringa's credibility and durability assessment

Baringa's credibility and durability methodology evaluates national commitments on their deliverability. The credibility assessment examines to what extent a climate target is deliverable by assessing the extent of financial and policy commitments. The durability assessment examines the likelihood of targets changing in light of political and economic developments, with higher scores denoting strong momentum in favour of decarbonisation with commitments "baked in." A high credibility and durability score signals a target is very likely to be met; a low set of scores signals a target is very likely to be missed.

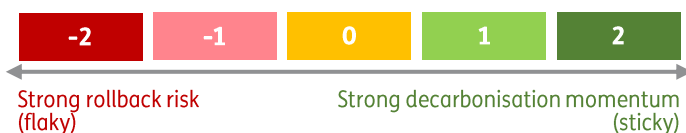
### Credibility: (Maturity)

"To what extent do current policies support the emission reduction target"



### Durability: (Momentum)

"With what likelihood will the current policies (the credibility score) strengthen or weaken over time"



Credibility	Durability	Emissions target impact
High ▲	High ▲	⊕ Likely to be met
Low ▼	Low ▼	⊖ Significantly miss

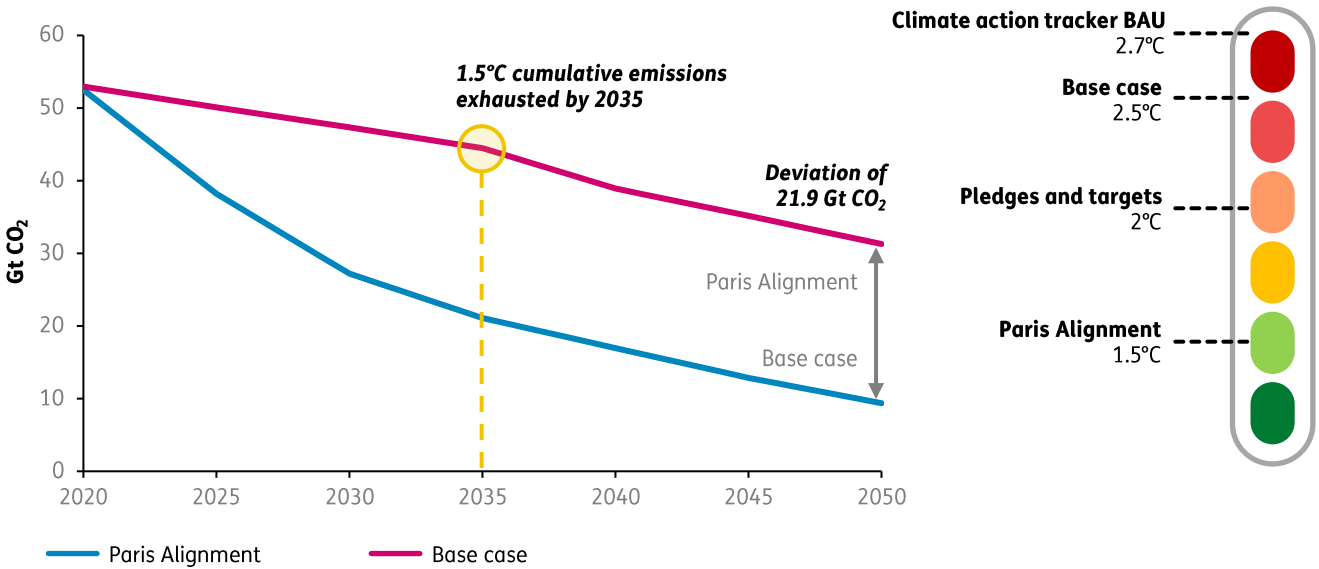
## Key themes

- 1 The Baringa climate base case currently projects a 2.5°C climate trajectory, well above Paris-aligned scenario.** By 2050, Baringa's base case projects cumulative emissions will be 522Gt in excess of a Paris-aligned scenario. In 2050, 35% of these excess emissions are from two of the largest emerging economies at present: China and India.
- 2 The reasons for not reaching the Paris aligned scenario differs between developed and emerging economies.** Developed economies have set ambitious Nationally Determined Contributions (NDCs) (targets), which we project that they will fail to meet. Emerging economies, in contrast, have set NDCs that they are likely to achieve, but do not deliver Paris-aligned emission reductions. According to our projections, the cost to emerging economies, if they were to prioritise Paris-aligned emissions, could be as much as c. \$31 tn and c.\$13 tn in GDP in China and India respectively between 2030-50.
