

# Assent of Environmental Financial Dynamics Gravity with Focus on Green Financing and Investments: The India's Accent

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**Abstract** - An This article concern highlighting the importance of Environment, Society and Governance in formation of a sustainable feasible country's economy with focus on climate change crisis issues and utilization of wisely valued resources in country's economy building preserving the ecology and significance of Green Financing and India's way ahead in decisive Green Financing measures implication; which all can reduce the Impact of climate change crisis making fit for economy grow smoothly benefiting majority of globe population.

**Key Words:** Environment, Society, Governance, Green Finance, Materialization, Risks, Globalisation and Sustainable.

## 1. INTRODUCTION

With the increasing financialization of our world, the need for sustainable investing is upmost concern as an alternate opportunity benefiting with longer-term rewarding return.

With Corporate sustainability being in the recent heightened demand throughout the globe being in perfect conformity with the CFA Institute mission "to lead the investment profession globally by promoting the highest standards of ethics, education, and professional excellence for the ultimate benefit of society."

Sustainable investment strategies can be driven by hedging portfolios against knowable risks by incorporating the latest best practices in risk management with investors focus on a long-term view making an active bet on societal change. Empirical research has shown that considering sustainability factors within investment practices does not come at a cost (i.e., through a reduced opportunity set) only, but form competitive returns also as one of the important factor of contribute. Furthermore, the resulting competition with growing market awaking of sustainable investing going mainstream have given invitation to the understanding the uniqueness of compressing fees for such products requiring staying informed about recent trends in sustainable investing irrespective of the prime motivation behind it.

### 1.1 Importance of Environment Society and Governance (ESG)

It is commonly to be understood that considering ESG criteria within an investment strategy is simply a part of

one's natural fiduciary duty, as long as these criteria are shown to have a long-term effect on the financial performance of companies. This has even become mandatory in certain countries, with France, for example, making it compulsory for certain categories of asset holders to explain how ESG factors are included in their investment strategy.

Accordingly, the integration of ESG factors is increasingly considered integral to pension funds' fiduciary duty, with a view to providing members with satisfactory annuities.

#### 1.1.1 Understanding Natural Capital

Natural capital is the totality of renewable and non-renewable resources (stocks) and ecosystems services (flows) that nature provides to society, which ensures human health, prosperity and economic growth. The value of natural capital to human wellbeing lies in the benefits it can provide. There are ongoing efforts to develop robust measures of the value of ecosystem services and the underlying natural capital that sustains them, including freshwater, oceans, surface and sub-surface terrestrial resources, habitats, and air (NCC, 2014). There are different frameworks for understanding the relationships between assets, stocks and flows.

Despite significant concern regarding the resilience of environmental systems and limits to growth (Club of Rome, 1972), the global macro economy has so far proved extremely resilient to environmental shocks. While technological innovations in production and consumption have improved natural resource efficiency (resulting in relative decoupling), most economies have not experienced absolute decoupling of natural capital impact and GDP growth (Fischer-Kowalski and Swilling, 2011; Hepburn and Bowen, 2012). Rapid environmental change has inspired a significant amount of institutional attention aimed at the valuation of global natural capital stocks (MEA, 2005; TEEB, 2008, 2010; TEEB for Business, 2013). Policies aimed at fostering green growth and sustainable development rely heavily upon the integration of natural capital into frameworks and accounting to inform decision-making, yet many of these process have only recently been initiated (Russi and ten Brink, 2013).

Natural capital underpins global economic and financial system health. However, natural capital inputs and services remain largely unpriced within the economy and are largely absent within the accounting processes governing firm value, the balance sheets of financial

institutions, and metrics quantifying economic growth. Natural capital degradation is just one of a broader set of risks, which include the policy, technology and societal responses to environmental issues. Broadly considered, these risks can have a significant impact on asset values today, and these impacts could increase in significance over time (Caldecott et al., 2013).

**1.1.2 Determinant Of Economics-**Financial-Climatic Risk Environmental risk is depends on Environmental change Climate change; natural capital depletion and degradation; biodiversity loss and decreasing species richness; air, land, and water contamination; habitat loss; and freshwater availability.

**1.1.3 Government Regulations-** Carbon pricing (via taxes and trading schemes); subsidy regimes (e.g. for fossil fuels and renewable); air pollution regulation; voluntary and compulsory disclosure requirements; changing liability regimes and stricter license conditions for operation; the 'carbon bubble' and international climate policy.

**1.1.4 Technological Change-** Falling clean technology costs (e.g. solar PV, onshore wind); disruptive technologies; GMO; and electric vehicles

**1.1.5 Social Norms And Consumer Behaviour-** Fossil fuel divestment campaign; product labelling and certification schemes; and changing consumer preferences.

**1.1.6 Litigation And Statutory Interpretations-** Carbon liability; litigation; damages; and changes in the way existing laws are applied or interpreted.

There are many examples of assets affected by environment-related risks, either separately or from a combination of risks being present simultaneously (Caldecott et al., 2014). Evidence from different domains, such as the insurance sector (Munich Re, 2014) and studies on specific risks such as the emergence of climate regulation (Nachmany et al., 2014), suggest that these risks are growing in significance and the speed at which they are emerging is accelerating.

## 1.2 Valuing And Accounting For Natural Capital

Natural capital accounting is the process of calculating the total of natural stocks and associated flows in a given geographic, sectoral, or business context, by applying monetary values to them. There are many different techniques that may be applied and definitions, standards, and methodological approaches vary. Prices and values of some natural capital goods may be derived from market prices for products (such as timber or fish), while others may be derived from the value of marketable natural capital assets (such as agricultural land).

In these cases, often where important cultural or other non-monetary values are associated with ecosystem service provision, non-market valuation techniques

(including attribute utility weighting) may be employed to derive proxy values for changes in the value of a particular ecosystem service (Prato, 1999; Mazzanti, 2002; Hajkowicz, 2006).

While the valuation of natural capital is not a new concept (Ahmad, Serafy and Lutz, 1989; Hartwick, 1990; UNSTATS, 1993; Jansson, 1994; Costanza et al., 1998, Wackernagel and Rees, 1997; Wackernagel et al., 1999; Constanza et al., 2014), there has been increasing progress towards the integration of natural capital values into public and private accounting in recent years. This is especially relevant in the context of national accounting at national, regional, and international levels. Recent research and analysis has suggested that natural capital depletion and degradation (Knight, Robins and Chan, 2013; NCC, 2014; TEEB for Business Coalition, 2013) may affect economic value at the firm level through several channels, including:

**1.3 Scarcity Of Priced And Un-Priced Resources For Products:** The most basic impacts on business value are likely to originate from changing commodity prices, as evidenced by the recent rises in commodity prices. Scarcity of priced and un-priced inputs for business operations: disruptions of natural capital flows, such as water scarcity, may have wide ranging effects on key sectors, such as thermal electricity generation, mining and oil & gas (WRI, 2013; Ceres, 2014). Demand suppression: Resource scarcity and variability in ecosystem service flows may affect demand for specific products or product classes. This may be motivated by changing social norms, procurement standards, regulatory actions, or technological innovation (Citi, 2013). Increased risk of punitive trade measures: border carbon tax adjustments or environmental standards that bias against outputs that negatively impact natural capital could affect trade flows and export competitiveness. Multilateral trade rules are a key component of cooperation on environmental protection and national policies to manage scarce resources (WTO, 2010). Impacts to non-market ecosystem values: Impacts related to various intangible ecosystem service values – including cultural, recreational, or reputational value – may have negative implications for the value of dependent sectors, for example, tourism and real estate (Ekins et al., 2003).

