



Confederation of Indian Industry

*Business
and
Climate Change Adaptation*

Case Study Manual

*Business
and
Climate Change Adaptation*

Case Study Manual

DISCLAIMER

@2016 Confederation of Indian Industry

No part of this publication may be reproduced, stored in retrieval system or transmitted in any form or any means, electronic, mechanical, photocopy or otherwise without the prior written permission from CII- Sohrabji Godrej Green Business Centre, Kothaguda Post, Hyderabad.

While every care has been taken in compiling the Case Study Manual, CII- Sohrabji Godrej Green Business Centre and supporting organizations accept no claims for compensation with respect to any wrong, abbreviated, incorrectly inserted content in the manual. The manual is only an attempt to create awareness, share technologies / knowledge/ know-how on climate change adaptation measures/ strategies for Indian Industry. The investment/ savings shared in the manual are based on inputs provide by the project host companies/ available in public documents. The individual/ readers are advised to take due care of all Statutory and other requirements during implementation of any project, if motivated from this manual.

Case study published in this document are from publically available sources / UNFCCC / CDP / company website/interviews to create awareness about this concept.

Published by:

CII- Sohrabji Green Business Centre
Kothaguda post, R R District
Hyderabad, Telangana 5000 054
Ph. +91 40 44185111
Fax. +91 40 44185189

CONTENT

PAGE	CHAPTER	TITLE
04		How to use this manual?
05	I	Executive Summary
11	II.	Case Study : Climate Change Adaptation Measures in Various Industrial Sectors
12	1	Adaptation Measures for Power Sector
13	2	App for Insitu Environment Monitoring for Assessment of Available Water Resources for Businesses
14	3	Circular Water Economy – A Way to Secure and Renew Water Resources to Prevent the Impact on Businesses
15	4	ClimaGrid – An Information Tool
16	5	Climate Change Impacts – Implications from Private Investment Decision Making and Supply Chain Networks
17	6	Creating Shareholder Value – Strategically Positioning for Climate Change Adaptation Technology Markets
18	7	Holistic Approach- Adaptation Strategies for Climate and Environment Friendly Business Management
19	8	Industrial Water Reuse – A Financial and Social Win-Win
20	9	Innovative Product to Combat Drought
21	10	Innovative Product to Prevent Floods- A New Business Opportunity
22	11	Safeguard Supply Chain - Conserve Natural Resources
23	12	Technology to Safeguard Businesses in Coastal Areas
24	13	Uninterrupted Business Operations - Profitable Business Growth
25	14	Weather Index Insurance – To Capitalize the Opportunities from Climate Change
26	15	Water Positive Cement Production Unit, India
27	III.	Conclusion & Action Plan
31	IV.	References
35	V	Glossary

Note: Case study published in this document are from publically available sources.

HOW TO USE THIS MANUAL?

The case study compilation represent 14 cases on climate change adaptation/ resilience in India and abroad.

Executive summary in this manual provides overview of national and international climate change scenario and the purpose of climate change adaptation. It also throws light on recent decision taken during Conference of Parties (COP) 21, UNFCCC meeting at Paris and call for action by political and scientific leaders of 195 countries.

Each case study showcase a project. It provides the details of project, country of origin of the case study, benefits reaped from the project implemented for adaptation to the adverse impact of climate change, tangible and non-tangible benefits which an implementer can reap, cost benefits / implication and replicability in sector/ area/country. Provided to showcase the name of industries who implemented climate change adaptation measures to cope up with specific climate change vulnerability.

Case study manual will be disseminated to create awareness, to propagates innovation, capacity building among industry, explore the possibility to replicate, to implement GHG emission reduction, adaptation measures or strategies. The source/ reference of case study are provided. Please do reach out to them to learn more about the case study –if you plan to implement any of such project at your facility.

Last but not the least, if you are aware of any 'climate change adaptation measures in industry' or 'climate resilience initiative', we are keen to hear from you. Please do not hesitate to reach out to us on the given phone numbers or email IDs Sharma.Shalini@cii.in, Kiran.Ananth@cii.in.

7

Executive Summary

EXECUTIVE SUMMARY

Adaptation is “Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation (IPCC TAR, 2001 a)”. In common language Adaptation is understood as “In human systems, the process of adjustment to actual or expected climate and its effects in order to moderate harm or exploit beneficial opportunities”². According to the space of implementation, adaptation can be:

1. Community based adaptation : Adaptation measures or strategies for vulnerability /impact on society
2. Ecosystem based adaptation: Adaptation for ecological issues
3. Transformational adaptation : Innovative adaptation strategies/ measures/ technologies
4. Adaptation in Industrial Sector: Adaptation measures/ strategies/plan/technology for adaptation in industrial sector to safeguard the operations/ businesses.
5. Strategic adaptation: Large scale schemes to reduce emissions

Case study on ‘Adaptation in Industry & Businesses’ are detailed in this manual.

India’s emissions in 1994 was 1228 Mt CO₂ e (India NATCOM, 2008) only for three gases i.e. CO₂, CH₄ and N₂O. Energy Emission Administration, 2006 presented India’s GHG emission as 1293 M metric ton CO₂ from fossil fuels. As per report from MoEF, in year 2007 India’s total GHG emission was 1727.70 Mt CO₂. India is fourth biggest emitter among top ten (China, US and EU are top 3, respectively), with 6.96% of total global emissions (June 2015). With respect to per capita emission, India is at position- number 10 with figure of 2.4 t per capita. According to GHG Emission profile (MoEF & CC, 2009) India’s GHG emission is expected to rise and vary between 4.0 – 7.3 billion t CO₂e and per capita emission will vary from 2.77 -5.0 t by 2031 i.e. without considering current commitment of 33-35% emission intensity reduction by 2030, committed thru Nationally Determined Contributions (INDCs), submitted to United Nations Framework Convention on Climate Change (UNFCCC) in Oct 2015.

India’s vulnerability to climate change impacts is profound since around 650 million Indians are dependent on rain-fed agriculture for their livelihoods; around 250 million Indians live along a 7500 km of coastline that is at high risk due to sea level rise and extreme weather events. Maximum number of business are situated near coastal areas and near river /other water bodies, many of the 10,000-odd Indian glaciers are receding at a rapid rate; and deforestation is happening (Garg et. al., 2015)

1. IPCC, TAR: 2001a: Intergovernmental panel on Climate Change, Third Assessment Report, 2001.

2. Amit Garg, Vimal Mishra, Hem H. Dholakia; W.P. No. 2015-11-01, November 2015; Climate Change and India: Adaptation GAP (2015), IIM, Ahmedabad, India

3. MoEF&CC, 2009: Ministry of Environment, Forest & Climate Change, 2009

Nationally Determined Contribution (INDCs) INDCs submitted to UNFCCC by MoEF&CC, GoI in October 2015, states that “new global compact for enhanced actions.....,should address all the elements including Adaptation, Mitigation, Finance, Technology Transfer, Capacity Building and Transparency of Action and Support”³.