- 3 Globally, all sectors miss their 2050 emissions targets according to the Baringa climate base case.** Transport in particular shows excess emissions running at 32% above global set targets, and a fall in emissions of only 13% between 2020-50, relative to the best performer, buildings, which would see a 72% decline in emissions.
- 4 Emerging economies represent investor opportunity in power generation with significant absolute deployment levels of renewable capacity, e.g. a twenty-fold increase in India.**
- 5 Key policy developments in the US and EU have materially increased their alignment towards net zero. The Inflation Reduction Act (IRA) and REPower EU support the deployment of green capital, and we estimate that they result in an additional cumulative emissions reduction of 9.5Gt between now and 2050.**
- 6 Transition is particularly vulnerable to exogenous supply chain shocks of mineral and manufacturing components, emphasising the importance of free and open trade in the energy transition. In our tail-risk supply chain shock scenario, countries heavily dependent on imports of critical resources, such as the US and EU, see a respective GDP contraction of 6% and 5% out until 2050 owing to their constrained ability to transition to net zero.**

### 1a Global trajectory set to miss 1.5°C Paris aligned emissions by 22Gt CO<sub>2</sub> in 2050

Global Greenhouse gas (GHG) emissions out until 2050 fail to meet regional targets and significantly miss Paris-aligned requirements towards a 1.5°C pathway. At its worst, the deviation from the Paris Accords reaches 70% in 2050, signalling global efforts towards net zero are grossly insufficient for the challenge at hand. By 2035, the Baringa base case projects that cumulative emissions will have exceeded Paris-aligned requirements.

Forecasted base case vs Paris aligned required annual global GHG emissions

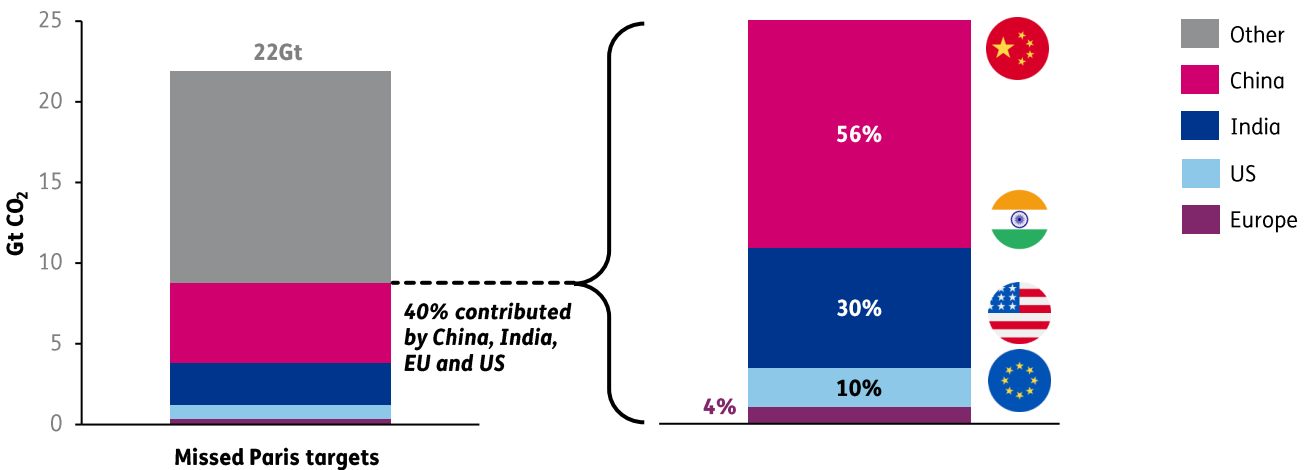


### 1b The 'Big 4 Emitters' make up 40% of the overshoot, driven primarily by China and India

Of the excess 22Gt CO<sub>2</sub> emitted in 2050, 40% is found to be from four major economies: China, India, US and the EU.

