



# Transition Risks, Scenarios and Planning for Climate Resilience

FY 2022 -23





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## List of Acronyms

INR	Indian Rupee
IPCC	Intergovernmental Panel on Climate Change
NGFS	Network for Greening the Financial System
RE	Renewable Energy
USD	United States Dollar
GHG	Greenhouse gas



# 1. Introduction

Healthcare and pharmaceutical companies have a large impact on the climate, although their vulnerability to climate-related credit risks varies. Risks to creditworthiness are heavily influenced by business models, established asset bases or product portfolios as well as local regulations.

The hospital and services sector are diverse, ranging from real estate, asset-heavy hospitals and care homes to increasingly digital provision of services. Real estate-heavy healthcare companies face heightened capital and operating expenditure

## How to use the information provided in this report

Businesses in India have not yet understood and realized their potential opportunities to identify risk and its subsequent adaptation. This report should help to recognize possible adaptation actions and unavoidable transition risks that lie ahead. The climate scenario analysis in this report is a valuable tool for understanding the consequences of climate change for the company and should assist in longer term strategic thinking about climate risks both physical and transition. This report also demonstrates the complexity of transition climate risk and throws light on the degree of vulnerabilities faced by the sector. However, it is also important to note that scenarios are not associated with

requirements to decarbonise their asset base, and opportunities for cost recovery may be constrained by local policy and regulation.

While the **pharmaceutical industry is emissions intense** when compared to other healthcare sub-sectors and requires energy efficiency investments. Since pharmaceutical industry has more investment power than the rest of the sector relatively, it also is in a better position and has the means to mitigate this problem in a more efficient manner than others.

likelihoods. The underlying scenarios are Network for Greening the Financial System (NGFS) scenarios. **Scenarios try to anticipate drivers such as policy or technological improvements, it does not estimate the likelihood of these drivers.** The strength of the scenario is the plausibility and consistency of the selected parameters over time. This should be considered when using the information in this report. Scenarios are critical to minimize risks and maximize opportunities. In the face of a host of unknown climate transition factors such as carbon prices; coal and gas prices; technology and energy mix shifts etc., scenario analysis emerges as a vital tool to:



Identify a range of, potentially extreme, market and climate impact outcomes.



Illustrate key drivers of change within each scenario.



Understand how a company might be able to adapt to the changing market and climate, given its current and potential future resources.

By framing climate risks in the context of potential future warming scenarios, it should help Lupin to assess the impact of future risks arising from climate change, make the necessary preparations,

and demonstrate their resilience to stakeholders. This report aims to support strategic planning and risk management, including providing the associated financial impacts, wherever possible.



## 2. About Lupin

Lupin's journey is a testament to the potential of human imagination, compassion, and the unwavering pursuit of a better tomorrow. Established in 1968 by our visionary founder, Dr. Desh Bandhu Gupta, Lupin has evolved from humble beginnings to become a global healthcare leader. Headquartered in Mumbai, India, we have expanded our footprint across the U.S., LATAM, APAC and EMEA regions, operating in over 100 countries and offering a diverse portfolio of over 1,000 products.

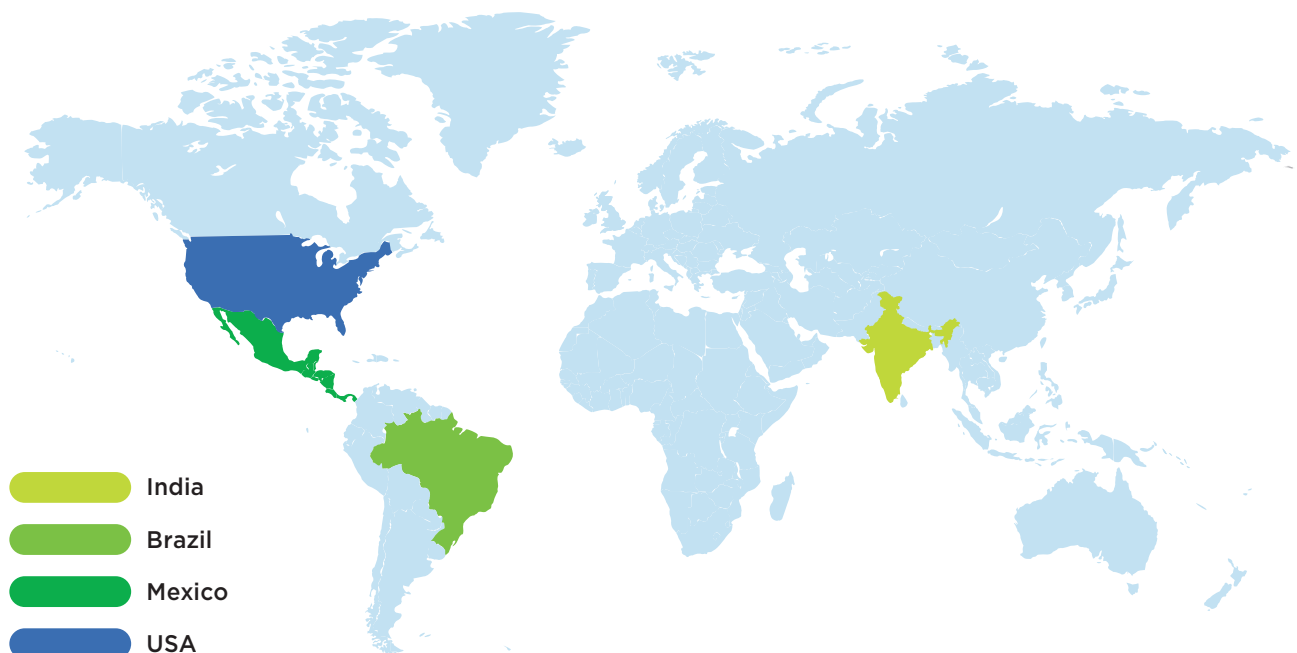
Inspired by the resilient lupin flower that nourishes the soil while thriving in challenging conditions, Lupin remains committed to its mission of making quality healthcare accessible to all. We recognize the importance of nurturing the communities we serve and leaving a positive impact on society.