Interactions between natural capital flows, population growth, and economic transition (via urbanisation, development, and resource decoupling) can affect natural capital stocks (Knight, Robins, and Chan, 2013), but this can occur in non-linear ways. Beyond these risks, stochastic extreme events that impact natural capital (such as natural disasters) may exacerbate existing vulnerabilities, including:

**1.4 Reduced Primary Environmental Productivity:** for example, loss of pollinators within agricultural areas/economies is likely to affect a range of sectors as well as human and social capital, leading to negative impacts in terms of sectoral GVA and total GDP growth.

Increased social-environmental health costs across the economy: reduced environmental quality will reduce lifespans and increase healthcare burdens, resulting in higher costs, lower productivity, and increasing socio-economic inequality. Increasing cost of reinvestment in natural capital: damages may affect distribution of capital spending across the economy, potentially negatively affecting socio-economic development outcomes if actions are taken at the expense of social spending.

**1.5 Empirical Research On The Macroeconomic Impacts Of Natural Disasters** has grown significantly in the last decade (Pelling et al., 2002; Okuyama, 2007; Raschky, 2008; Hallegatte and Przulski, 2010; Cavallo and Noy, 2009; Cavallo et al., 2013). It is generally accepted that such events have negative macroeconomic costs, with some impacts at global scales; in a meta-analysis of 22 studies Lazzaroni and van Bergeijk (2013) find that the majority of multi-nation and multi-event studies examining natural disasters suggest negative macroeconomic value implications. However, it should be noted that delineating the costs of disaster impacts across scales is challenging. There may be overlap and uncertainty in the attribution of direct costs (market losses with observable prices), indirect costs (such as interrupted flows of goods and services), and secondary costs (longterm macroeconomic performance over time) that may be linked to a disaster event (Hallegatte and Przulski, 2010).

Natural Disasters have increased both in frequency and in magnitude of direct and indirect losses over the last several decades (Munich RE, 2014). Despite these increases there remains a dearth of research on the financial implications of disasters beyond the insurance sector. While direct losses from disasters and their immediate costs to the financial institutions may be clearer to assess (for example, the costs of a second hurricane Sandy to US and global public equities due to disruption of markets), the long-term impacts and the distribution of these impacts across the sector remains unclear.

**1.6 Materiality For Sustainability** reporting is not limited only to those sustainability topics that have a significant financial impact on the organisation. Determining materiality for a sustainability report also includes considering economic, environmental, and social impacts that cross a threshold in affecting the ability to meet the needs of the present without compromising the needs of future generations.

### 1.7 Securitisation Of Environmental Risk

Many insurers, reinsurers, and other financial stakeholders are undertaking efforts to reduce environment related risk exposure through the issuance of financial securities. The use of catastrophe bonds ('cat bonds') and other insurance-linked securities (ILS) are becoming increasingly prevalent in transferring environment-related risks to capital markets, often via

indexed approaches to valuing damages from NCEs. Cat bonds are a private sector mechanism that are related to a wider group of public and private disaster risk financing mechanisms, which are outlined in Table 4. The IPCC's recent AR5 WG2 report supports catastrophe bonds and risk securitisation as a key tool for the diversification of climate-related disaster risk across capital markets. New instruments that may operate as capital market risk transfer mechanisms include weather derivatives and hybrid products linking parametric climate-based and capital market loss triggers, acting as a hedge against a 'double hit' from direct disaster losses and losses incurred within asset management portfolios and capital markets (IPCC, 2014). Changes in the dynamics of these markets call attention to the potential for systemic risks arising across the financial system in response to increased exposure to NCE damages.

### 1.8 Other Policy Responses

There are a range of policy drivers (including conservation, trade, industrial, and social policies) that have the potential to increasingly affect the relationship between natural capital degradation and the financial sector.

### 1.9 Policies To Conserve/Sustain Natural Capital, Including Investment

It is becoming increasingly accepted that well-designed policies to support natural capital resilience and conservation are considered positive for long-run economic competitiveness, as they help to drive resource productivity (HSBC 2014). Regulatory and legislative responses to mitigate, abate, or manage natural capital degradation and other environment-related risks comprise a significant body of response measures, including:

- Conservation policy
- Protected areas and knock-on effects (collateral actions)
- Investments in ecosystem restoration and rehabilitation
- Investments in natural infrastructure
- Investments in ecosystem resilience

Impacts on financial stability may arise from national-level regulations and policies that affect business competitiveness and trade. The most important of such actions include production restrictions, import restrictions, and export restrictions implemented to control, abate, or maintain natural capital (such as key environmental resources). As these policies may often be directly designed to affect trade flows, they may have ripple effects across the economy that pose sector-wide or potentially systemic financial risks.

- Public policy responses to environment-related risks have the potential to impact the financial system and financial stability. These include monetary and fiscal policy responses to environment-related risks in



commodity markets, environmentally-motivated trade policy (including export restrictions), as well as more direct environmental control policies.

- Due to their spread of investments and activities across sectors and geographies, the indirect exposure of financial institutions to natural capital risks may have equally costly impacts on balance sheets and system function than those firms with clear direct linkages to natural capital value.
- Financial policymaking and regulation need to strongly consider natural capital, in terms of interactions with environmental, climate, energy, and industrial policies. Managers and regulators should engage in thinking about financial sector sustainability and resilience – in terms of both its impacts and system vulnerabilities, and the potential unintended consequences of policies designed to improve sector health.
- A number of major financial and investment policies, which have been implemented or are under development with the purpose of addressing policy objectives unrelated to facilitating a transition to a low carbon and environmentally resilient economy, are widely accused of being structured in ways that have unintended consequences on the ability of the financial sector to participate in this economic transition. These include, inter alia, Solvency II, Basel III, EU unbundling regulation and certain accounting regulations and standards. At the same time, sparse empirical evidence exists to support some of these claims, possibly because it is difficult to model the impacts of regulations which are under development and in varying stages of implementation, or to distinguish between transitional and permanent effects, as well as the type of market or region that may be affected.
- The lack of a mandate for companies to integrate ESG factors in decision-making, undertake materiality assessments or disclose environment-related risks hinders both consistent understanding of the issues and the ability to mitigate risks.
- Fiduciary duty and is often cited as an obstacle to incorporating ESG factors into the investment process. The argument that ESG-inclusive investing is inconsistent with fiduciary duty is based on the premise that including ESG factors in investment decision-making would compromise returns to achieve extraneous social or environmental objectives. This perspective is frequently argued as missing the mark on both the nature and goals of 'sustainable investing'. It is argued that the interpretation of fiduciary duty has evolved significantly over time and must continue to evolve to adjust to changing social and economic realities.
- In the wake of the global financial crisis, as new financial reform is being pursued this has the potential to have a positive impact on the transition to a low carbon economy, but in practice there are few instances where environmental sustainability issues have been integrated

or even discussed in this context. Efforts are underway by governments (an estimated 40 countries and 20 sub-national jurisdictions) to lay the foundations of 'investment grade policy settings' with a price on carbon, but in other major investment destination countries there is inertia, or even worse from the perspective of interested investors: progress is being undone through the dismantling of carbon pricing mechanisms or retroactive change to support mechanisms for renewable energy.

- In recent years, major analytical research efforts have been aimed at quantifying and describing the nature of some of these above-mentioned issues and proposing solutions, from short-termism in financial markets to drivers of and responses to asset stranding. As more data and research become available and as the environmental sustainability agenda becomes more integrated with the broader long-term investment agenda, potential for meaningful and catalytic change exists.
- Finally, to date, the majority of the literature in this area has focused predominantly on OECD countries and comparatively little research exists for emerging economies and developing countries. This is an area identified as having great significance for future research.

A recent area of research that may prove relevant to natural capital is green industrial policies, and the role of the government in facilitating industrial competitiveness through a green economy lens (Hallegatte et al., 2013). While not directly related to financial stability, the implementation of green industrial policies could significantly affect brown industry if provisions are not adequate to avoid significant stranded asset issues, as outlined previously.