However, of this 40%, China comprises over half of the emissions, with India following at c.30%. The US and EU hold a slight 10% and 4% in comparison, highlighting the diverging pathway of emerging and developed economies.

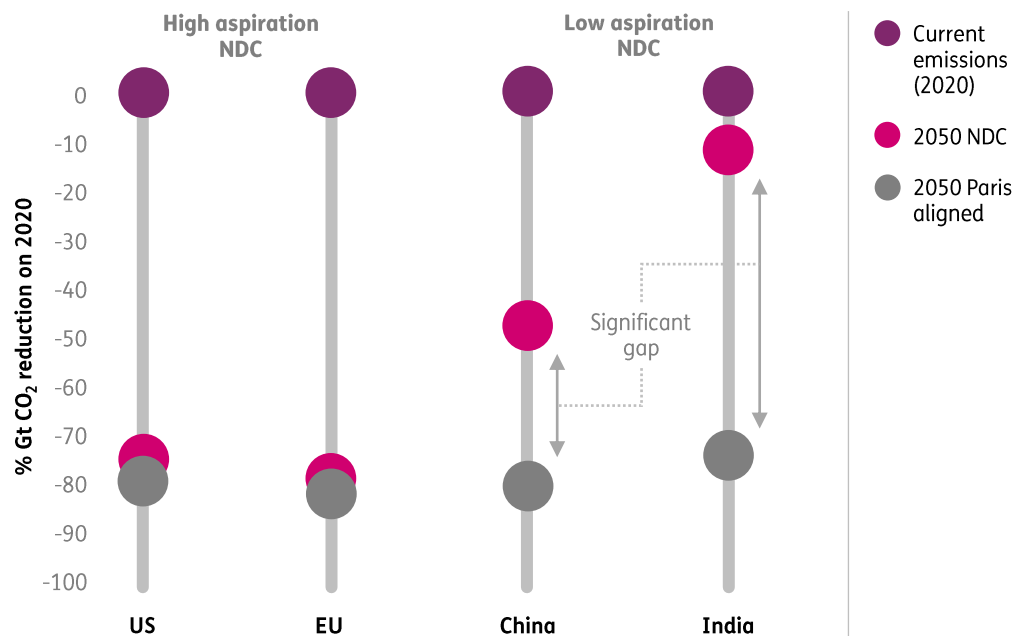
Excess GHG emissions forecast 2050



## 2a 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 reveal a clear distinction in their efforts to align with Paris requirements.





The 2050 US and EU targets deviate from Paris respectively by 17% and 12%. This is dwarfed by India and China's 78% and 70% deviation.



## 2b Making these targets more credible in emerging markets

Given the less ambitious targets relative to a Paris-aligned scenario, emerging economies are projected to nearly meet their targets in 2050 according to the Baringa climate base case. In contrast, the US and EU remain 66% and 58% above their target emissions.