With our robust manufacturing capabilities and strong research and development, we have emerged amongst the leaders in generics, complex generics, APIs, specialty, and biologics. Lupin's commitment to innovation and patient-centricity has fueled its success in therapeutic areas such as cardiovascular health, tuberculosis, diabetes, respiratory, gastrointestinal disorders, and women's health.

At Lupin, we understand that true success lies in the convergence of business growth and social impact. Beyond healthcare, we are dedicated to the upliftment of the communities we serve. This commitment is channeled through the Lupin Human Welfare and Research Foundation (LHWRF), which focuses on two pillars: Improving Lives and Improving Livelihood. Across 5,431 villages in nine states of India, we positively impact the lives of over 2.5 Mn people, reflecting our commitment to social responsibility and sustainable change.

Our journey is guided by the belief that healthcare should be accessible, affordable, and of the highest quality. We strive to advance our infrastructure, embrace innovation, and expand our presence in high-growth markets to better serve the evolving needs of patients worldwide.

As we embark on the next chapter of our story, we remain committed to our vision, mission, and core values. With boundless optimism, we embrace the challenges that lie ahead, confident that our collective efforts will continue to make a lasting impact on the world of healthcare.

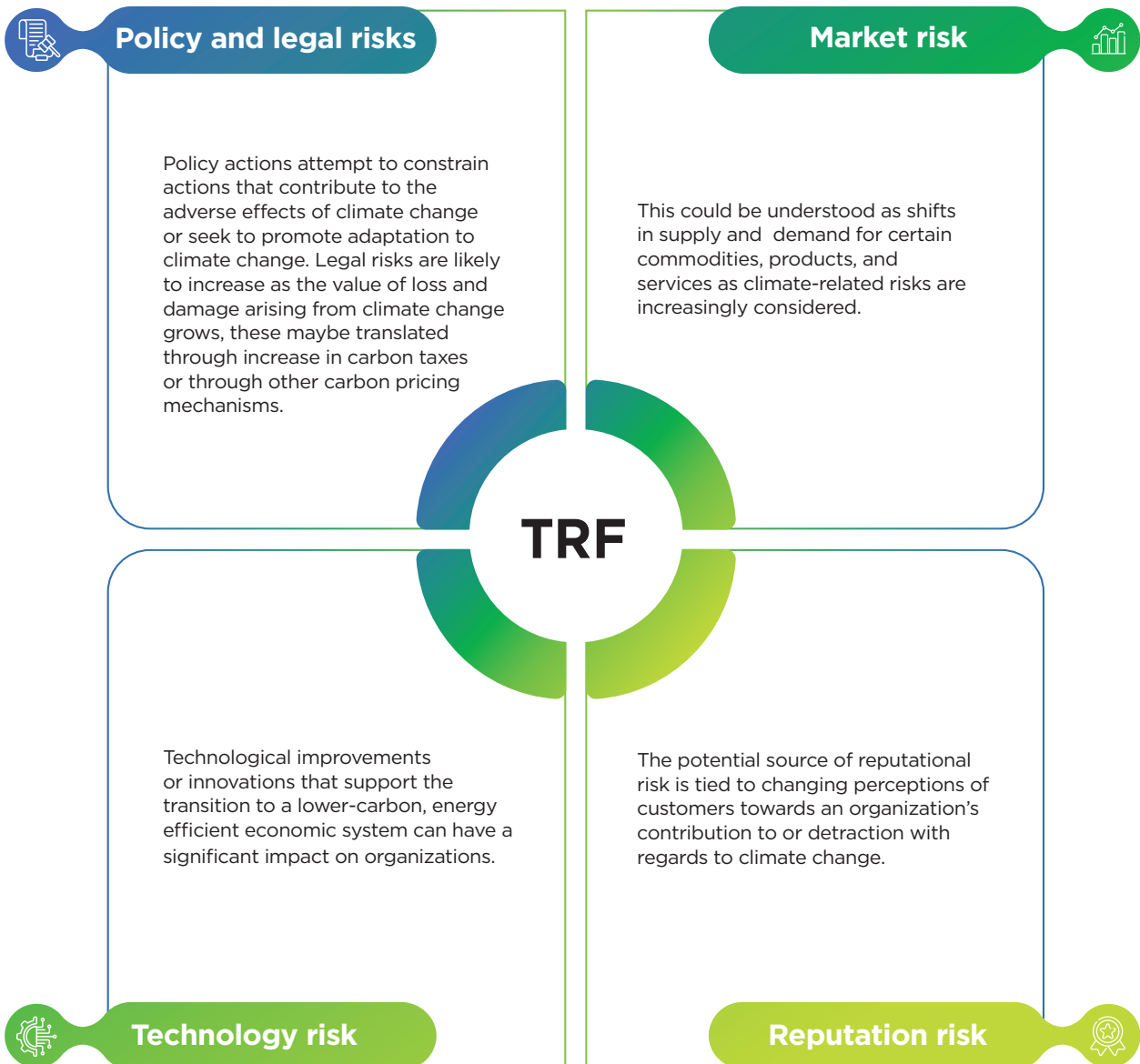


### 3. Transition Risk

Transitioning to a lower-carbon economy may require extensive policy, legal, technology and market changes to address mitigation and adaptation requirements related to climate change. Depending on these changes, transition risks may pose

varying levels of financial and reputational risk to organizations.

**A variety of transition risk factors (as defined by the TCFD) are reviewed for this study:**



### 3.1 Transition Risks and Scenarios Modelling

Scenarios provide plausible alternative views of how the future could evolve – in this instance, the transition to a low carbon economy. This study uses the Network for Greening the Financial System (NGFS) Scenarios developed in partnership with an academic consortium from the Potsdam Institute for Climate Impact Research (PIK), International Institute for Applied Systems Analysis (IIASA), University of Maryland (UMD), Climate Analytics (CA) and Eidgenössische Technische Hochschule Zürich (ETH).

The transition pathways for the NGFS scenarios used in this study have been generated with a well-established integrated assessment model (IAM), namely GCAM. GCAM is a global model