Finally, policies in response to significant social or civil society concern could also have financial implications. Examples of this can be seen in the recent campaign to divest from fossil fuels in the US and the EU (Ansar et al., 2013), as well as public protest in response to air pollution in China. As social norms around natural capital may change rapidly if human health and human environmental quality are negatively affected, governments are likely to respond rapidly (and potentially unpredictably) to social issues with policies that may significantly affect financial markets.

## 2. REVIEWS FINDINGS

The review identifies the following issues as areas of convergence in the academic, policy and financial literatures: The phenomenon of short-termism in financial markets undermines the ability to invest and manage risk with due consideration for environmental-related risk factors. It is driven in part by the practices and regulations that govern financial institutions. These include short-term benchmarks for performance measurement, risk management, reporting and compensation along with other factors such as decreasing CEO tenure, but also in the realm of financial regulation with the application of mark-

to market accounting practices, liquidity requirements, and insufficiently granular risk-based calibration and modelling.

Potential financial implications Environment-related risks and natural capital degradation specifically, will have a diverse range of impacts on the financial system. Here we set out three potential, high-level scenarios based on recent events and relevant literature:

- Bottom-up contagion
- Capital flight
- Hazard globalisation

**2.1 Bottom-Up Contagion:** cascading risks posed by stranded assets and firm-level losses. There is a rapid devaluation of assets as a result of previously mispriced environment-related risks being repriced and been of sufficient size, scale and rapidity affecting financial stability. With judgmental mispricing (disproportionately large) rooted in a specific sector and in the pathway of its repricing, incremental mispricing spreads to other sectors and jurisdictions. The Carbon Tracker Initiative (2013; 2014) has put forward a version of this scenario where a 'carbon bubble' bursts when 'unburnable' fossil fuel reserves lose value precipitously due to climate policy destabilising the financial system. It is to be agreed that the systemic risk also depends on (or could potentially be) carbon footprints within the economy., analysis of this can be of lead in taking useful insights for how other drivers may have an impact on financial stability. The key motivating factor in a bottom-up scenario could either stem from physical impacts (such as natural capital disruptions), or strong and comprehensive regulatory policy in response to a specific natural capital challenge, such as water scarcity or air quality. A hypothetical example of China implementing strong national controls on water use by coal-fired industry lowering the coal consumption will have ripple effects across global coal markets, leading to potentially considerable losses in major coal exporting countries ( Caldecott, Tilbury and Ma, 2013).

**2.2 Capital Flight:** Natural capital revenues, investment and credit degradation of natural capital stands as an especially significant macroeconomic risk to income, growth and stability in resource-reliant economies. Analysis of such risks has mainly focused on the potential 'resource curse' faced by resource-rich economies (Ross, 1999; Auty, 2001, 2007; Van der Ploeg, 2011), a broader range risks may be posed beyond the risks based on depletion of natural resources. If a country or region experiences significant degradation of natural capital stocks and flows, capital may rapidly flow from this area as investors reallocate current and planned investments. Building on the theory of capital flight from political risk (Van Wijnbergen, 1985; Dooley, 1988; Alesina, and Tabellini, 1989), negative capital flows could be motivated by either natural capital degradation or increasing option value on future natural capital stocks in different geographies. In countries heavily reliant on a selected number of resource based industries predicated on natural capital stocks and flows of such a capital flight face serious

macroeconomic consequences, affecting inflation and international competitiveness. This may be especially significant for those relying upon non-renewable natural capital assets. Under a scenario of serious natural capital degradation across the economy, outflows of invested capital could significantly harm exchange rates, triggering fiscal policy responses. Such a situation would likely be compounded in those countries with little internal investment, high domestic deficits, and negative trade balances. Potential causes of a natural capital degradation event of this scale could result from events such floods, earthquakes, or species-based epidemics (like the North American mountain pine beetle infestation). However, more gradual resource-based risks – such as increasing population pressure and higher per capita consumption – may present more detrimental underlying constraints if not managed.

**2.3 Hazard Globalisation:** The globalisation of key commodity supply chains and increasing financialisation of commodity markets (Henderson, Pearson, and Wang, 2012; Cheng and Xiong, 2013) have increased exposure to climatic shocks affecting production in remote geographic areas. This process of 'hazard globalisation' (Sternberg, 2013) represents a new dimension of environmental risk transfer through which natural capital degradation affects regional social, economic and political volatility, in turn impacts global financial stability. Natural capital degradation may influence global markets and trade flows through either price-based shifts or regulatory actions giving rise to the complex relationships between climate change and trade with significant incremental regional social and political turmoil. Insights from research on the climate-related dimensions of the Arab Spring are useful in examining how different dimensions of natural capital risks could be transmitted globally through the international trading system.

In countries such as Egypt, where approximately 38% of household income is spent on food (FAO, 2006), price-based drivers of food insecurity proved especially significant, global wheat prices doubled from 2010 to 2011 in response to supply shortages brought on by shifting weather patterns. Sternberg (2013) 'Climate factors curtailed wheat production in Russia (down 32.7 percent) and Ukraine (down 19.3 percent) due to drought, heat waves, and fires, while cold and rainy weather in Canada (down 13.7 percent) and excessive rain in Australia (down 8.7 percent) resulted in reduced global wheat supply and major price increases'. Climatic disruptions inspired countries such as Russia to implement export restrictions on wheat, significantly curtailing supplies traded on global exchanges (Welton, 2011). In order to mitigate the impacts of its own 2010 drought the Chinese government began purchasing wheat from global markets which greatly exacerbated this shortage. As the crossborder wheat trade represents 6-18% of total global wheat production (Sternberg, 2013), aggressive demand increase sharply affect major wheat importers – with Egypt being the largest (Lampietti et al., 2010; Index Mundi, 2013).

### 3. INSTITUTIONAL PERSPECTIVES ON RISK AND MATERIALITY

Institutional perspectives on the materiality of environment-related risks to financial stability have changed over the course of the last decade. Work on the role of environment and climate risks in fiduciary duty and the materiality of environmental, social and governance (ESG) risks to enterprise increased after 2004, following the publication of UNEP Fresh fields I and II reports (Clemons-Hunt, 2012). A PRI/UNEP FI report (2010) demonstrated that it is in the financial interest of fund beneficiaries that large diversified institutional investors such as pension funds, mutual funds and insurance companies address the environmental impacts of investments to reduce exposure to externalities, and recommended that they seek policy and regulatory solutions to address externalities. Since 2010 there has been an increasing recognition of both the scope (in terms of magnitude of risks considered) and potential scale of natural capital risk materiality to value, growth, and financial stability in various areas in terms of specific natural capital issues, including:

**3.1 Carbon Risk:** From the late 1980s and accelerating rapidly from 2000, individuals and organisations working on climate change issues have been acknowledging the possibility of climate change policy and regulation negative influence on the value or profitability of fossil fuel companies and impaired (Krause et al., 1989; IPCC, 2001). With the concept of a global 'carbon budget' (Krause et al., 1989) – the 1 trillion tonnes of cumulative atmospheric CO<sub>2</sub> emissions allowable accounting for 2 degrees of global warming – there was a way to determine when too much was enough. When the amount of fossil fuels combusted, plus the amount of carbon accounted for in reserves yet to be burned exceeded the carbon budget, either the climate or the value of fossil fuel reserves will have to be accountable – this is the 'unburnable carbon' or 'carbon bubble' concept cited earlier.