India’s expenditure on programmes with critical adaptation components has increased from ~1.48% of GDP in 2000-01 to ~2.98% during 2010-11 and is increasing further. Expenditure on human capabilities and livelihoods viz. poverty alleviation, health improvement and disease control and risk management, constitutes more than 80% of the total expenditure on adaptation in India. GoI states that “for India adaptation is inevitable and an imperative for the development process. It is of immediate importance and requires action now” (INDC, MoEF&CC, 2015).

To augment the availability of assured targeted resources, Government of India has set up two dedicated funds at the national level to mobilize/finance the mitigation and adaptation actions on ground.

1) **Cess on Coal:** GoI imposed a cess on coal in 2010. The total collection of INR 170.84 billion (USD 2.7 billion) till 2014-15 is being used for 46 clean energy projects worth INR 165.11 billion (USD 2.6 billion).

2) **National Adaptation Fund:** Initial allocation of INR 3,500 million (USD 55.6 million) is to meet the adaptation needs in various sectors and this is in addition to sectoral spending by the respective ministries.

In addition, international funding agency like Green Climate Fund (GCF) provides funds for the adaptation action on ground and the results of such activities need to be assessed in the terms of GHG emission reduction and enhancement in adaptation capacity of vulnerable areas/ societies/ operations.

Preliminary estimates indicate that India would need around USD 206 billion (at 2014-15 prices) between 2015 and 2030 for implementing adaptation actions. Apart from this there will be additional investments needed for strengthening resilience and disaster management in all other areas/ sectors. Assessment of the costs of climate change adaptation in South Asia indicates that approximate adaptation cost for India in energy sector alone would roughly be about USD 7.7 billion in 2030s. The report also projects the economic damage and losses in India from climate change to be around 1.8% of its GDP annually by 2050 (Ahmed & Suplachalasia, 2014). Mitigation requirements are even enormous.

Keeping in view the impacts of climate change, floods, resource scarcity, land degradation, sea level rise, heat and water stress, businesses need to adapt to such changes to ensure their smooth operations and sustained profitability. Business giants like Toyota, Ford etc. faced the impacts of climate change during floods in Thailand in year 2011-12 and emerged with various strategies to adapt climate change which was essential to reduce their facility and financial losses. Various businesses are aware of the impact of climate change but could not take scalable action due to various reason. Barriers to corporate adaptation as figure-1 and business case of adaptation as figure-2 is depicted below:

3. *Intended Nationally Determined Contribution (INDC), 2015, Ministry of Environment Forest & Climate Change, GoI, India*

4. *Ahmed, M. and Suplachalasia, S. Assessing the Cost of Climate Change and Adaptation in South Asia, 2014, Asian Development Bank report and UKaid*

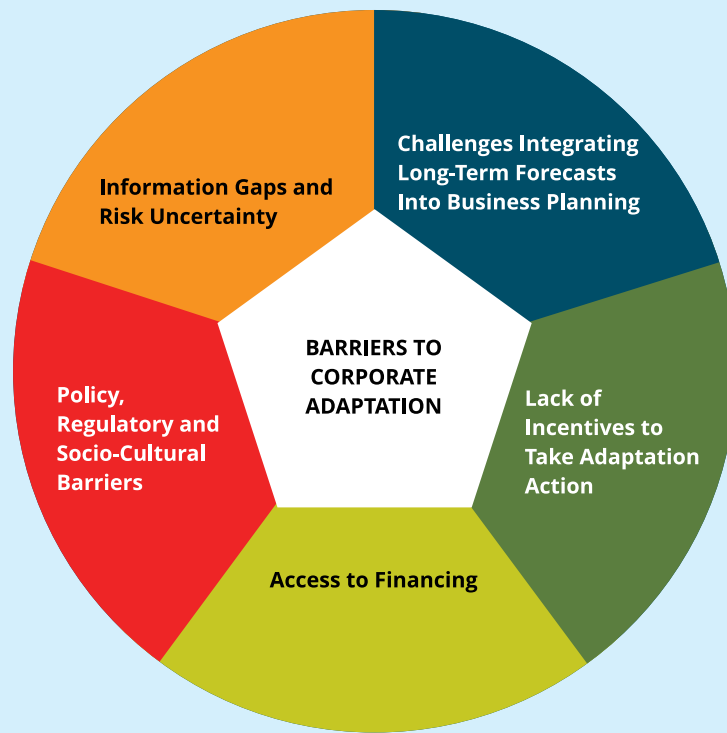


Figure-1⁵ : Barriers to Corporate Adaptation



Figure-2:⁵ : Business Case for Climate Change Adaptation

Its high time to invest on climate change adaptation and to take effective measures to manage/ stop further damage to the businesses and society. A message for business community: *Save Business and Lives, Invest in Triple Bottom Line - the Sustainable Development.*

The 'matrix' (next section in this book) provided below showcase the summary of: name of the company showcased in this manual, the climate change impact on selected company and steps taken by the company to adapt to the particular climate change impact. For few companies, climate change impact was an opportunity to innovate and create a new business stream. For others climate change impact create loss to the extent that they need to shift their operations/ formulate new adaptation strategy.

5. *The Business Case for Responsible Corporate Adaptation: Strengthening Private Sector and Community Resilience, 2015; Caring for Climate, United Nations Global Compact (UNGC) and United Nations Environment Programme (UNEP)*

This compilation of case study on 'climate change adaptation' are the actions taken by industries to meet their operational requirements during climatic tumult. This manual is to create awareness among industry about the possibilities and opportunities to safeguard the business operations, prevent losses, adaptation opportunities in supply chain, ways & means to fulfill the infinite requirements of raw material, management of outsourced operations, thru the implementation of climate change adaptation measures. This compilation may also be useful for provoking innovative ideas for dealing with climate change effectively and to manage unhindered operations/ businesses.

This best practice manual can help to deal with 'risk to businesses' and 'preparation in advance'. While reading these case study few questions like:

- Does business need to adapt beyond the boundaries of its own operations?
- How can businesses prosper if customers, workforces or supply chains are impacted by climate change?
- Is there a business case for supporting adaptation in community?
- What adaptation measures are required by industry to safeguard the operations OR supply chain?

may get answered.

Some examples of huge financial loss to Toyota, Hyundai, Nissan etc. because of floods in Thailand in 2011/ 2012 are detailed in this manual, providing a glimpse of grave situation that may arise due to climate change induced disasters. Therefore, this manual is for business community to read, understand, adapt and upscale. More specifically, each business house should focus and march towards assessment of vulnerabilities to their business/ facility and endeavor to 'climate proof' their businesses well in advance, in order to restrict significant bearing on your business in future.