that represents the behavior of, and interactions between five systems: the energy system, water, agriculture and land use, the economy, and the climate. GCAM includes two major computational components: a data system to develop inputs and the GCAM core. The GCAM Data System combines and reconciles a wide range of different data sets and systematically incorporates a range of future assumptions. GCAM represents the entire world, but it is constructed with different levels of spatial resolution for each of these different systems. In the version of GCAM used for this study, the energy-economy system for India was used. GCAM is typically operated in five-year time steps with 2015 as the final calibration year.<sup>3</sup>

This analysis used 5 of the NGFS reference scenarios cover three aspects of the NGFS scenario matrix (i.e., orderly, disorderly, and hot house world). From a transition risk perspective, these 5 scenarios were considered by different contributing modelling groups leading to different transition pathways (i.e., across different scenarios and models). The transition pathways all share the same underlying assumption on key socio-economic drivers, such as harmonised population and economic developments. Further drivers such as food and energy demand are also harmonised, though not at a precise level but in terms of general patterns. All these socio-economic assumptions are taken from the shared socio-

economic pathway SSP2 (Dellink et al., 2017; Fricko et al., 2017; KC & Lutz, 2017; O'Neill et al., 2017; Riahi, van Vuuren, et al., 2017), which describes a “middle-of-the-road” future. In order to account for the COVID-19 pandemic and its impact on economic systems and growth, the GDP and final energy demand trajectories have been adjusted based on projections from the IMF (IMF, 2020).

The transition pathways do not incorporate economic damages from physical risks, so economic trajectories are projected without consideration of feedbacks from emissions and temperature change onto infrastructure systems and the economy.





The transition pathways for the NGFS Scenarios are differentiated by several key design choices relating to long-term temperature targets, net-zero targets,

short-term policy, overall policy coordination and technology availability. The different assumptions and the design choices are explained below:

### Nationally determined contributions (NDCs) scenario:

Nationally Determined Contributions (NDCs) includes all pledged policies even if not yet implemented. This scenario assumes that the moderate and heterogeneous climate ambition reflected in the conditional NDCs at the beginning of 2021 continues over the 21st century (low

transition risks). Emissions decline but lead nonetheless to 2.6 °C of warming associated with moderate to severe physical risks. Transition risks are relatively low.



### Below 2 °C scenario:

Below 2 °C gradually increases the stringency of climate policies, giving a 67 % chance of limiting global warming to below 2 °C. This scenario assumes that climate policies are introduced immediately and become gradually more

stringent though not as high as in Net Zero 2050. CDR deployment is relatively low. Net-zero CO<sub>2</sub> emissions are achieved after 2070. Physical and transition risks are both relatively low.