Research on stranded electricity assets has also noted the counter-intuitive outcomes of market and policy drivers stemming from carbon risk, distributed generation, market reform, and climate policies (IEA, 2013; Caldecott & McDaniels, 2014; Greenpeace, 2014). A particularly striking example is EU thermal power generation, where new high-efficiency gas-fired power plants have been rendered uneconomic in comparison to cheaper coal-fired generation due to the combined effects of merit order displacement by renewable energy, weak carbon prices, and cheap coal displaced by the US shale boom (Caldecott & McDaniels, 2014). While the potential for systemic financial risks originating from losses on gas plants may be negligible, the experience of utilities illustrates how rapid and unanticipated impacts of policy and technology shifts may have material impacts in other sectors and regulatory contexts.

Notable recent ESG financial developments include the UK House of Commons Environmental Audit Committee (2014) citing a need for the assessment and management of carbon asset risk within a recent parliamentary

submission, as well recent analysis by international organisations including the IEA (2013), IPCC (2013), World Economic Forum (2014), and others. Some institutional investor coalitions have undertaken work to stress test portfolios for carbon asset risk (Ceres, 2013). In the private sector, many global banks – including HSBC (2014), Citi (2013a, 2013b), and others – have conducted research on the potential for demand constraints on fossil fuel assets value across various global majors. In a recent study, HSBC (Knight, Robins and Chan, 2013) suggested that carbon risk and water risks are the greatest natural capital issues facing business over the short term. Such findings were echoed in other recent assessments, including the WEF 2014 global risk report – three of the top ten global risks were environmentally-based, with water crises being cited in the top three (WEF, 2014). In 2013, Bloomberg launched a tool for investor clients to stress test company valuations against different carbon constraint scenarios and this is being improved and updated (Caldecott and Elders, 2013).

**3.2 Water Risk, Biodiversity Loss, And Terrestrial Environmental Quality:** One important area of research is current and potential risks brought on by water scarcity, and the processes by which changing weather patterns, water availability, and water quality may have significant impacts on asset value across the economy. There has been increasing research on the implications of biodiversity loss to business value, and the materiality of biodiversity risks to financial systems (Dempsey, 2013). In response to the recognition of biodiversity's importance to long-term value, various assessment tools and accounting metrics have been developed to Financial Dynamics of the Environment – Working Paper for the UNEP Inquiry – July 2014 quantify and manage these risks (Hill et al., 2011). In recent years biodiversity loss has been integrated into natural capital accounting frameworks, and stakeholders appear to be taking a wider view of the potential materiality of risk associated with biodiversity loss. In addition, governments appear to be taking an increased interest in terrestrial resources, principally soil quality, as a foundational element of natural capital and ecosystem quality (NCC, 2014; House of Commons, 2014).

**3.3 Cross-Cutting Risks:** Natural disasters at the macro scale, institutional investors are increasingly recognising the potential materiality of macroeconomic risks posed by climate-related natural disasters. Much of this work addresses the macroeconomic costs of catastrophic events, as opposed to the creeping risks posed by continued degradation of capital stock, flows, and pollution sinks. Significant environmental events impacting natural capital have grasped the attention of the financial sector because of the large-scale losses they can inflict on firms, governments, and society. The macroeconomic impacts of such events have been of greatest interest to the insurance industry, and are becoming of increasing interest to institutions involved in project finance, corporate finance, and investment. Empirical research on the macroeconomic impacts of natural disasters has grown significantly in the last decade (Pelling et al., 2002; Okuyama, 2007; Raschky, 2008; Hallegatte and Przulski, 2010; Cavallo and Noy, 2009; Cavallo et al., 2013). It is generally accepted that



such events have negative macroeconomic costs, with some impacts at global scales. However, it should be noted that delineating the costs of disaster impacts across scales is challenging. There may be overlap and uncertainty in the attribution of direct costs (market losses with observable prices), indirect costs (such as interrupted flows of goods and services), and secondary costs (longterm macroeconomic performance over time) that may be linked to a disaster event (Hallegatte and Przulski, 2010). Natural disasters have increased both in frequency and in magnitude of direct and indirect losses over the last several decades (Munich RE, 2014). Despite these increases there remains a dearth of research on the financial implications of disasters beyond the insurance sector. While direct losses from disasters and their immediate costs to the financial institutions may be clearer to assess (for example, the costs of a second hurricane Sandy to US and global public equities due to disruption of markets), the long-term impacts and the distribution of these impacts across the sector remains unclear.

#### 4. MATERIALITY AND INSTITUTIONAL STANDARDS

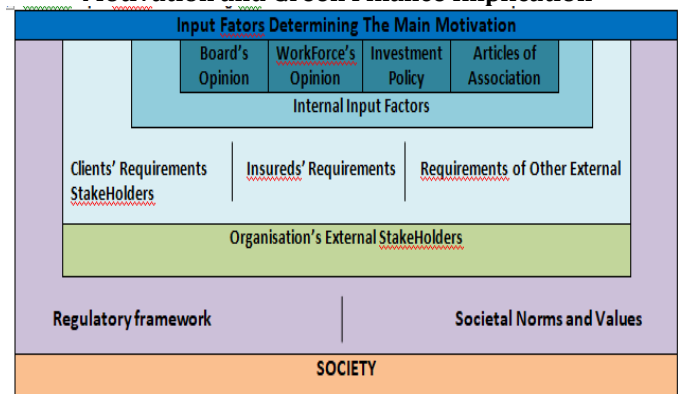
The first step to understanding the various ways ESG factors may impact corporate value – both positively and negatively – is a materiality assessment at the firm level, which can then facilitate more efficient resource allocation. Recent analysis suggests that institutional definitions and perceptions of materiality – in terms of disclosure codes, accounting frameworks, and other standards – may be broadening through changes at the ‘boundaries’ of materiality assessments (ACCA, 2013). Criteria affecting scope (in terms of the ESG issues considered), stakeholders (in terms of actors to be included when assessing materiality of risk), and timeframes vary depending on interpretations of materiality employed by an organisation or a firm (Accountability, 2013).

**Table -1: Steps for Implementation Of Sustainable Investment Policy**

General Information on Sustainable Investments		
Determining the main motivation		
Determining the Sustainable Investment Policies		
Analysis of the current portfolios	Possible Implementation Variants	Simulation and Prioritization
Implementation by means of sustainable Investment Strategies		
Internal Implementation		External Implementation
Selecting Research Providers	Implementing Investment Process	Selecting External Asset Manager
Implementing Investment Process		
Monitoring of the Sustainable Investment Strategy		
Reporting on Sustainable Investment Strategy		

Source: Swiss Sustainable Finance (2016)

**Table -2: Input Factors Determining the Main Motivation and Green Finance Implication**



#### 5. INTRODUCTION TO GREEN FINANCE INSTRUMENTS

The predominant financial instruments in green finance are debt and equity. Financial instruments have several features, such as level of seniority (junior equity versus preferred stock), the channel through which the flow of finance is arranged and the intermediary actors (types of investors and investment vehicles), terms of the agreement and origin of funds among others. This brochure focuses on those related to debt and equity, as well as risk management product - a guarantee Equity financing, often used in the early stages of developing a project or company, is the method of investing capital in a company stock in return for an ownership interest. Equity, also called stock or shares, can be split into preferred stock and common stock.

In green finance, we often see investments in “junior equity”, which normally refers to the common stock in a company. In the event of liquidation, the company would pay out preferred stockholders before holders of junior equity. On the other hand, holders of company bonds are paid before holders of preferred stock. The GEF invests money in junior equity to absorb some of the risk for other (private) equity investors. Essentially, when they see investments in junior equity, other equity investors are attracted to purchase preferred stock. This ensures they have first claim on distribution of profit and reduces their risk. Debt financing is typically used at later stages of development and often in combination with equity. In debt financing, investors lend money to borrowers, who pay back this amount (the principal) with interest.