CLIMATE CHANGE IMPACT ON BUSINESSES

AREAS FOR INTERVENTION										
SECTORS	Business Vulnerable to (Vulnerability)					Risk Management Measures (Preparedness)				COMPANIES
	DROUGHT/ LAND DEGRADATION	FLOOD/ HURRICANE / TYPHOON/ SEA LEVEL RISE	TERRESTRIAL ECOSYSTEM	IMPACT ON LIVELIHOOD/ FOOD SECURITY	HIGH TEMPERATURE / OTHER DISASTER	WATER RESOURCE MANAGEMENT	NATURAL RESOURCE SAVING FOR FUTURE	HEALTH & FINANCIAL RISK & MANAGEMENT	CAPACITY BUILDING/ PVT SECTOR INITIATIVES/ EARLY WARNING	
Telecommunication			✓	✓	✓	✓	✓	✓		BSkyB
IT Sector		✓✓		✓	✓	✓	✓		✓	1. BT 2. Intel 3. Microsoft
Insurance / Banking	✓	✓✓	✓	✓	✓✓			✓	✓✓	1. Australian Infra Company 2. Sompo Japan
Coastal Zone Operation/ Export Import					✓			✓	✓	Vale
Agriculture / Food Security/ Forestry	✓	✓✓	✓	✓	✓				✓✓	BASF
Chemical / Technology	✓✓	✓✓			✓✓	✓	✓✓		✓	1. BASF 2. Braskem 3. SUEZ S.A.
Retail / F & B Sector						✓	✓	✓	✓	Starbucks
Power		✓✓✓		✓	✓					1. Energias do Brasil 2. ClimaGrid
Supply Chain		✓✓			✓			✓✓		Thailand Floods- Toyota, Nissan, Honda
Cement	✓			✓		✓	✓			KIL, Vasavdatta Cement

NOTE: One ✓ represent one impact. Multiple ✓ represent multiple impacts &/or Management measures possible or required.

77

Case Study



TITLE	Adaptation Measures for Power Sector		
COMPANY & COUNTRY	All Countries	PRODUCT/ STRATEGY	General- Adaptation Strategies for Power Sector
APPLICABILITY TO COUNTRIES	India, Tropical regions	APPLICABLE IN AREAS	Power plants in hot and tropical areas
CHALLENGE	<ul style="list-style-type: none"> ❖ Peak electricity demand due to warmer and more frequent hot days could in some regions exceed the maximum capacity of current transmission systems and will be combined with system stresses due to heat ❖ Increased risk of damage to facilities and infrastructure from extreme and unpredictable weather conditions. ❖ Uncertainty over energy output from hydroelectric plants due to potential water shortages ❖ Uncertainty over water supplies for cooling power plants ❖ Danger of flood 		
SOLUTION	<p>Following adaptation measures can be taken up in power sector:</p> <ul style="list-style-type: none"> • Implement decentralized solar power plants in rural areas where transmission line cannot reach easily • Information and Communication Technologies (ICTs) in rural areas can be used to communicate and take actions in short time period, in case of any support required by rural population • Build/ enlarge water reservoirs to reduce flood risk, build dykes, berms, and spillways, carry out flood hazard assessments • Relocate/protect fuel storage areas to prevent the fuel and energy loss • Improve the performance of the gas turbine cycle: Focus on the gas turbine technology, with pretreatment of the intake air to reduce temperature or redesign the topping cycle technology to accommodate a warming climate • Improve performance of the cooling water cycle: Focus on reducing the intake water temperature or increasing the performance of the cooling water system pumps and heat exchangers. 		
IMPACT ON BUSINESS	<ul style="list-style-type: none"> ✦ Positive impact after taking adaptation measures ✦ Reduced load and operational issues, after implementation of decentralized solar power plants 		
AREAS OF INTERVENTION	<ul style="list-style-type: none"> – Conventional power plants 		
FINANCIAL IMPLICATION	<ul style="list-style-type: none"> ◇ Investment required for water treatment / new technologies 		

Capacity Building

Information Technology

TITLE	App for Insitu Environmental Monitoring for Assessment of Available Water Resources for Business ¹		
COMPANY & COUNTRY	Intel, USA	PRODUCT/ STRATEGY	Product
APPLICABILITY TO COUNTRIES	All Countries	APPLICABLE IN AREAS	Information Technology Services for Capacity Building/Awareness
CHALLENGE	❖ Software and technology innovations to enable individuals and organizations to address climate change.		
SOLUTION	<ul style="list-style-type: none"> • Intel has combined gaming and scientific research with its development of Water Wars, a 3D gaming platform that conducts a study on how people respond to water shortages. This gaming app is of interest for industry as well as for society to be aware about the consequences of water scarcity, thus use the water judiciously. • In app Water Wars, Intel has modeled an area of the Rio Grande in New Mexico and created a role-playing game that allows residents of that area to participate in different water scenarios. As the game creates new situations and water problems, the residents respond, and this data informs the researchers about what we can expect to see socially as the water crisis in the US and worldwide grows. • Intel wants farmers, real estate developers, regulators, environmental activists, manufacturers and many other watershed stakeholders to participate in the game, so that it can accurately model out scenarios and solutions for rational, proactive reactions to water shortages. These models will provide information that hopefully allows us to skip trial-and-error policies and prevent possible violence over water, in the US and globally. 		
IMPACT ON BUSINESS	✦ The Water Wars project seeks to demonstrate the ways Intel's technology devices and applications can support in-situ environmental monitoring and collective action, and help to address the world's most pressing environmental problems.		
AREAS OF INTERVENTION	– Water modeling, Information for decision making, New business avenue for IT companies		
FINANCIAL IMPLICATION	◇ Financial benefit for IT companies		

Ref.:

¹Water Wars - Private Sector Initiative Actions on Adaptation, United Nations Framework Convention on Climate Change (UNFCCC)