### “Net Zero 2050” scenario:

Net Zero 2050 is an ambitious scenario that limits global warming to 1.5 °C through stringent climate policies and innovation, reaching net zero CO<sub>2</sub> emissions around 2050. Some jurisdictions such as the US, EU and Japan reach net zero for all greenhouse gases by this point. This scenario assumes that ambitious climate policies are introduced immediately. CDR is used to accelerate

the decarbonization but kept to the minimum possible and broadly in line with sustainable levels of bioenergy production. Net CO<sub>2</sub> emissions reach zero around 2050, giving at least a 50 % chance of limiting global warming to below 1.5 °C by the end of the century, with no or low overshoot (< 0.1 °C) of 1.5 °C in earlier years.



### Delayed Transition scenario:

Delayed Transition assumes global annual emissions do not decrease until 2030. Strong policies are then needed to limit warming to below 2 °C. Negative emissions are limited. This scenario assumes new climate policies are not introduced until 2030 and the level of action differs across countries and regions based on currently implemented policies, leading to a “fossil recovery” out of

the economic crisis brought about by COVID-19. The availability of CDR technologies is assumed to be low pushing carbon prices higher than in Net Zero 2050. As a result, emissions exceed the carbon budget temporarily and decline more rapidly than in Well-below 2 °C after 2030 to ensure a 67 % chance of limiting global warming to below 2 °C.



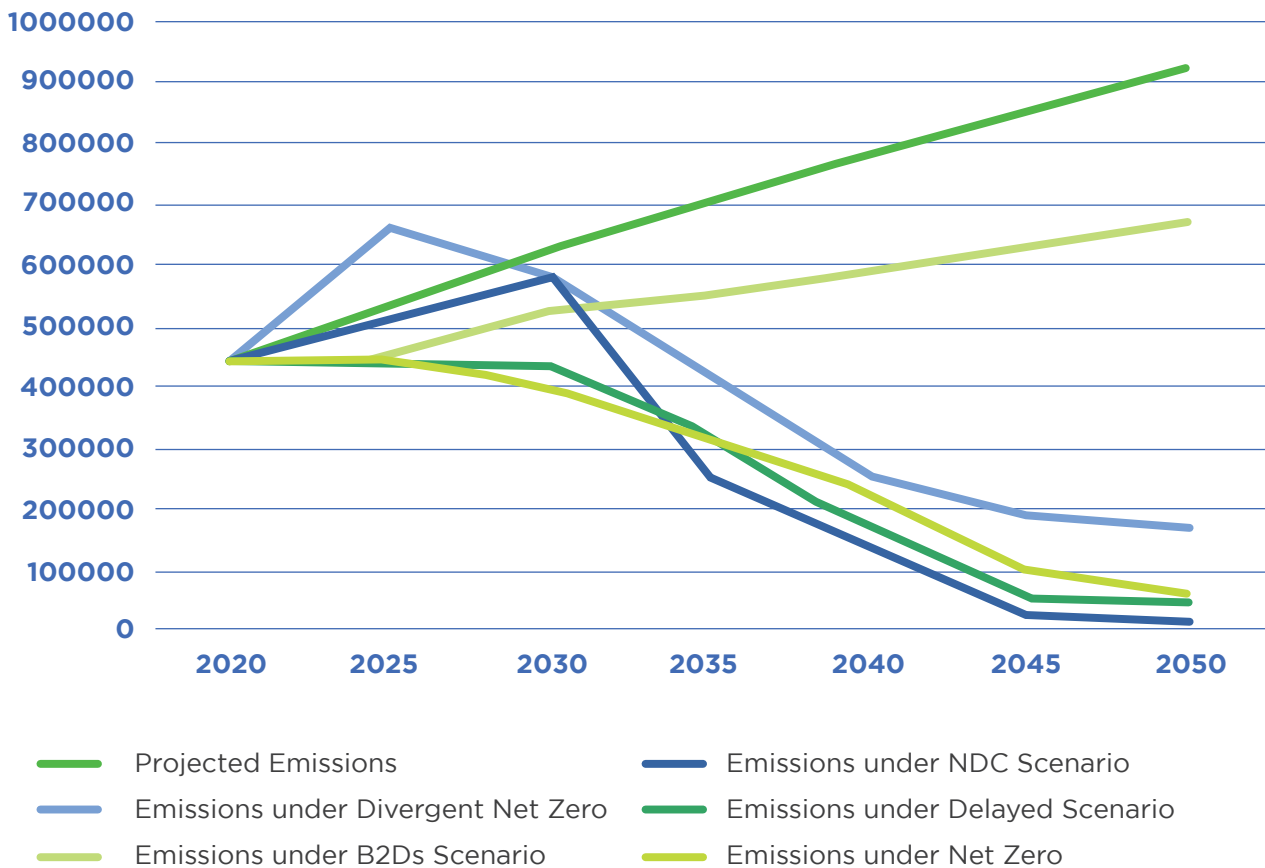
### Divergent Net Zero scenario:

Divergent Net Zero reaches net-zero by 2050 but with higher costs due to divergent policies introduced across sectors and a quicker phase out of fossil fuels. This scenario differentiates itself from the Net Zero 2050 by assuming that climate policies are more stringent in the transportation and buildings sectors. This mimics a situation where the failure to coordinate policy stringency across sectors results in a high burden on consumers, while decarbonization of energy supply and

industry is less stringent. Furthermore, the availability of CDR technologies is assumed to be lower than in Net Zero 2050. Emissions are in line with a climate goal giving at least a 50 % chance of limiting global warming to below 1.5 °C by the end of the century, with no or low overshoot (<0.1 °C) of 1.5 °C in earlier years. This leads to considerably higher transition risks than Net Zero 2050.



### Emissions under different scenarios



Since the projected emissions remain higher than the Divergent Net zero, Delayed Transition, Net Zero and Below 2-degree scenario post 2035, the emissions growth as planned by Lupin can be impacted if these scenarios take place, however, the current projected emissions are low enough to quickly transition and adapt. Even if India, brings in new policies for the Net Zero target by 2050, then emissions from the company would need to be 30000- 40000 tonnes lesser than current emissions.

Currently India does not envisage a carbon tax or a domestic ETS system, therefore the scenario analysis also does not assign a carbon price. India currently has an energy savings-based market mechanism. With the introduction of Carbon Credit Trading Scheme, the energy transition efforts will be enhanced with an increased scope that will cover the potential energy sectors in India. For these sectors, GHG emissions intensity benchmark and targets will be developed, which will be aligned with India’s emissions trajectory as per climate goals. The trading of carbon credits will take place based on the performance against these sectoral trajectories. Further, it is envisaged that there

will be a development of a voluntary mechanism concurrently, to encourage GHG reduction from non-obligated sectors .

As mentioned earlier, these scenarios are a plausible description of how the future may develop based on a set of assumptions about key driving forces (e.g., rate of technological change, prices). These scenarios are neither predictions nor forecasts but are used to provide a view of the implications of developments and actions. Therefore, the likelihood/ probability of these carbon prices being implemented also vary. If, and when, a carbon tax/ price is implemented in India, it would fundamentally shift the economics of the pharmaceutical industry in favor of low-emissions production. Therefore, as per the model we assume that if India was to take the four pathways, then we foresee implementation of a carbon price trajectory. The difference in emissions between the projected and the other four scenarios was taken. This was multiplied with its subsequent carbon price. Following are the possible financial impacts for Lupin in case of a carbon pricing initiative. In parallel to its emissions, Lupin is at risk of carbon costs due to its high emissions in the progressive years.

Year	Carbon Price (USD per tCO <sub>2</sub> e)				Financial Impact (Million USD)			
	Delayed Transition	B2DS	Net Zero 2050	Divergent Net Zero	Delayed transition	B2DS	Net Zero 2050	Divergent Net Zero
2020	0	0	0	0.00	0.00	0.00	0.00	0.00
2025	0	41.49	30.67	202.69	0.00	0.00	0.00	0.00
2030	0	77.32	57.72	228.07	0.00	9.57	5.45	0.00
2035	139.91	109.09	101.59	289.75	41.62	25.7	23.6	40.3
2040	187.93	134.83	145.75	374.72	85.53	49.8	61.5	125.3
2045	336.31	184.37	226.6	553.79	202.43	96.9	129.4	243.3
2050	773.26	265.76	450.83	883.16	503.84	162.4	281.8	440.5

In case carbon pricing is introduced in India, there would be a financial impact on Lupin as per all the non-NDC scenarios. It will have to pay a maximum of 500 million USD under delayed transition scenario. For the Below 2oC scenario, the maximum

amount to be paid would be around 162 million USD relatively much lesser than other scenarios. This scenario will have comparatively less transition risk than the other scenarios.

### Implications from the Indian Carbon Market

Recently the Bureau of Energy Efficiency has released a notification where new sectors are recognized as Designated Consumers (DC). The industries/facilities having more than the threshold energy consumption as specified in the notification are considered designated consumers. This is a basic requirement to qualify for the PAT Scheme and there are various obligations of the DC which they have to comply with. There are now 27 sectors classified as DCs. The Pharma sector units (API) with more than 3000 TOE energy consumption will be qualified as DC. While its not very clear these sectors may be transitioned to the Carbon market in the long term.