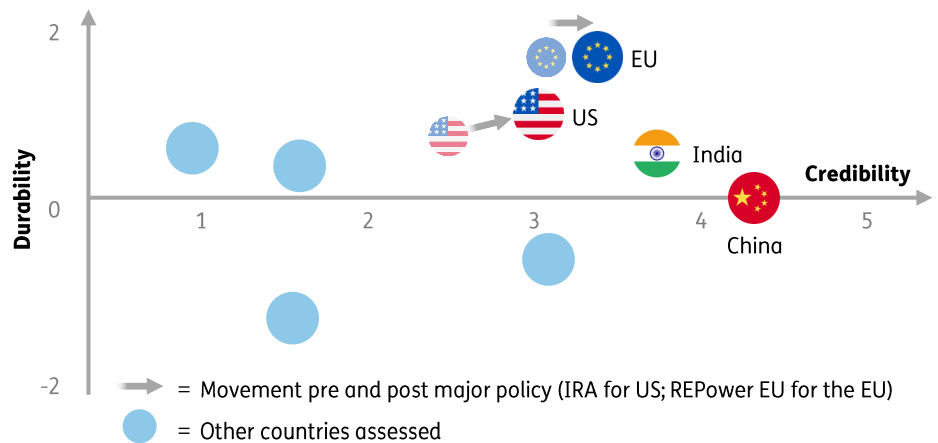
### 2050 GHG Emissions

Country	Baringa credibility score	Base case excess on NDC	Base case excess on Paris
 India	High	6% (0.2 Gt)	376% (3.0 Gt)
 China	High	9% (0.6 Gt)	258% (5.0 Gt)
 EU	Medium	58% (0.3 Gt)	79% (0.4 Gt)
 USA	Medium	66% (0.7 Gt)	101% (0.8 Gt)

## 2c Ambitious targets from developed markets lack credibility

The missing of targets by developed economies can be accredited to their lower credibility scores due to a lack of operational maturity, government support, supply chain stability and microeconomic viability. In contrast, China and India's high credibility gives them a high probability of meeting their less ambitious targets.

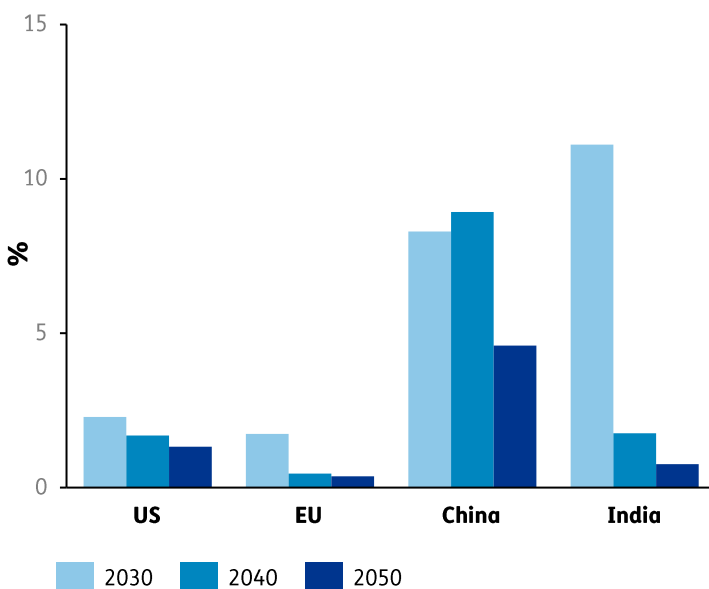
Baringa credibility and durability assessment (overall country rating)



## 2d Emerging markets prioritise economic growth over the next decade

The lack of proximity between NDCs and Paris-aligned goals in emerging economies can be explained by the higher economic cost of Paris targets for emerging economies. Paris-aligned emissions could require China to cumulatively forego 11% of its GDP relative to Baringa's base case between 2030-50 and India 16%. Heavy industry focus and continued dependence on non-renewable fuels such as coal, create a costly Paris-aligned transition for these economies. The US and EU's smaller industrial base and pre-emptive renewable capacity results in a more moderate economic impact.

Proportion of annual GDP foregone in Paris Alignment vs base case 2030-50



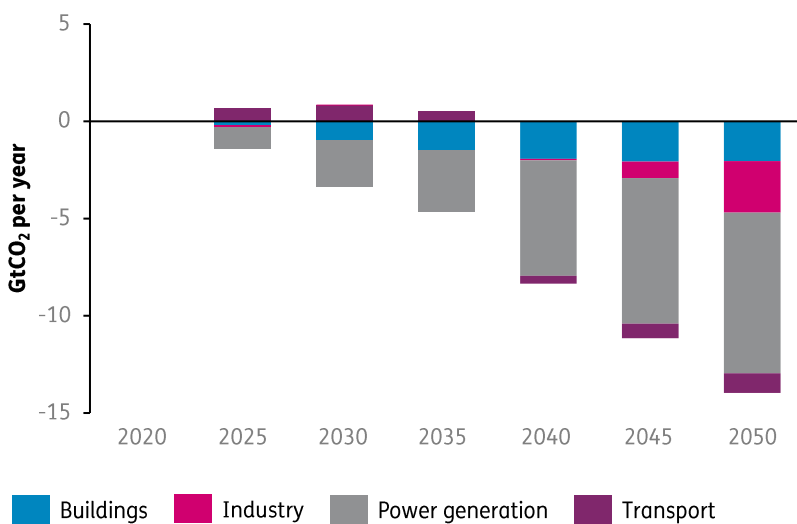
Cumulative foregone GDP 2030-50 if Paris Aligned and NDC Aligned