Drought
Natural Resources

Technology
Public Private Partnership

TITLE	Circular Water Economy –A Way to Secure and Renew Water Resources to Prevent the Impact on Businesses		
COMPANY & COUNTRY	SUEZ S.A., Paris, France	PRODUCT/ STRATEGY	Product
APPLICABILITY TO COUNTRIES	Any drought affected country/ area	APPLICABLE IN AREAS	Water Treatment, Waste Management
CHALLENGE	❖ Los Angeles in Southern California, USA, is highly vulnerable to the effects of climate change, particularly with respect to long-term, recurring drought. This is a challenge increasingly impacting the population and businesses in this area.		
SOLUTION	<p>SUEZ S.A. collaborated with the West Basin Municipal Water District (WBMWD), a public agency which provides drinking and recycled water to a 185 square mile service area in southwest Los Angeles County. Together, they launched their first major treated wastewater reuse project in 1995, which, according to the company, still serves as a state-of-the art example of climate adaptation and specifically water recycling in drought prone regions. Specifically, they pursue to:</p> <ul style="list-style-type: none"> • Provide a safe and reliable water supply for WBMWD • Reconstitute groundwater levels and avoid salt water intrusion • Reduce the amount of effluents released in the natural environment <p>SUEZ 's wastewater reuse project ensured continued community benefits in the face of unprecedented drought conditions in Southern California. As SUEZ stated that their company aims to increase the use of recycled water over 2002 levels by at least one million acre-feet per year by 2020, and by at least two million by 2030. The West Basin project is the only water recycling facility in the world able to produce five different qualities of water for variety of uses like, irrigation water, cooling tower water, low-pressure boiler feed water, high-pressure boiler feed water and ground water replenishment water.</p>		
IMPACT ON BUSINESS	✦ Circular water economy is an example that industry may apply in their surroundings to meet their own water requirements.. Water treatment facility can be the PPP model for business where implementer can reap benefit for themselves as well as for others.		
AREAS OF INTERVENTION	– Drought prone, Companies willing to safeguard their business operations		
FINANCIAL IMPLICATION	◇ One time investment ne time investment for technology to produce different types of water		

Ref.:

Circular Water Economy – Beyond Adaptation, a Way to Secure and Renew Water Resources; The Business Case for Responsible Corporate

Adaptation: Strengthening Private Sector and Community Resilience; A Caring for Climate Report; UN Compact, UNFCCC, UNEP, UNEP-DTU, CDP, The CEO Water Mandate, ND Gain, Oxfam America, rainwater Alliance, 2015



TITLE	ClimaGrid – An Information Tool ¹		
COMPANY & COUNTRY	EDP Energias do Brasil Brazil	PRODUCT/ STRATEGY	Product, Strategy
APPLICABILITY TO COUNTRIES	Brazil	APPLICABLE IN AREAS	Information and Communication Technology, Energy, Early warnings
CHALLENGE	❖ ClimaGrid aims to reduce climate change risks for society, improve the services provided and enhance energy efficiency.		
SOLUTION	<ul style="list-style-type: none"> • ClimaGrid was developed through a partnership between Energias do Brasil (EDP) and National Institute of Space Research (INPE). EDP participated in the construction of Brasil DAT. The system created a net of sensors to detect cloud to ground and intra-cloud flashes. This information and historical data registered by INPE enabled the creation of a mathematic model able to monitor climate variables that influences power grids. • INPE developed the meteorological model WRF - Weather Resource Forecast with spatial resolution of 5km for predictions of 24hours of variables as: precipitation, speed and wind direction, temperature, humidity and atmospheric pressure. This information are available daily and automatically, through information M2M (Machine to Machine). The WRF produces a variable called PLR (Probability Lightning region) that is a global innovation launched by INPE/ EDP in December of 2012. The model was integrated with the pioneer Smart Grid systems developed by EDP. • The ClimaGrid is an innovative tool in deployment in Smart Grids in Brazil. Inserting the new concept of grid: enables the convergence of space-time and also information about climate and environmental variables, providing the “3D” vision for the smart grid. ClimaGrid as an automation platform, able to anticipate climate variations that can potentially affect power grids. This is also helpful to avoid & minimize the interruption in energy transmission and distribution. 		
IMPACT ON BUSINESS	✦ EDP could map the climate risks and opportunities. The historical data allowed the planning of short, medium and long term company’s assets. The real time and prediction data helped to improve the emergency team action during the extreme events. The most important opportunities are in energy supply and energy consumers, because through the data Energias do Brasil found opportunities of micro-generation, climate variables influence, industrial and residential consumption patterns.		
AREAS OF INTERVENTION	– Energy		
FINANCIAL IMPLICATION	◇ Initial investment required		

Ref.:

¹ClimaGrid, Brazil, 2013, Private Sector Initiative Actions on Adaptation, Nairobi Work Programme, United Nations Framework Convention on Climate Change (UNFCCC)



TITLE	Climate Change Impacts : Implications for Private Investment Decision Making and Supply Chain Networks		
INDUSTRIAL SECTOR/ COMPANY & COUNTRY/	Supply Chain- Automotive Sector Toyota, Nissan, Honda Thailand	PRODUCT/ STRATEGY	Strategies
APPLICABILITY TO COUNTRIES	Thailand, Industrial clusters in coastal region, Flood prone areas	APPLICABLE IN AREAS	Automotive, Manufacturing
CHALLENGE	❖ Inundation of seven industrial parks (804 companies) during floods in Thailand in year 2012. 56.7% out of 804 companies were owned or operated by Japanese companies. In spite of the best management measures only one (Wangnoi Industrial Park) out of seven industrial park achieved 100% restoration. It took 33 to 62 days to complete discharge from the inundated industrial complexes.		
SOLUTION	<ul style="list-style-type: none"> Decentralized Production System: after Thailand floods, Toyota moved their globally centralized production system to a regionally independent production system. General Motors did the same. Effective Management of Supply Chain: After Thailand floods, Toyota requested to about 500 of their suppliers disclose details of their supply chains. After receiving responses from about half of them, they found that 300 production places could be vulnerable to risks. Then, Toyota requested these suppliers to mitigate risks by measures such as diversifying procurement, securing alternate facilities, and increase inventories. Establishment of Alternative Bridge Tie: After floods, Nissan recovered more rapidly than Toyota and Honda because it had diversified its suppliers and owned alternative sources. In order to have an alternative bridge, companies OEMs should have 'design information substitutability' (Fujimoto 2011). By doing so, a company can bring its design to other facilities (during climate crisis); manufacturers can shift production of the particular component to another supplier OR suppliers can shift their operations to facilities that had not been adversely affected. Supply Chain Resiliency Index: Cisco Systems has developed the TTR matrix and a "Resiliency Index," which is a composite of these resiliency attributes: product resiliency, supplier resiliency, manufacturing resiliency and test equipment resiliency. Cisco applied the Resiliency index to Cisco's top 100 products, which account for approximately 50% of Cisco's revenue (Cisco Systems 2012). According to Cisco Systems (2012), in addition to other tools (such as business continuity planning), and due to this index, Cisco anticipated the risk of Thailand floods in October 2011 and adjusted its supply chain to minimize the impact to primary suppliers. Climate and flood forecasts: Technology for providing forecast shall be installed at all disaster prone areas like flood, hurricane, typhoon etc. Regional flood proofing can be done thru 'systematic risk analysis' and its use in infrastructure design, land use zoning, water infrastructure operation and appropriate transportation systems 		
IMPACT ON BUSINESS	<ul style="list-style-type: none"> ✦ Swiss Reinsurance Company Ltd expected approx. \$600 million worth exposure for their own company ✦ Munich Reinsurance Company estimated its losses at approximately \$655 million (Wright 2012) ✦ Several SMEs/ MSMEs, the suppliers to Toyota, Nissan and Honda faced huge loss due to disrupted operations ✦ Many other electronic companies lost their infra and operations in floods 		
AREAS OF INTERVENTION	- Automotive, Electronics		
FINANCIAL IMPLICATION	<ul style="list-style-type: none"> ◇ Loss during floods: USD 46.5 billion ◇ During floods in 2012, Toyota, Honda and Nissan faced a loss of 57.5%, 59.7% and 9% respectively, in comparison to the profit of 2010, which tunes to approx. 705 billion Yen (200, 250, 290 billion Yen respectively) for these companies. 		