After committing to a net-zero emissions target in 2022, India is trying to pace up and move gradually in the climate mitigation space. Although India is one of the largest polluters of the world, the per capita emissions are significantly lower than developed economies. Still, financial institutions in India have subpar involvement in green finance, deterred by a lack of demand and a dearth of investors in green bonds. Most green initiatives in India have so far come from companies in the renewable energy space. Since the banks and the regulated entities are still exploring the risks and opportunities associated with climate risks and sustainable finance, the effect on the pharmaceutical companies financially is quite insignificant.



### Market Risk

Market risks are varied and complex when it comes to getting affected by climate change. One of the major ways in which markets could be affected are through shifts in supply and demand for certain commodities, products, and services as climate-related risks and opportunities are increasingly considered. Pharmaceutical companies all over the world are increasingly facing a shift in prices of global fuel, power/electricity rates at local sites and cost of raw materials.

For Lupin, all these factors have increased globally for majority of their sites. With an increase in cost for the essentials, Lupin needs to transition to renewable sources for energy. It is important to note as the Indian Government currently has no plans to phase out coal, the scenarios consider the price to remain same and not expected to increase. This is similar for the NDC scenario. However, the other three low-carbon transition scenarios see a very steep increase in prices especially post 2030,

this indicates that there is dissuasion to use coal as a source of energy. Globally, Lupin units would be affected as policies would impact the market to an extent. Pharmaceutical manufacturers, as energy-intensive industries, may be subject to carbon tax obligations, depending on their emissions profile. Carbon tax was introduced in Mexico in 2014. It applies only for the use of fossil fuels indirectly putting pressure on pharmaceutical companies for using fossil fuels. The Tax is intended to create awareness of CO<sub>2</sub> Emissions, to put a price to carbon and to promote the use of cleaner fuels (initial price set at \$5 US\$/tCO<sub>2e</sub>). It also allows for the use of offsets in the payment (only CDM).

The other risk faced by the company could be in terms of demand decrease by product price increase due to the cost increase of procurement items such as diluents, fillers, disintegrates etc. There is no apparent risk in terms of reduced demand due to shift in consumer preferences.

### Technology Risk

Financial impact from technological risks could be understood through the costs required to implement the measures needed to reach net zero or carbon neutrality. Technological improvements or innovations that support the transition to a lower-carbon, energy efficient economic system can have a significant impact on organizations.

Globally, policies have been encouraging industries to invest in renewable energy products to transition to a lower carbon economy. Policies such as Renewable Portfolio Standards (RPS) in USA are state-level policies that require utilities to obtain a certain percentage of their energy from renewable sources. The specific targets vary by state. Compliance with RPS requirements could lead to higher electricity costs, potentially impacting pharmaceutical manufacturers' operational expenses.

In India Maharashtra New Industrial Policy 2019, Madhya Pradesh Renewable Energy policy 2022, Gujarat's Solar Policy 2015 etc are promoting development of renewable energy sources such as solar, wind, biomass, and small hydroelectric power plants. The implementation of these sources can lead to increased availability of renewable energy, potentially reducing reliance on traditional

energy sources, such as fossil fuels. This shift toward renewable energy sources could impact the pharmaceutical industry by influencing the cost and availability of electricity, which may have implications for manufacturing, production, and overall operational costs.

Lupin units might face the risk of increased power consumption and increased emissions due to fossil fuel dependence. Over the last few years, Lupin has been increasingly using renewable sources of energy production. Currently Lupin uses renewable power through onsite solar power plant, wind and hybrid power through open access. Their total renewable power in FY 22 was 14.6 Mn KWH and total renewable power in FY 23 was 19.5 Mn KWH. They have also been moving towards agro-waste boilers at 7 of their locations Tarapur, Nagpur, MDP, Sikkim, Ankaleshwar, Dabhasa & Indore.

The company would face a technological transformation if governments are going to deliver on the internationally agreed target of limiting global warming to "well below" 2°C. Shifting to total renewable sources for energy consumption would require significant investment affecting manufacturing, production, and overall operational costs.



## Reputational Risk

Climate change has become a highly sensitive topic for multinational companies. Stakeholders demand companies act responsibly and limit their negative impacts on the climate. It is of utmost importance that pharmaceutical companies comply to environmental and health regulations. The pharmaceutical industry is subject to waste disposal regulations and specific requirements for handling hazardous substances. These regulations ensure the safe and proper disposal of waste generated during manufacturing processes and the protection of the environment. This can be seen as a real reputational risk for Lupin if they do not adhere to safe and proper disposal of waste.

The pharmaceutical industry in UK is subject to environmental impact assessments (EIAs) for the construction or expansion of manufacturing facilities. These assessments evaluate the potential environmental effects of proposed projects and ensure compliance with environmental regulations. EIAs may consider energy consumption, emissions, and waste management, among other factors, impacting the industry's operations.