If a company liquidates its assets, debt has higher priority than, or is “senior” to, equity. In other words, a company must meet its obligations to creditors (those who lent the money) before it pays those who borrowed money to invest in equity. As a result, more senior debt has a greater level of security, which allows for a lower interest payment than more junior security (also known as subordinated debt). Debt financing can come from a lender’s loan or from selling bonds to the public. While a loan is a transfer of money from a bank to a company/individual, a bond is a transfer of money from

the public/market to a company that issues a bond. Unlike loans provided through bank debt, bonds traded on public debt markets tend to involve larger amounts of capital (typically US\$100 million and above) and are open to the general public for investments. Bonds in the green finance field have been targeted more at qualified investors. However, certain types of notes (e.g. promissory or structured notes) have also been made accessible and affordable to retail investors because they require less upfront investment. How much debt, and how much equity is right for a project or a company, varies by industry. Fast-growth fields with potential for high returns, such as software and biotech, attract equity investors more easily. Those companies also often have intangible assets and uncertain cash flow. This makes it difficult to forecast debt repayment schedules and conditions. As a result, they are often unable to borrow at workable rates. Debt investments typically involve less risk than equity investments. Consequently, they also typically offer a lower potential return on investment. Debt and equity funds are investment vehicles of choice in environmentally related finance. This is because they enable project and cash flow to aggregate into one common investment vehicle. This vehicle combines several projects that may have a different focus, such as land use, forestry and agriculture. Whatever their focus, they have the same level of maturity (either early stage development, proven concept or mature). However, they use distinct scaling and risk mitigation strategies. Finally, funds typically allow for risk diversification among projects/investments. Mainstream investors are usually more familiar with their structure, and thus more comfortable investing in them.

Investors often manage risk using loan/credit guarantees from public finance institutions that protect them against defaults on their loans. This instrument transfers part or all of the risk from the lender onto the public institution (loan guarantor). In this way, the lender can charge a private investor a lower interest rate on the loan, thereby lowering its cost of capital and increasing its profitability. Similar to guarantees, other risk management tools are used to leverage debt or equity investments. Public institutions can insure private investors against risks arising from policy uncertainty. Foreign exchange liquidity facilities can help reduce the risks associated with borrowing money in a different currency. They do this by creating a line of credit, which the project can draw upon when it needs money. It repays the credit when the project has a financial surplus due to currency fluctuations.

### 5.1 Leveraging Private Finance

The growth of green finance markets represents an emerging opportunity for both the private sector investment and project developers. Filling this gap to finance the preservation of the world's precious ecosystems will require billions of dollars in additional capital, and private investment capital may be the main source of such funds. This highlights the need for intelligent development finance that goes well beyond filling financial gaps and that can be used strategically to leverage private resources. The private sector is seeking new opportunities to invest capital in ways that could

possibly generate market-rate financial returns and an environmental impact. Already, pioneering investors have put together financial solutions that combine real assets, like tropical forests, with cash flows from operations in fields such as sustainable timber, agriculture and ecotourism. Scarce public funding can play a significant role in helping to unlock private sector investments required to fill the existing funding gaps. Attracting investments in conservation is challenging because potential investors perceive high financial risks and low returns. Credit enhancements, whereby a company attempts to improve its debt or credit worthiness by encouraging the flow of capital to bankable projects by reducing risk or increasing returns. Impact investors those interested in environmental and social wellness impact uses a broad range of tools for credit enhancements, some of which is catalytic first-loss capital. As the name implies, this instrument absorbs some of the risk (as in the case of junior equity or subordinated debt). Less risk encourages other investors to join, thus catalyzing additional resources for conservation. Such credit enhancements hold great potential to leverage far greater volumes of capital than public or philanthropy resources alone. with such a participation it forms a platform for sustainable investment flows into new markets, improving the terms at which project developers can access capital. Grants, equity, guarantees and subordinated debt are commonly used as catalytic first-loss capital to leverage private finance. This can be done in the following ways:

- Equity: By taking the most junior equity position in the overall capital structure, the provider (public sector) takes first losses, although it sometimes also seeks risk-adjusted returns; this includes common equity in structures that incorporate preferred equity classes.
- Grants: A grant provided to cover a set amount of first loss.
- Guarantee: A guarantee to cover a set amount of first-loss capital. The objective is similar to the grant, but the guarantee has a cost.
- Subordinated debt: The most junior debt position in a company with various levels of debt seniority (with no equity in the structure).

Providers of catalytic capital are typically foundations, high net-worth individuals, government and development finance institutions (DFIs). However, any investor with the appropriate motivation and risk appetite can play this role.

Private investors can be put off not simply by risk-return profiles, but also by the capacity of project developers to design an investable initiative that is scalable and replicable. Many investment opportunities suffer from a lack of information or track record on past performance, given the novelty of either the market or the opportunity in question. Other barriers on the project side are high search costs of suitable projects, lack of project developers with a track record in developing cash-flow generating projects and lack of expertise in monitoring environmental impact. Additionally, scalability and replicability are key concerns in growing the green finance market. Few conservation



projects today are big enough to be structured as marketable standalone investment products. There is an enormous opportunity for public and private investors to join forces through blended finance to address project risk, return and environmental impact. They could bring their respective strengths and expertise for overcoming the lack of capacity, monitoring and evaluation for results, proper design and replicability.

### 5.2 Role of the GEF

The GEF has a long history of catalyzing private sector investment through grants and non-grant financial instruments, most of the latter being debt, equity and guarantees. Initially, grant-based support creates the enabling environment for private sector investment. Grants, the largest source of GEF funding, are used to overcome policy barriers, strengthen institutional capacity or demonstrate innovative conservation approaches and lay foundation for further investments. Support from the GEF and government (South Africa), put in place new policy and regulatory frameworks to govern renewable energy markets helping South Africa to become the G20 country with the fastest-growing clean energy market over the past five years, other examples of grant-funded support for innovation are the GEF's early support for concentrating solar power production and the groundbreaking support for payment for ecosystem services. GEF investment in equity proved especially attractive for supporting small-scale clean energy projects and leveraging private finance. The equity funding provided by the GEF and other partners is expected to attract at least US\$150 million from public, institutional and commercial partners. At the same time, it is likely to generate significant additional private sector finance, primarily debt, for the actual project. The Green Logistics Program, managed by the European Bank for Reconstruction and Development (EBRD), will improve efficiency and productivity of freight transport in the Black Sea Region. GEF funding will provide subordinated loans at a concessional rate and security for EBRD investments that promote energy efficiency and lowering GHG emissions in the logistics sector. The availability of junior funding (subordinated debt) from the GEF will allow the EBRD to invest its own funds in projects that otherwise would be priced excessively. The GEF provided guarantees and subordinated debt for land restoration. It deploys innovative risk mitigation instruments to support public and private sector investments to restore degraded lands in Latin America as a way to bring low productivity land into production. Such investments, however, have longer payback periods and represent various types of high financial risk making them difficult to finance for which GEF funds will be used to provide guarantees and subordinated loans. In so doing, it will reduce perceived risk and thus catalyze additional public and private sector investments.

### 5.3 Green Finance Comprises

- The financing of public and private green investments (including preparatory and capital costs) in the areas of environmental goods and services (such as water

management or protection of biodiversity and landscapes) of prevention, minimization and compensation of damages to the environment and to the climate (such as energy efficiency or dams).

- The financing of public policies (including operational costs) that encourage the implementation of environmental and environmental-damage mitigation or adaptation projects and initiatives (for example feed-in-tariffs for renewable energies).

- Components of the financial system that deal specifically with green investments, such as the Green Climate Fund or financial instruments for green investments (e.g. green bonds and structured green funds), including their specific legal, economic and institutional framework conditions

#### Clarification:

Climate finance is merely one aspect of green finance, which is particularly focused on adaptation to the impacts of climate change or the reduction or limitation of greenhouse gas emissions.