	Paris Alignment scenario	NDC scenario
US	▼ \$9.3tn	▼ \$7.3tn
EU	▼ \$1.5tn	▼ \$0.5tn
China	▼ \$31.0tn	▼ \$1.7tn
India	▼ \$13.0tn	▼ \$4.7tn

### 3a Global sector outlook: power generation leads the fall in emissions; transport remains a laggard

The decline in sector emissions is propelled by buildings (72%) and power generation (62%), largely due to the cost effective decarbonisation of these areas. Areas such as industry and transport, however, remain laggards in their emissions outlook as they are not even set to halve 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.

CO<sub>2</sub> emissions reduction by sector on 2020



Global sector emissions 2020-50

Sector	Change in emissions 2020-50	
	%	GtCO <sub>2</sub>
Buildings	-72%	-2.1 GtCO <sub>2</sub>
Power generation	-62%	-8.3 GtCO <sub>2</sub>
Industry	-29%	-2.6 GtCO <sub>2</sub>
Transport	-13%	-1.1 GtCO <sub>2</sub>

### 3b NDC misalignment suggests significant challenges for the transport sector

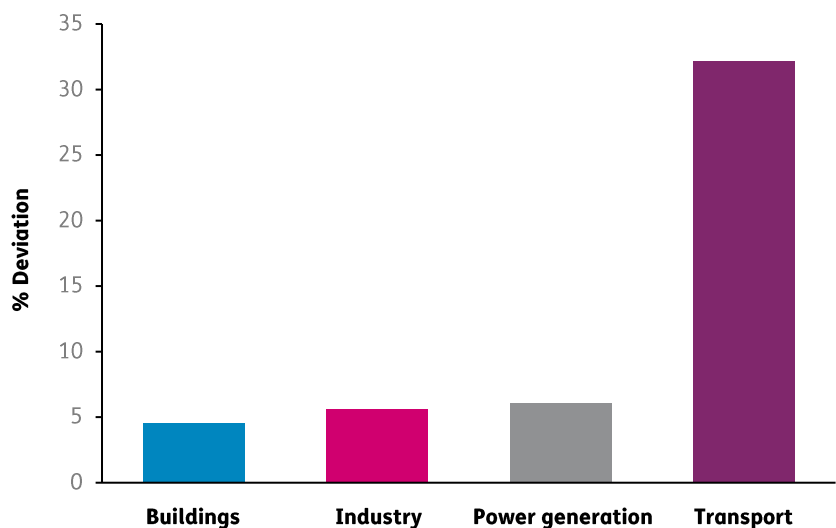
All sectors are set to miss their NDC targets for their emissions outlook out until 2050.

Buildings and power generation lead the decline in emissions but remain above their NDC.

Industry also operates c.10% above the upper bound of its NDC, highlighting the difficulty of decarbonising this area.

However, transport's significant 32% deviation from reaching its global NDC target signals both supply and demand side challenges on the ability of this sector to decarbonise, due to low EV penetration and technological constraints in aviation and shipping.