Lupin has adopted a policy of “Zero Liquid Discharge (ZLD)”. To alleviate any negative environmental impact through wastewater generated, the company has been implementing ZLD systems at many of their manufacturing facilities. Currently, almost 50% of their sites in India have ZLD systems. The efficient management of effluents within their manufacturing sites is in accordance with the standards prescribed by regulatory authorities. This is also a first step towards their commitment to Anti-Microbial Resistance (AMR) stewardship and they strive to ensure that there are no antibiotic releases to the environment. Therefore, risk faced by Lupin appears to be more environmental rather than climate/ emission related.





## 4. Opportunities

Regardless of the risks posing threat to the pharmaceutical industry, changing climate and situations provide ample number of opportunities for a pharmaceutical industry to develop and grow. These opportunities could be identified through

launch of new innovative products, water-waste-emission saving activities, GHG emission reduction throughout the supply chain, increased investor attraction etc. (Table 4).

### Identified Opportunities and its implications on business

#### Identified Opportunity

- Development of new products or services through R&D and innovation
- Use of more efficient production and distribution processes
- Use of public-sector incentives

#### Business implication

- Increase revenue through new solutions to adaptation needs.
- Energy cost savings and emission reduction
- Increased revenues through access to new and emerging markets (e.g., partnerships with governments, development banks)



#### Technological innovations

Lupin has undertaken various technological initiatives for lowering down its carbon consumption and to improve their energy consumption practices. They have prioritized responsible and efficient energy consumption across their operations.

Due to Lupin's commitment to achieve higher energy efficiency and they have successfully implemented various technologies and measures to increase energy efficiency across all their sites. They track the progress of energy-efficient measures across all thirteen manufacturing locations in India and three overseas locations including Brazil, Mexico, and the United States.

On the basis of the identified opportunities (Table 4) and global policies in the pharmaceutical industry, Lupin has the potential to transition to a lower carbon economy without much hurdle.

The current propellants used in metered dose inhalers, HFA 134a and HFA 227ea, have significant global warming potential (GWP). Alternate propellants with low GWP such as HFA152a and HFO1234ze have been developed. Lupin is actively engaged in lowering the GWP footprint of its inhalation products, both in India and the developed markets, by developing novel formulations that incorporate low GWP propellants while achieving similar therapeutic effect. This work includes re-formulation and modifying the container closure system to establish in-vitro equivalence. Lupin will also be demonstrating the clinical safety of the low GWP propellant for its formulations through verification of non-inferior ciliary function and absence of airway sensitization. This switch to low GWPs demonstrates Lupin's commitment to the environment.

### Resource efficiency and cost savings

For reduction of their carbon footprint, Lupin has set a target for reducing direct and indirect GHG emissions by 15% by 2030. It has been continually striving to introduce energy and water saving initiatives such as replacement of Old Conventional Luminaries by energy efficient LED lights as well as using Electronically Commuted motors in AHU's, installation of solar rooftops at various sites, air and water pollution control equipment, installation

of energy efficient cooling tower, using smart and efficient Heating Ventilation and Air conditioning (HVAC) equipment, optimization of pressure of cooling water and chilled water pumps, replacement of old evaporators with efficient ones, installation of heat exchangers etc. This would help Lupin reduce fuel consumption, water and carbon for many sites across the world.



### Emission Reduction Through Cloud Technology

Lupin has embarked on a comprehensive transition to Cloud Technology, aiming to shift away from physical storage and server options. As part of this move, they have successfully implemented Microsoft Cloud Based Technologies across our various sites and offices. By leveraging these technologies, they have achieved operational efficiency and significantly reduced carbon emissions. They have implemented usage

of the Microsoft Emissions Impact Dashboard to quantify and track progress, which enables them to accurately measure the emissions savings resulting from migrating production workloads to the cloud.

In FY23, Lupin's collective efforts translated into a reduction of approximately 27 tCO<sub>2</sub>e across operations.

Cost savings through energy reduction initiatives in FY 22 has been 31 million and in FY 23 has been 5 million by Lupin. It has also achieved savings through renewable energy as 27 million in

FY 22 and 47 million in FY 23. Major contribution in FY 22 has been through wind energy as 15.12 million and in FY 23 through solar power as 22.46 million.

### Decarbonization commitments through value chain partners




Lupin can benefit by having a climate resilient supply chain. Over the course of the years, value chain partners of Lupin are interested in decarbonizing or committing to GHG emission

targets such as Novartis. Peer like Pfizer promoted product achievements through videos for pharmacists and promotional literature and conducted lifecycle assessment to substantiate claims reductions in GHG. A lifecycle assessment (LCA) of the supply chain would help Lupin bring resiliency and help in increased revenue.