**Table -3: Green Finance**

Table 3. Green Finance		
Green Financial System	Financing of Public Green Policies	Financing of Green Investments (Incl. Preparatory and Capital Costs)

**Table -4: Green Investment Target**

Table 4. Green Investment Targets								
Climate Change Adaptation	Renewable Energies	Energy Efficiency	Other Climate Change mitigation (eg. Reforestation)	-----	Industrial pollution Control	Water Sanitation	Biodiversity Protection	Water Processing and Recycling

In 2018, the International Finance Corporation, (a private-sector arm of the World Bank), and Amundi, (a leading asset manager from France), launched the world's largest green bond fund focused on emerging markets. The Amundi Planet Emerging Green One (EGO) fund would invest in green bonds issued by emerging markets. Examples like these would greatly help scale-up green finance in vulnerable emerging markets and increase their capacity to fund climate-smart investments.

Overall, nearly 1,500 global investors managing \$45 trillion of assets have made public commitments towards responsible investment. This would expand access to green projects and achieve environment and social Return on Investment. It also signifies that institutional investors, who manage substantial corpus, are now becoming active in the green finance space, and it is to utilise the funds from these sources that Indian enterprises have scaled-up their issuance of green bonds.

A Bloomberg New Energy Finance report said India ranked second, globally, in the attractiveness for renewable sector investments. Green bond issues, especially Indian private-sector players in renewable energy, were \$3 billion in 2017, almost double from 2016 levels, as per Dealogic.

But while the year-on-year doubling sounds impressive, the absolute value of \$3 billion is dwarfed when compared to the trillions India needs. The Environment ministry estimates India will need \$280 billion over the next five years for green infrastructure alone, while Moody's Investors Service estimates India would need \$150 billion over the next five years, to meet its 2022 renewable target of 175 GW.

#### 5.4 Scaling Up Green Finance In India Would Require Targeted Policies

Green finance is essentially the funding of projects that save our natural environment from further degradation. India's financial market regulator, the Securities and Exchange Board of India, mandates sectors like renewable energy, public transport, waste management, water conservation and biodiversity as environment-friendly. However, the policies may need to expand this further, to include the finance of projects related to agriculture and private transport and the broader industry, since these are also amongst the largest emitters of greenhouse gases. Air, water and soil are the precious resources we need to protect for our future generations, who are already showing their unhappiness at the excesses of the previous generations. The policies also need to expand coverage in terms of not only preferring projects that are environment-friendly, but rather ensure every project undertaken by the finance industry in India is compliant with environmental standards.

The UK's Green Finance Taskforce provides and advocates the policy roadmap for promoting green finance. It has also promoted London as a green finance hub, thus making the London Stock Exchange as the most sought-after green bond market globally. The India International Exchange in GIFT-City is India's first international exchange promoted by the Bombay Stock Exchange. It launched its green bond platform in 2019, and aims to facilitate debt capital raising in any currency by both foreign and Indian issuers (\$4 billion listed so far). Policies have to ensure that the listing process is made even more issuer-friendly so that it scales-up fast. The platform also needs to broaden its role in policy advocacy, in line with the UK's Green Finance Taskforce. Policies should also seek to develop a disclosure framework in line with the Task Force on Climate-Related Financial Disclosures (TCFD) recommendations, complemented by voluntary information.

Greening of investments can often come at the expense of short-term growth, its long-term benefits aside. Therefore, emerging markets like India need to reduce the cost of green investments in order to fuel a sharper uptick from issuers. Policies need to look at reducing the cost through partial guarantees from the multilateral or public sector bodies, through a hedging mechanism, to lower the hedging cost for the issue or other mechanisms that help in reducing the cost of capital requiring joint action by the public and private sector, rather than by the private sector players alone. Credit support even can make the smaller issuers more attractive to risk-averse institutional investors.

Some Indian asset managers are launching green-only funds, focusing mainly on ESG (environment, social and governance) parameters, which judge the issuer rather than the project. There are some Alternative Investment Funds looking at this space. Policies have to support local fund structures interested to fund green projects and are able to mobilise dedicated debt capital from local investors accordingly. Starting with high net worth individuals, and Family Offices, followed by pension and insurance funds, with investment restrictions on debt capital lifted, and further from non-resident Indians, with foreign investment portfolio policies permitting it.

In the end, financial policies have to develop approaches and instruments to mainstream green finance, and this needs collective effort by all the stakeholders; government, regulator, corporations and investors. Once designed and executed, the policies need to hold consistent so that the investors gain the confidence to allocate further assets to these spaces. Lastly, policy also needs to build awareness and acceptability of green finance, both amongst the potential issuers and investors, so that more capital flows into, and is demanded, into such assets.

In times when there's constant emphasis on sustainable practices and a conscious need for adopting cleaner energy, the role of finance has grown significantly over the past few years.

With about 1.2 billion more people expected to live in Asian cities in 35 years, the cities have the potential to attract more than USD 20 trillion in climate-related investments in six key sectors by 2030, according to a recent report by International Finance Corporation, stating that with its plans, policies and projects, the Asia Pacific region has the highest climate smart investment potential of any region in the world, with by far the biggest opportunity in green buildings, estimated at a \$17.8 trillion opportunity by 2030.

In the Asia Pacific region, the investment potential in green buildings is USD 17.8 trillion; in waste USD 104 billion; public transport USD 352 billion; renewable energy USD 407 billion; climate-smart water USD 571 billion and electric vehicles USD 783 billion, as the report estimates.

Furthermore, funding is also an issue that has come up for deliberations at global climate summits. This was evident at the 24th Conference of Parties (CoP) on climate change held at Katowice in Poland recently. What garnered attention was the fact that India stressed on the need for "international public finance flows from developed to developing countries critical for urgent action on climate change".

In a discussion paper titled "3 Essential 'S' of Climate Finance – Scope, Scale and Speed: A Reflection, released on the side lines of the conference", the Indian Ministry of Finance called for "more credible, accurate and verifiable numbers on the exact size of climate finance flows from developed to developing countries."

Chavi Meattle, one of the authors of the Global Climate Finance report released by the Climate Policy Initiative, admits that governments across the world are focusing on

ways to most effectively finance the implementation of their agreed upon nationally determined contributions (NDCs) and India is no exception. "In fact, India should move to an even more ambitious plan, and move beyond the NDCs (nationally determined contributions) for greater climate action," she said. "This needs buy-in from everyone, so not just limited to companies and start-ups, or public and private actors."

### 5.5 Indian Scenario

Having set an ambitious target of 175 GW through renewable energy by 2022, India is ensuring the country moves towards the desired figure it has set out to achieve. According to a report by Bloomberg New Energy Finance (BNEF), India secured second place in the global ranking driven by its policy thrust towards renewables and increasing investments in the clean energy sector. It is also the second largest renewable energy investment market among all Climate scope countries, attracting USD 9.4 billion in new investments in 2017. Additionally, India's renewable auctions market is the largest in the world. Over 11 GW of projects were awarded through auctions in 2017 resulting in the best year for solar capacity as installations jumped by 90% over the year.

Where, India is in dire need of funding in seeding technologies and innovation but both government and private sources find difficulties in meeting them. For instance, it is much more straightforward to raise money for a new solar plant to "green" the power grid, but difficult to raise money on behavior-changing technologies to modify or reduce our actual energy need. The latter is perhaps much more powerful, and often time has much higher impact on the return on investment as well.

However, due to the nature of early-stage innovation, metrics are not sufficiently clear to help funding agencies support the right start-ups and the risk appetite of public funds does not match the risk appetite needed to support innovation. Although renewable energy and electric vehicles (EVs) are important sectors for project fund, the need of the hour is to accelerate funding for innovation, and India is a good example of how clearly articulated government policy combined with ambitious renewable energy investment goals results in increasing amounts of private finance supporting renewable energy solutions, as suggested by experts in India Climate Dialogue.