Ref.:

- Cisco Systems (2012). *De-Risking the Supply Chain: Cisco's Risk Intelligence and Analytic Tools*.

- Fujimoto, T. (2011) "Supply Chain Competitiveness and Robustness: A Lesson from the 2011 Tohoku Earthquake and Supply Chain "Virtual Dualization"." MMRC Discussion Paper Series ible

TITLE	Creating Shareholder Value – Strategically Positioning for Climate Change Adaptation Technology Markets		
COMPANY & COUNTRY	Adaptation oriented products	PRODUCT/ STRATEGY	Products
APPLICABILITY TO COUNTRIES	All regions	APPLICABLE IN AREAS	Infrastructure
CHALLENGE	<ul style="list-style-type: none"> ❖ Creating safe work environment for employees ❖ Building climate resilient infrastructure 		
SOLUTION	<p>This case showcase the efforts in progress, by Australian product manufacturers and how these manufacturers are strategically positioning themselves for growth by producing climate change adaptation technologies and products to help business and households to adapt to risks from climate change. Australian manufacturers have developed / developing:</p> <ul style="list-style-type: none"> • Businesses initiated manufacturing of products like: advanced insulation products, double glazed windows, low-emissivity windows, energy efficient lighting (which emits less heat than incandescent bulbs) to name a few. • Greater risks of variable water supply and water purity - Many Australian manufacturers, spurred on by the recent drought, have innovated and developed locally suitable products/technologies to help achieve greater levels of water efficiency, water storage, treatment and recycling. Some Australian manufacturers are recognized world leaders in manufacturing water savings, storage, treatment and recycling products² • Improve the “thermal” building envelope using better building insulation, high performance window glazing, external window shading, proper window coverings and natural ventilation to improve the workplace conditions for employees • Roofs painted by heat insulating paint “reflective white” to reduce air-conditioning loads by as much as 20%³ 		
IMPACT ON BUSINESS	+ Reduced cost implication, Better preparedness, Good working environment		
AREAS OF INTERVENTION	– Long term planning for climate resilient infrastructure		
FINANCIAL IMPLICATION	◇ One time investment (depends on the climatic conditions and city/ country)		

Ref.:

1. *Assessing Climate Change Risks and Opportunities for Investors Industrials, Manufacturing and Materials Sector (2015), A Report by Dr Michael A. Smith; Australian National University and Investor Group on Climate Change; Responsible Investment Association Australasia (riaa); CDP; Funded by ClimateWorks Australia.*
2. *Department of Innovation, Industry, Science, Research and Tertiary Education (DIISRTE) Water Industry Capability Report at <http://www.innovation.gov.au/Industry/AustralianIndustryParticipation/SupplierAdvocates/Documents/WaterIndustryCapabilityReportwebversion.pdf>*
3. *Levinson, R., Akbari, H., (2010) 'Potential benefits of cool roofs on commercial buildings: conserving energy, saving money, and reducing emission of greenhouse gases and air pollutants' <http://www.springerlink.com/content/9r48k34558240825/> and Akbari, H., Menon, S., Rosenfeld, A. (2008) 'Global cooling: increasing world-wide urban albedos to offset CO₂' <http://newscenter.lbl.gov/news-releases/2010/07/19/coolroofs-offset-carbon-dioxide-emissions/>*



TITLE	Holistic Approach - Adaptation Strategies for Climate and Environment Friendly Business Management		
COMPANY & COUNTRY	Starbucks worldwide	PRODUCT/ STRATEGY	Strategies
APPLICABILITY TO COUNTRIES	<ul style="list-style-type: none"> ❖ Any country having Starbucks ❖ Retails stores ❖ Food and Beverages sector 	APPLICABLE IN AREAS	Natural Resource Conservation
CHALLENGE	<ul style="list-style-type: none"> ❖ Challenges in following areas were addressed thru various strategies: 1. Recycling & Reducing Waste 2. Energy Conservation 3. Water Conservation 4. Building Greener Stores 5. Tackling Climate Change 		
SOLUTION	<p>In case projection at website, Starbucks detail following areas of improvement to operate green:</p> <ul style="list-style-type: none"> • Recycle and Reuse: Aim to service 25% of beverages in reusable cups. For this purpose Recycling in stores, Reuseable cups, Greener cups, Composting were/ are being done. • Energy Conservation & RE: Starbucks purchase renewable energy 20% of the total electricity used in company-operated stores in US and Canada and working on improvement of efficiency of HVAC efficiency. • Build Greener Stores: Efforts to green Starbucks stores include a mix of design elements like conservation of energy by allowing air-conditioned stores to reach 24°C instead of 22°C on warm days, saving water by using high-blast nozzles to clean jugs instead of running water, Installation of low-flow valves throughout the store, Installing cabinetry made from 90% post-industrial material (where available) with no added formaldehyde, lighting efficiency, use recycled flooring tiles, using wood products that are Forest Stewardship Council–certified (where available), use paints with low amounts of volatile organic chemical. • Tackling Climate Change: Starbucks showcased their commitment to facilitate farmers’ access to carbon markets, support them to generate additional income while helping to prevent deforestation. In 2011 Starbucks stated in an article “Coffee varieties adapted to certain climate zones so a temperature increase of just a half of a degree can have a big affect and cause lower crop yields. A good example is the almost 30 percent decrease in Indian coffee production from 2002 to 2011”. 		
IMPACT ON BUSINESS	<ul style="list-style-type: none"> ✦ Resource efficiency ✦ Economic benefit ✦ Positive Reputational impact 		
AREAS OF INTERVENTION	<ul style="list-style-type: none"> – Water conservation – Energy efficiency – Waste management 		
FINANCIAL IMPLICATION	<ul style="list-style-type: none"> ◇ Starbucks follow the ‘preventive’ approach for dealing with long term climate impact and planned business operations accordingly. In addition, while practicing EE, RE, recycle, water saving etc. company achieve financial savings too. 		