## 5. Recommendations

Regardless of the risks posing threat to the pharmaceutical industry, changing climate and situations provide ample number of opportunities for a pharmaceutical industry to develop and grow. These opportunities could be identified through

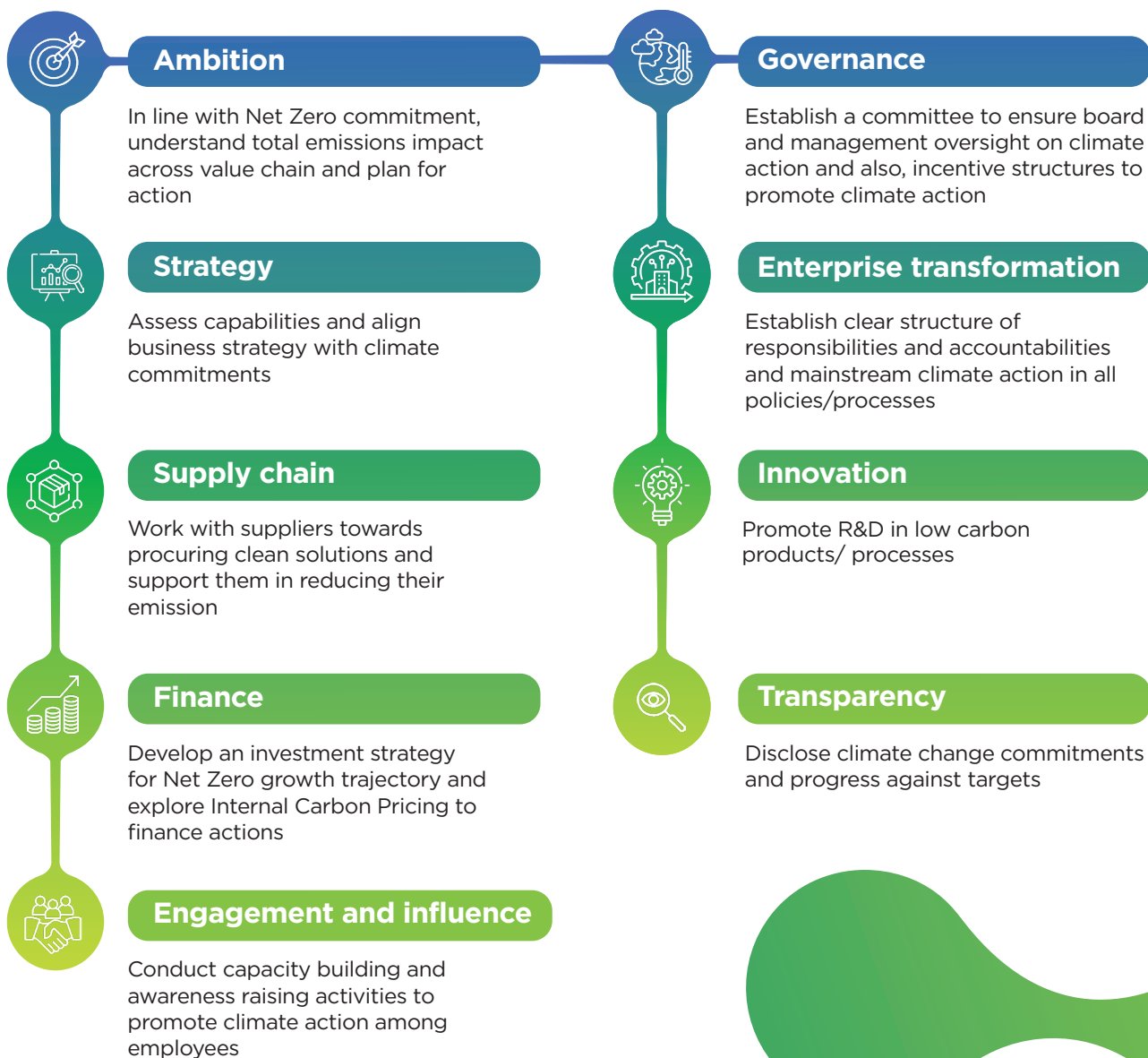
launch of new innovative products, water-waste-emission saving activities, GHG emission reduction throughout the supply chain, increased investor attraction etc. (Table 4).

Risk	Risk Level	Description
 <b>Policy and Legal Risk</b>	Low- Medium	Currently there is no carbon price/tax implemented in India. Thus, regulatory implications from a point of view of policy is low. But on the other hand, the units based out of India might have some regulatory implications on their operations due to different carbon prices/tax policies currently in practice.
 <b>Market Risk</b>	Low- Medium	High investment in renewable source of energy and higher carbon taxes for units outside India would pose significant market risk.
 <b>Technology Risk</b>	Low- Medium	Currently the total energy consumption from renewable sources of energy is low compared to non-renewables. Moving to renewable source of energy would require higher investment in better technologies.



**Lupin must integrate transition risks into its overall Net Zero plan and mainstream transition risk across**

**all business functions from governance, to supply chains, to finance and innovation.**










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**REGISTERED OFFICE**

3<sup>rd</sup> Floor, Kalpataru Inspire, Off Western Express  
Highway, Santacruz (East), Mumbai - 400 055. India.  
Tel: + 91 22 6640 2323

**CORPORATE IDENTITY NUMBER**  
**L24100MH1983PLC029442**

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