Sector emissions decline deviation from NDCs US, EU, CHN, IND 2020-50


















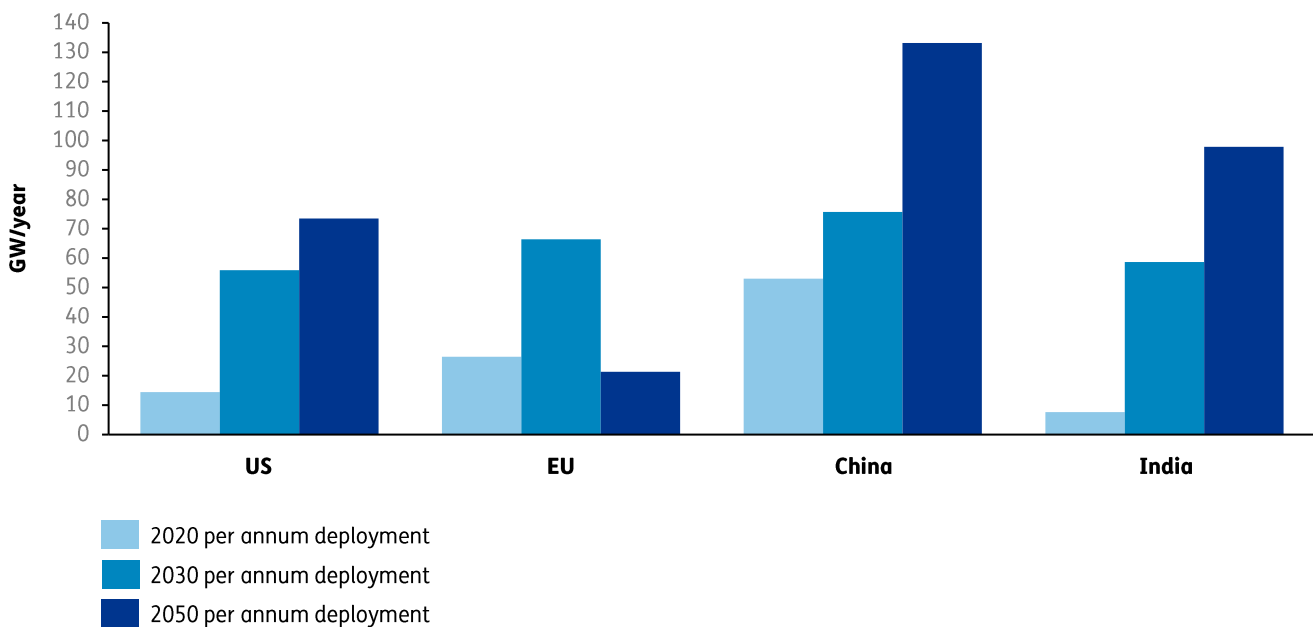
## 4 Emerging markets represent significant investor opportunity as India's renewable capacity is set to grow twenty-fold by 2050. China will have highest absolute renewable capacity

Renewable capacity deployment is headed into turbocharge in major emerging economies. India's exponential deployment of renewable capacity remains consistent until 2050, presenting significant investment opportunity with projected annual deployment of c.100GW per annum from 2030, most of which is driven by growth in wind. China represents the largest investment opportunity in absolute terms, driven primarily by solar. The US also demonstrates significant deployment growth out until 2050, due to the existing renewable capacity in the mix. Europe's deployment peaks by 2030, due to the strong starting point of renewable capacity in its current energy mix.

### RES capacity growth – absolute

	Growth 2020-50	Capex required until 2050	2050 deployment growth on 2020
 US	  2030 GW	\$2.2tn	7.7 times higher
 EU	 1090 GW	\$2.0tn	2.9 times higher
 China	   3420 GW	\$2.2tn	5.3 times higher
 India	   2540 GW	\$1.3tn	20 times higher