Ref.:

Starbucks, <http://www.starbucks.in/responsibility/environment/water> and <http://www.triplepundit.com/2011/10/starbucks-worries-climatechange-will-disrupt-coffee-production/>

Drought



Technology

TITLE	Industrial Water Reuse : A financial and social win-win		
COMPANY & COUNTRY	Braskem, Brazil, Latin America (producers of biopolymers, petrochemical products and resin)	PRODUCT/ STRATEGY	Strategy
APPLICABILITY TO COUNTRIES	Any water intensive industry, Industry in water scarce regions	APPLICABLE IN AREAS	Any water intensive company worldwide
CHALLENGE	❖ eClimate change induced draughts and subsequent water scarcity pose a significant threat to business operations of Braskem (petro chemical company), Brazil		
SOLUTION	<ul style="list-style-type: none"> • Brazilian-based petrochemical company Braskem implemented an industrial water reuse programme in a drought-prone region and implemented initiatives to reduce consumption of the scarce natural resource. • In Bahia, the project combined the reuse of industrial wastewater and use of rainwater, which reduced the need of fresh water collection. The water reuse project initiated in São Paulo, called Aquapolo, aimed to obtain water from industrial reuse, using advanced treatment of domestic sewage. Aquapolo, for which Braskem entered into a public private partnership with Sabesp and Odebrecht Ambiental, is being considered as the largest recycled water project for industrial use in the South America. • This facility was designed specifically for the most water intensive industries in São Paulo, and has a capacity of 1000 liters per second, a 17 km water pipeline and 3.6 km of distribution networks. Braskem reported the Aquapolo water reuse project in São Paulo significantly increased the amount of water reused for industrial purposes in the area. Braskem operations alone consume 65 per cent of the capacity at the Aquapolo site. The company reused 8.8 billion liters of water in 2014, reducing its net water use by the equivalent of the annual consumption of 240 thousand people. • Such projects are the example for industry worldwide because the time now calls for 'Conserve and reuse your own water'. 		
IMPACT ON BUSINESS	<ul style="list-style-type: none"> ✦ Project 'Industrial water reuse' secured the operations of Braskem and thus production and profit. ✦ This project contributed to water security for the entire region Additionally, the water reuse activities return higher quality water than the input, reducing the need for cleaning of cooling equipment and chemicals for water treatment 		
AREAS OF INTERVENTION	<ul style="list-style-type: none"> – Petrochemical, Polymers, Manufacturing of any product – Braskem has developed a water reuse indicator to monitor the development of water reuse practices across the company as a whole. Such practice can be followed by other water intensive companies. Such project can be upscaled by any industry worldwide. 		
FINANCIAL IMPLICATION	<ul style="list-style-type: none"> ◇ Approx. USD \$95 million . ◇ Profit - On continuous basis (one time investment provide long term service) 		

Ref.:

Braskem: Industrial Water Reuse as Part of the Business Climate Strategy: A Financial and Social Win-Win; Frey, B., Gardaz, A., Karbass, L., Goldberg, M., Luboyera, F., Fischer, R., ... Coffee, J. (2015). The Business Case for Responsible Corporate Adaptation: Strengthening Private Sector and Community Resilience.: A Caring for Climate Report. UN Global Compact.

Drought



Agriculture

TITLE	Innovative Product to Combat the Drought		
COMPANY & COUNTRY	BASF, Brazil and Germany	PRODUCT/ STRATEGY	Product (AgCelence)
APPLICABILITY TO COUNTRIES	Drought affected areas, Agriculture fields, Drought prone agro-forestry	APPLICABLE IN AREAS	Drought prone areas
CHALLENGE	❖ Climate change induced drought affected crop. This lead to low yield, ultimately impacting the livelihood of farmer.		
SOLUTION	<ul style="list-style-type: none"> • Environmental factors like heat and cold often determine the quality of the harvest. Due to impact of climate change there is a growing market demand for solutions that deal with weather stresses in the agricultural sector, without compromising yield. BASF is supplying customers with stress-tolerant plants, which helps improve local yields of food crops like corn, soy and wheat that are exposed to extreme weather conditions. Benefits of stress tolerant plants are: • Higher Yield: AgCelence helps to buffer against environmental stress and maximizes yield potential. BASF detailed that AgCelence increases photosynthesis, which means that plants have more energy and more energy means higher yield. • Increased Stress Tolerant & Vitality: AgCelence products enhance the ability of a plant to buffer against environmental stress like drought or cold, and farmers get better yields. • Improved Marketable Quality: AgCelence products satisfy the end user's demand of quality. • Increased Production Efficiency: The use of AgCelence products can benefit production efficiency in different ways: Nitrogen, for example, is used more efficiently. 		
IMPACT ON BUSINESS	<ul style="list-style-type: none"> ✦ New area of business for BASF ✦ Enhanced crop safety- safeguarding likelihood 		
AREAS OF INTERVENTION	– Chemical, Innovation		
FINANCIAL IMPLICATION	◇ Profit from new product sale. An added business stream for BASF		

Ref.:

http://www.agricentre.basf.co.uk/agroportal/uk/en/products/featured_products/cereals_2/tracker_5/agcelence_benefits.html

Flood



Chemical / Innovation

TITLE	Innovative Product to Prevent Flood – A New Business Opportunity		
COMPANY & COUNTRY	BASF, Germany	PRODUCT/ STRATEGY	Product (Elastocoast)
APPLICABILITY TO COUNTRIES	Flood prone areas in any country/ region	APPLICABLE IN AREAS	Coastal region / River banks
CHALLENGE	❖ Floods during rainy season. Flood in low lying areas near sea coast or flood prone areas on river banks.		
SOLUTION	<ul style="list-style-type: none"> • BASF published the case study about the innovative product to prevent flood related risks. • BASF detailed that – In many parts of the world climate-related flood disasters cause devastating damage putting thousands of peoples at risk. The consequences of such disasters is not only flooded areas but also the loss of land and human lives. • Worldwide, the regions at greater flood risks are raising the height with dike systems to as much as 9 meters to safeguard their land and habituated area. • BASF is offering an innovative and environment-friendly solution to provide effective and stable coastal protection. BASF developed a special polymer - elastomer polyurethane system (Elastocoast). With the use of this polymer dikes remain protected, even absorbing the force of the breaking waves and slowing down the water masses. This product can prevent loss of land in coastal areas thus providing safety to human beings, in flood prone and coastal areas. 		
IMPACT ON BUSINESS	<ul style="list-style-type: none"> ✦ New area of business for BASF ✦ Enhanced safety – an advantage for user ✦ Ensure safety of society on riverside ✦ Prevent impact on livelihood of poor/ flood prone population 		
AREAS OF INTERVENTION	– Chemical, Prevention of flood, Safeguarding the operations in coastal zone		
FINANCIAL IMPLICATION	◇ Profit thru ‘new business stream’ with continuous profit for the company.		