### 5.6 Private Investment Growth

The Global Finance Report details on how private investment continues to account for the major share of climate investments. At 54% annually for 2015/2016, private finance actors, such as project developers, corporations, and commercial banks accounted for most climate finance flows. Integration of EV investment estimates result in an additional \$11 billion sourced from the household sector in the form of retail purchases of battery-operated electric vehicles. Increase in global private investments to increased investments from the private finance actors, such as project developers, corporations, and commercial banks. Integration of EV investments resulted in an additional \$11 billion sourced

from the household sector in the form of retail purchases of battery-operated electric vehicles.

In the years to come, there is enough evidence to prove that the overall climate finance increase will continue. The Preliminary estimated for global climate finance flows in 2017 ranged from approximately USD 510 billion to USD 530 billion, based on early data showing steady renewable energy investment, rising electric vehicle investment, and rising investment from development banks.

## 6. SCOPE FOR GREEN BUSINESS IDEAS

Global warming is a serious issue that needs to be addressed with a greater urgency than perhaps we are witnessing now. It is complex, dealing with issues of politics, equity, but green businesses, especially technology-based green start-ups, will play a significant role in this transition to a more sustainable world.

Clean tech start-ups can solve problems today by designing and delivering products to customers that solve the latter's needs profitably while still reducing negative impact on our environment. Energy efficiency solutions can reduce a client's energy needs and bill, which reduces the environmental impact of setting up more power plants. The world requires climate entrepreneurs to experiment, build, and take risks to build the sustainable world that we all need.

Meanwhile, the start-up story has taken off in India in the last decade, with thousands of new start-ups launched, USD 10 billion of capital per year invested and tremendous government support for the sector. However, clean tech start-ups have lagged behind. Given that India has invested significant funds in developing R&D solutions in agriculture, water and energy and have significant environmental problems in every part of our country, it is strange of not capitalizing on these two factors to develop a healthy, vibrant clean tech start-up program.

What is different about clean tech is that, unlike other start-up segments, product development periods and time to market are much longer than in other start-up segments. What's more, it requires specialised knowledge to truly support start-ups, be it during product development, market access, or fund-raising.

### 6.1 Early-Stage Ecosystem

Climate Launch pad was launched in India — to help build up this early-stage ecosystem. Essentially, it is a business plan-focused accelerator that helps entrepreneurs build a business model around their finished, or near-finished, product and test it directly with the market. By providing this bridge between technical product development and the market, the entrepreneur is able to understand how to approach the market, develop a language that the client comprehends and planning of the documents on which investors are comfortable to evaluate funding.

In 2016-17 The accelerator program was launched in 5 states — Maharashtra, Telengana, Andhra Pradesh, Tamil



Nadu and Karnataka — along with Sri Lanka, supporting 53 climate and start-ups.

In Scotland in November 2019, more than 130 finalists from around the world (roughly three finalists from each participating country) competed to join the European Union's ClimateKIC accelerator. Four teams were sent from India and in the final round of 16 on Day 2, three teams from India made the cut (more than any other country), while the majority of countries were not able to send even one.

Encouragingly, JSP, a waste water treatment start-up from Chennai, won the second place overall and a spot in the EU ClimateKIC accelerator. Also, Evlogia, a biodegradable straw start-up from Bangalore, won one of two social start-up prizes available.

The accelerator was run (in 2019) across 13 states in India — Maharashtra, Goa, Gujarat, Tamil Nadu, Telangana, Andhra Pradesh, Karnataka, Kerala, Pondicherry, National Capital Region, Punjab, Uttar Pradesh, Rajasthan — along with five countries in South Asia (Sri Lanka, Mauritius, the Maldives, Pakistan, Nepal), to support nearly 200 climate and start-ups. In 2020, plan is to aim reaching out to more of east India along with Bangladesh and Bhutan, to support nearly 300 start-ups. This would be perhaps the largest early-stage climate and start-up program in the world, outside of the combined European Union programme.

## 6.2 Recent Developments In Green Banking Initiatives

**6.2.1 State bank of India launched Green Pin facility** in Mumbai in February 2016 under which the Pin can be generated through ATM, internet banking, IVR and SMS. This would save the customers efforts and time for visiting the branches and help the bank in saving the costs on courier and stationary.

**6.2.2 In 2016 Punjab National Bank launched the Green pin facility** under which pin can be generated through SMS request. It launched mobile apps which serve as PNB ATM locator, helps in instant lodging of issues on operational aspects and understanding basic banking. Moreover, the bank provided SMS based facility to block and unblock internet banking and mobile banking.

**6.2.3 Axis Bank** started using water from rain water harvesting and water treatment plants, made furniture from the recycled materials. Apart from this it implemented Remote Management Service Program to regulate the energy usage in the offices and development of green data centers. Under its "Root For Planet" initiative it has been presented the certificate by Limca Book of Records for accomplishing a national record of planting 24 varieties of 1,27,199 saplings in a day across 24 centers involving 7000 volunteers in 687 branches.

**6.2.4 Green Financial Products And Services:** In India Green Bonds: Green bond is a debt instrument which has characteristics similar to that of a standard coupon bond but the difference is only that the issuer of this bond utilizes the proceeds from this bond in energy efficient projects relating to renewable energy, emission reduction,

reforestation, etc. In India, Indian Renewable Energy Development Agency (IRDA) issued a tax free Green Bond in February 2014 for Rs.1,000 each. It issued bonds with 10 year, 15 year and 20 year terms carrying interest rates at 8.16%, 8.55% and 8.55% p.a. respectively. CARE and Brick Works gave it AAA rating. Yes Bank has issued a 10 year Green Infrastructure bond in February 2015 raising an amount of Rs.1,000 crores. The amount raised by the bank is to be diverted towards the financing of the Green Infrastructure projects such as solar power, biomass, wind power and small hydel projects. It has tied up with KPMG India to provide Assurance services annually in accordance with the green bond principles. Hindustan Power Project entered the green bond market with an issue of bonds fully underwritten by Yes Bank. In 2016 Yes Bank issued another green bond as a private placement with International Finance Corporation (IFC) as a sole investor for INR 3.15 billion. The bond has been rated as AA+ by ICRA and CARE.

**6.2.5 EXIM Bank of India** issued a five year \$500 million green bond in March 2015. It is the India's first dollar denominated green bond. The bank would utilize the proceeds in funding the green projects in India, Bangladesh and Sri Lanka. NTPC Ltd. had planned to raise \$ 500 million by way of green bond issue. The proceeds from this issue will be used for setting up 10 GW solar power capacities. The state governments of Andhra Pradesh, Telangana, Madhya Pradesh and Rajasthan have asked the company set up large scale solar power projects for which it has issued tenders worth 1.25 GW solar PV power capacity. Re New Power Ventures issued green bonds for raising \$68 million backed by Goldman Sachs. Greenko, a clean energy player issued a \$550 million high yield corporate bond to re-finance its wind and hydro power projects carrying a interest rate of 8% p.a. It was rated B by Fitch. CLP India Ltd. issued Green bonds to raise Rs. 600 crore offering a coupon rate of 9.15 % p.a. in three series of equal amounts and its maturity would take place every year in April 2018, 2019 and 2020. IDBI Bank Ltd. raised US \$350 million by issuing a five year Green Bond priced at Treasuries plus 255 bp, which was oversubscribed by three times i.e.. US \$1 billion.

**6.2.6 Green Insurance:** Green insurance schemes are those schemes which provide risk cover at a low premium and enhanced coverage for green products to minimize the impact of climate change, thereby fostering good corporate behavior. In India at present HSBC collaborated with Allianz to provide its customers with green reinvestment insurance. It provides cover to buildings obtaining certification from international environmental standards such as US Leadership in Energy and Environmental Design (LEED) and Building Research Establishment Environmental Assessment Methodology (BREEAM). This cover provides an additional 5% over and above the normal insured loss amount with a only minor increase in premium. This would encourage the builders to create more energy efficient buildings.