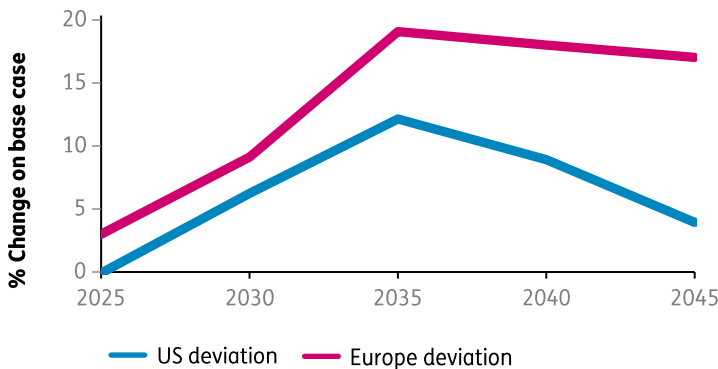
### Roadmap of annual deployment





## 5 IRA and REPower EU reduce US and Europe CO<sub>2</sub> emissions by 10Gt 2020-50

The US' Inflation Reduction Act (IRA) and Europe's REPower EU climate packages represent a significant government intervention with financial and non-financial measures. Without the incentive-based measures, our forecasted emissions would be higher in the US and EU respectively by 4.7 and 4.8Gt of CO<sub>2</sub> until 2050 when compared to Baringa's base case. The impact on emissions is most profound after 2030 with deviation peaking in 2035 for the EU at c.19% and the US at c.12%. This has knock on impacts for the energy landscape as in the year 2030 alone, RES deployment would be 12% lower in the US without IRA and 15% less in Europe without REPower EU. By 2030 this would sum to a foregone 53GW of solar and wind capacity in the US and 146GW in Europe.

Emissions outlook pre-policy developments vs base case 2025-45



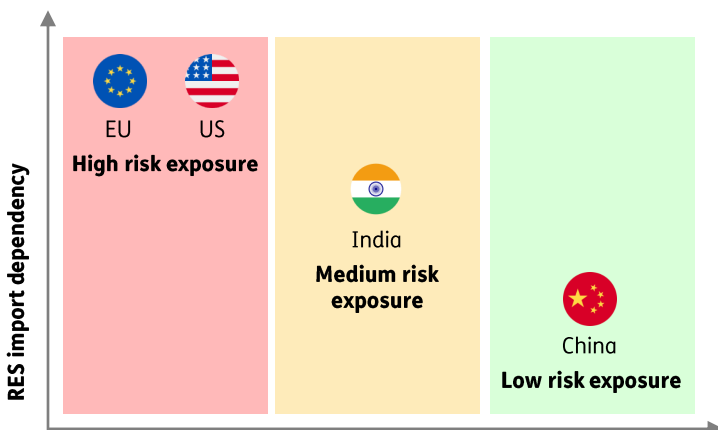
2030 pre-IRA, Repower EU vs base case

	RES deployment deviation	Solar and wind capacity deviation
 US	-12%	-53GW
 EU	-15%	-146GW





## 6 Emerging risk: high import dependence in the west threatens net zero targets

In a supply shock scenario, where China's mineral and manufacturing exports are significantly reduced in retaliation to the EU and US enacting a Carbon Border Adjustment Mechanism (CBAM), Baringa's modelling reveals significant disruption to the energy transition. This disruption would most be felt in developed markets due to a higher dependence on critical minerals and manufactured imports. This goes on to have ripple effects economically for the EU and US with respective cumulative GDP contractions of c.5% and c.6% cumulatively until 2050.

Despite ambitious targets and government support, the US and EU face looming supply insecurities which represent a material risk to the energy transition in those markets. This emerging risk stems from these regions having a high import dependency on the critical components required for clean technology, often coming from geographies such as China, South America and Africa. Although remedial efforts have been made in the form of the US' IRA domestic requirement quotas and the EU's Critical Raw Minerals Club initiative, the geopolitical nature of such relations continues to place pressure on the US and Europe's ability to reach their net zero targets.



Supply shock implications

	Renewable capacity impact (2030)	GDP impact (2023-2050)
 US	-185GW	-6%
 EU	-210GW	-5%
 India	-162GW	-3%
 China	-20GW	-3%



**If you are interested in hearing more, please get in touch with our experts:**



**James Belmont**  
Partner,  
Expert in Climate Risk

[James.Belmont@baringa.com](mailto:James.Belmont@baringa.com)



**Oliver Rix**  
Partner,  
Expert in Climate Modelling

[Oliver.Rix@baringa.com](mailto:Oliver.Rix@baringa.com)



**Dominique Harvey**  
Expert in Climate Risk

[Dominique.Harvey@baringa.com](mailto:Dominique.Harvey@baringa.com)

**Thematic Research – Global Energy Perspectives:**



**Caspian Conran**  
Expert in Economics

[Caspian.Conran@baringa.com](mailto:Caspian.Conran@baringa.com)



**Nikhita Swarnkar**  
Expert in Climate and Energy Policy

[Nikhita.Swarnkar@baringa.com](mailto:Nikhita.Swarnkar@baringa.com)

**Find out more:**

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