Ref.:

<http://www.polyurethanes.basf.de/pu/Coastal-Defense/index>



TITLE	Safeguard Supply Chain- Conserve Natural Resources		
COMPANY & COUNTRY	British Sky Broadcasting (BSkyB) United Kingdom	PRODUCT/ STRATEGY	Strategy
APPLICABILITY TO COUNTRIES	Any country	APPLICABLE IN AREAS	Telecommunication / Natural resource conservation/ Circular economy
CHALLENGE	❖ Ensuring a reliable and cost-efficient source of rare earth metals		
SOLUTION	<ul style="list-style-type: none"> • BSkyB has taken innovative initiative of recycling and developing a closed-loop supply chain. Case study is learnt thru widespread academic sources and publications on website. • BSkyB company elaborate about their company's initiative i.e. proactive process for reuse and recycle all its products returned through its engineers or freepost. By taking back, recycling of old equipment and re-using elements for production of new equipment the company hope to create its own dependable closed-loop supply chain. Such initiative reduce the burden on environment as well as reduce dependency on suppliers for rare metals. In addition, taking back the product for inhouse recycling develop the 'organized recycling market'. • Also, BSkyB stated that the company works with suppliers and business partners to ensure that products and services are delivered in the most energy efficient ways. This helps reducing the operational cost in the short and medium term. 		
IMPACT ON BUSINESS	✦ Safeguarded supply chain for seamless operations.		
AREAS OF INTERVENTION	– Supply chain, Telecom		
FINANCIAL IMPLICATION	◇ Profit thru seamless uninterrupted operations		

Ref.:

Safeguard Supply Chain- Conserve Natural Resources, BSkyB, UK

TITLE	Technology to safeguard businesses in coastal areas		
COMPANY & COUNTRY	Vale, Brazil	PRODUCT/ STRATEGY	Product (Weather forecasting system) and Strategy
APPLICABILITY TO COUNTRIES	Coastal areas in any country	APPLICABLE IN AREAS	Metals and Mining, Logistics, Energy, Fisheries, Sea food / Business in coastal areas
CHALLENGE	❖ Extreme weather events threatening Brazilian port (which covers 18 square kilometers, services about 77 vessels a month and handles iron ore and pellets) operations		
SOLUTION	<ul style="list-style-type: none"> • Case study about 'Nowcasting System for Harbor Operations in Brazil' was published in 'Caring for Climate report 2015'. Such weather forecasting system is applicable for safeguard any business operations in coastal areas. Case is detailed below: • Vale annually evaluates climate and weather-related risks and opportunities, including financial and regulatory ones as a part of their global corporate risk management policy. Company decide to invest in the Capixaba Hydrometeorological Monitoring Center (CCMH) in partnership with the Government of Espírito Santo, as part of the state government's Adaptation programme, in order to create and disseminate more accurate climate and weather information and forecasts. This also help improve the company's capacity to take preventative actions in the event of extreme weather conditions at the Tubarão complex. CCMH includes a climate monitoring system with multiple capabilities including: <ul style="list-style-type: none"> • Long-range radar (out to 240km); 25 automatic weather stations installed throughout the state that measure temperature, pressure, rainfall, wind speed and direction, integrated into a system of satellites for uninterrupted operation; and Mathematical processing of climate variables performed by a supercluster computer. • Data from the CCMH is used for forecasting and nowcasting (forecasts for the next 30 minutes to 3 hours), Climate information enable Vale and Government to take timely action to safeguard their business, port operations and society. 		
IMPACT ON BUSINESS	<ul style="list-style-type: none"> ✦ Weather forecast and Alert System has improved the ability of Vale's Tubarão complex to appropriately discharge, handle and load or unload material, or to have vessels berth or unberth and move to the safest location, improving reliability of operations. ✦ Vale helped to improve the overall capabilities of the Operational Control Center (CCO), which allows the state government' Civil Defense department to mitigate high impact weather events in all 78 cities across the state. ✦ As published in case study, Vale participate in meetings with government and business organizations to develop a Brazilian National Adaptation Plan. 		
AREAS OF INTERVENTION	<ul style="list-style-type: none"> - Prevent climate disasters - Prevent export business and port operations - Prevent reconstruction cost and agri loss 		
FINANCIAL IMPLICATION	◇ One time investment - USD \$18.6 million		

Ref.:

The Business Case for Responsible Corporate Adaptation: Strengthening Private Sector and Community Resilience; A Caring for Climate Report; UN Compact, UNFCCC, UNEP, UNEP-DTU, CDP, The CEO Water Mandate, ND Gain, Oxfam America, rainwater Alliance, 2015

TITLE	Uninterrupted Business Operations - Profitable Business Growth		
COMPANY & COUNTRY	BT.com, United Kingdom	PRODUCT/ STRATEGY	Strategy
APPLICABILITY TO COUNTRIES	UK, USA, India, China	APPLICABLE IN AREAS	Information Technology sector
CHALLENGE	<ul style="list-style-type: none"> ❖ Enforcing short and long-term planning to minimize the physical risk on internet/ broadband operations, presented by climate change and meeting stakeholder expectations ❖ <i>For eg. Widespread flooding across UK in 2007 caused an additional 31,000 customer complaints and cost BT approximately £9m in operational insurance claims.</i> 		
SOLUTION	<p>BT.com published their efforts as 'fully integrated multi-disciplinary company-wide management processes to monitor, manage and adapt. Following steps were detailed by BT.com as measures for climate change adaptation and cost saving thru the measures:</p> <ul style="list-style-type: none"> • BT.com developed best infrastructure to reduce cost of travel and energy savings • Energy efficiency programme (motors, smart meters, smart control network) were implemented to save energy as well as cost • Cooling data centers by fresh air was implemented • Due to BT.com number of homes who can receive flood warnings was increased. Homes were able to prepare themselves better to cope up with flood and related problems. This initiative provided benefit to society at large. • Due to good quality of equipment and undisturbed connectivity, requirement of technician for checking/ repair was reduced. This lead to 37% emission reduction within 5 years. 		
IMPACT ON BUSINESS	<ul style="list-style-type: none"> ✦ Providing quality service, Reduce cost implication, Reduced emissions thru transportation, Safeguard brand image 		
AREAS OF INTERVENTION	<ul style="list-style-type: none"> - Internet/ Broadband 		
FINANCIAL IMPLICATION	<ul style="list-style-type: none"> ◇ Profit thru uninterrupted operations 		