**6.2.7 Green Loan Schemes:** Green loan schemes are the financing schemes offered by commercial banks and financial institutions at concessional interest rates directed

towards providing support to investment in energy efficient projects. State Bank of India (SBI) had launched a Green Home Bank loan scheme at low interest rates to encourage the customers to opt for Green housing i.e. the buildings that are certified by rating agencies such as Leadership in Energy & Environmental Design (LEED) India, India Green Building Council (IGBC) and TERI - GRIHA from TERI- BCSD India. ICICI Bank has launched a scheme of Vehicle finance which aims at reducing the interest rate by 50% on the loans taken by the consumers on purchase of cars employing renewable sources of energy like the Civic Hybrid of Honda, Tata Indica CNG, Reva electric cars, Mahindra Logan CNG versions, Maruti's LPG version of Maruti 800, Omni and Versa and Hyundai's Santro Eco. Under its Home finance schemes the bank attempts to reduce the processing fees of customers purchasing homes in LEED certified buildings. (Raghupati & Sujhatha, 2015) Union Bank of India offers schemes extending loans to farmers for purchase of solar water heaters, solar water pumps and installing of solar home lighting system. Punjab National Bank offers medium term loan schemes to farmers for construction of green houses, setting up of biogas plants with sanitary latrines and has a scheme of PNB's Saur UrjaYojna for small farmers to finance the purchase of solar home lighting and water heaters. India being a developing country has a bond market operating in the nascent stage. Therefore, there are certain challenges which confront India for issuance of green bonds in International markets which are as follows:

- i). High currency hedging costs Poor sovereign ratings (currently at BBB)
- ii). Low tenure (currently concentrated between 3 to 10 years)

There are some recommended policy measures which the government can take to overcome the challenges faced by green bonds:

- i). Development of an exchange risk liquidity facility through foreign reserves to the participants of green bonds for specified period.
- ii). Complying with the guidelines of Green Climate Fund (GCF) to provide risk mitigation products such as partial credit guarantees, risk guarantees or hedging product, etc.

One of the policy measures to reduce hedging risks can be indexing electricity tariff to inflation.

## 7. FUTURE SCOPE OF GREEN FINANCE IN INDIA

Environment sustainability being a key issue on worldwide level has increased the scope for investment in green projects utilizing renewable energy resources. Therefore, many banks and financial institutions would look forward at tapping this growing sector. Thus, there will be increase in demand for Green bonds and structured green funds. Moreover, investors would get the benefit of diversification from investment in such bonds. This is true in context of India also as a study of Mc Kinsey & co. found that a probable increase in carbon emissions to 5 - 6.5 million MT in India could be lowered by 30% to 50% by

2030 by investing in energy efficient technologies in building infrastructure and for this purpose there would be need for an additional 600 - 750 billion Euros even after accounting for steep decline in cost of renewable energy technologies. International Finance Corporation (IFC) has taken a step in this regard. It has decided to invest \$75 million in green bonds issued by Punjab National Bank Housing Finance Ltd. in 2015. These are secured non - convertible debentures whose proceeds will be directed towards the construction of Green residential buildings certified by World Bank's EDGE. In India a Council on Climate change under the supervision of Prime Minister was constituted in 2007 and reconstituted in 2014 for adaptation and mitigation of climate change. It has launched various programs like National Action Plan on Climate change, Jawahar Lal Nehru National Solar Mission, National water Mission, National Mission for Enhanced Energy Efficiency, National Mission on Strategic Knowledge for Climate Change, National Clean Energy fund. Other programs like Auto Fuel vision and Policy 2025, Expert groups on Low Carbon Strategies, etc. In 2015 the Green Climate Fund set up under the framework of the United Nations Framework Convention on Climate Change (UNFCCC) has accredited NABARD as National Implementing Entity (NIE) to finance clean energy projects in India. The recent government policies and initiatives which have increased the scope of Green financial products in India are as follows:

**7.1 India's National Action Plan on Climate Change** recommended that country should generate 10% of its power from renewable energy resources by 2015 and 15% by 2020. Of India's installed power generation capacity of 2, 55,012.79 megawatt (MW), renewable power has a share of 12.42% or 31,692.14 MW which shows that there exists a huge scope for investment in this sector.

**7.2 The Ministry of New and Renewable Energy (MNRE)** has revised its targets for energy capacity to 1, 75,000 MW till 2022, comprising 1, 00,000 MW solar, 60,000 MW wind, 10,000 MW biomass and 5,000 MW small hydro. These revised targets demand a huge investment. Since, the sanctioned budget would not suffice so MNRE has asked the public and private sector financial institutions such as Power Finance Corporation (PFC), Rural Electrification Corporation (REC), Indian Renewable Energy Development Agency (IREDA), IFCI Ltd, SBI Capital Markets Ltd and ICICI bank Ltd to raise funds.

**7.3 The finance ministry** has increased the clean energy cess on coal by Rs.100 per metric tonne to fund clean environment initiatives. The scope of National Clean Energy fund (NCEF) has been expanded to include financing and promoting clean environment initiatives and fund researches towards that end.

**7.4 The government** has also proposed the use of renewable energy resources in railways sector. It includes use of CNG in train operations, setting up of water recycling plants, use of solar energy to illuminate coaches, station buildings and platforms. There is also a proposal to change the design of locomotive cabin to reduce the noise level.

**7.5 Other initiatives** on part of government includes its plans for creating a solar army, providing venture capital to ambitious solar power generation projects and setting up of solar parks totaling 20,000 MW over a period of five years. Indian Innovation Lab, a new initiative of MNRE aims at bringing the public and private leaders on common platform to develop innovative instruments that would mitigate risks and direct more investment for green growth in India. It has launched four winning ideas: Loans for SME, Rooftop Solar Private Sector Financing Facility, P 50 Risk solutions and Renewable Energy Integrated Hedging, Equity and Debt fund.

## 8. CONCLUSION

The impact of climate change will prompt substantial structural adjustments to the global economy. Several sectors, such as coal and steel, are expected to experience significant disruption, while others such as renewable, carbon capture, and adaptation technologies are likely to benefit. Such fundamental changes will inevitably impact the financial statements and the operations of banks, leading to both risks and opportunities. While mortgage portfolios in coastal areas may be exposed to the physical impact of climate change through rising sea levels and flooding, massive amounts of capital and new financial products will be required to fund the transition and finance climate resilience, creating demand for bank services. Meanwhile, regulators are beginning to act, and investors, clients, and civil society are looking for actions, mitigation, adaptation, and transparency on the issue.

With the growing recognition of the financial stakes, rising external pressures, and upcoming regulations it has become decisive important for banks and specifically their risk management teams to competently manage climate risks.

In order to effectively manage climate risks and protect banks from its potential impact, institutions should treat climate risk as a financial risk—moving beyond traditional approaches that focus on reputational risk. This shift implies integrating climate risk into financial risk management frameworks and expanding the responsibility and capabilities beyond Corporate Social Responsibility (CSR) to also include risk management teams.

With all knowledge of determinants of economic financial climate risk and research based knowledge of connectivity of macroeconomics and degree of measurable natural disasters giving emphasis to importance of environment, society and governance in achieving prosperous sustainable economic growth with having in abundance for future life to continue participating interestingly and understanding the scope and need of implications of green businesses/ green finance to the best possible level government throughout the globe should take measurable actions in leading the world economy for betterment of all (resources) existences taking in account of the present utilisations with far ahead future requirements.

From above reading one should be able to make out that the India with a great potential and decisive plans to create

a green infrastructure needed for green finance by overcoming the barriers and creating awareness among the corporate citizens for economic betterment environmentally supporting all resources available leading sustainable feasible economic growth reducing climate change crisis with all controls.

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