Ref.:

Ref.: *Uninterrupted Business Operations - Profitable Business Growth, Bt.Com, UK*

TITLE	Weather Index Insurance – To Capitalize the Opportunities from Climate Change		
COMPANY & COUNTRY	Sompo Japan Nipponkoa Group, Japan	PRODUCT/ STRATEGY	Product, Strategy
APPLICABILITY TO COUNTRIES	Thailand, Applicable to any country (national policy support required)	APPLICABLE IN AREAS	Insurance, Banking
CHALLENGE	❖ Investment risk		
SOLUTION	<ul style="list-style-type: none"> • Sompo Japan Nipponkoa Group, Japan found “New Weather Index Insurance programme” an insurance product specifically designed to provide compensation or insurance payments when weather indices (like temperature or rainfall) reach certain predetermined levels. This financial product was to help small-holder rice farmers, by covering revenue losses from crop damage, while strengthening their climate resilience. • Weather Index Insurance is effective and economically beneficial adaptation strategies, as it relies on an index regarding meteorological data, and is easy for the insurance company to payout insurance without complex surveys. Sompo Japan Nipponkoa Group offered Weather Index Insurance as part of a pilot project in NE Thailand, because of its high vulnerability to drought, large low-income population, frequent borrowing farmers and availability of weather data to develop the insurance product. Weather Index Insurance provided significant safety net to farmers, by covering 10% of the insured loan principal depending on the timing and severity of the drought. • The Thai Meteorological Department and Japan’s National Institute for Agro-Environmental Sciences (NIAES) provided access to weather data and helped Sompo Japan Nipponkoa Group to understand the impact of climate change on the agricultural sector. The Remote Sensing Technology Center of Japan (RESTEC) is provides satellite data to further help inform the Weather Index Insurance product. Overall, information by NIAES / RESTEC is helping farmers and insurance company to deal with climate risks and operate symbiotically. 		
IMPACT ON BUSINESS	✦ In 2014, Sompo Japan Nipponkoa Group launched “Typhoon Guard Insurance”, a type of Weather Index Insurance, for agricultural producers in the Philippines. The company aims to provide Weather Index Insurance to 30,000 farmers in Southeast Asia by 2025. Launch of new service Weather Index Insurance in Japan indicate the profitability in this business model.		
AREAS OF INTERVENTION	– Insurance, Banking, Agriculture, Industry, Fisheries		
FINANCIAL IMPLICATION	◇ Weather Index Insurance reduce the risk for Sompo Japan Nipponkoa Group because of market expansion. This leads to enhanced profitability.		

Ref.:

Weather Index Insurance to Enhance Resilience of Agriculture in Developing Countries, Sompo Japan Nipponkoa Group Sompo Japan Nipponkoa

Group; The Business Case for Responsible Corporate Adaptation: Strengthening Private Sector and Community Resilience; A Caring for Climate Report; UN Compact, UNFCCC, UNEP, UNEP-DTU, CDP, The CEO Water Mandate, ND Gain, Oxfam America, Rainwater Alliance, 2015

Drought / Heat

Manufacturing

TITLE	Water Positive Cement Production Unit, India		
COMPANY & COUNTRY	Kesoram Industries Ltd, Vasavadatta Cement Sedam, Karnataka, India	PRODUCT/ STRATEGY	Strategy
APPLICABILITY TO COUNTRIES	Any drought affected area	APPLICABLE IN AREAS	Drought affected areas, Industrial Hub
CHALLENGE	❖ Cement Plant with Power Plant needs water ~12000 cubic meter per day when plants run in full capacity. The water in nearby river was not even sufficient, especially in lean period. Setting up any industry in such drought prone area was a challenge.		
SOLUTION	<ul style="list-style-type: none"> • Industry in India is supposed to make own arrangements to fulfill their water requirement. Government may not allow to draw water from rivers / underground specially in water scarce areas, because society need to be served at priority. • As all mining companies, Vasavdatta Cements Ltd was advised to rehabilitate their limestone mines (15-20 meter deep) and use the land purposefully. Vasavdatta cement planned to use these mines as 'water reservoirs'. Aim was to use stored water into the cement plant and captive power plant (CPP). Because of local terrain, the challenge was to design and channelize the rain water to these mine pits. Further, bunds around the mine boundary were created, small channels were designed in such a fashion that all rain water converge and fall in mine pit. By the end of 2015 Vasavdatta Cements created a capacity to store 44 Lac Mt Cube water. A pit near power plant was created to ensure the water availability at the site. Storm water drains diverted for use in power plant. Excess water was diverted to mine pits. • Vasavdatta Cement has constructed check dam to river Kamlavati, adjacent to the cement unit. This lead to having more water available in all the seasons. Check gates are opened only during peak water flow to release the excess water. • These water management measures in Sedam area in India, lead to water table rise and converted a water scarce area into a sustainable habitat. At present, water remains available in river and underground throughout the season for use by the industry and society at large. 		
IMPACT ON BUSINESS	<ul style="list-style-type: none"> ✦ Continuous operations leading to sustained profits ✦ No shortage of water for cement unit, power plant and society in nearby areas ✦ Ground water table increase by 30% in last 25 years 		
AREAS OF INTERVENTION	– Strategic Management decisions,		
FINANCIAL IMPLICATION	◇ Initial investment for creating check dams, study of suitability of pits to store the water and drainage system to collect storm water in pits was done by Vasavdatta Cement company. The availability of water in Sedam area helped company to continue their operations and earn profit.		

Ref.:

KIL Unit, Vasavadatta Cement, Sedam, Karnataka, India

777

Conclusion & Action Plan

CONCLUSION

Various case study presented in this manual are to showcase the impact of climate change on business. Though the poorest are affected the worst but business community is also not at very different platform. Floods in Chennai in Nov- Dec 2015 are the fresh example of this. **Recommendations on climate change adaptation for business leaders** is provided below:

RECOMMENDATIONS FOR BUSINESS LEADERS

(Ref. A Caring for Climate Report, 2015)



RECOMMENDATIONS FOR POLICY MAKERS

(Ref. A Caring for Climate Report, 2015)



The action plan provided below explicitly details our role in current scenario of climate change. It's time for business community along with the Government, general public, scientists and engineers, to combat climate change. Climate change adaptation / resilience can be well initiated with GHG accounting, monitoring of GHG emissions and further, implementation of appropriate action to reduce GHG emissions, effectively.

ACTION PLAN

STAKEHOLDERS	ACTION ITEMS
All Stakeholders	Implementation of best available low –carbon technologies
Ministry of Environment, Forest and Climate Change	<ul style="list-style-type: none"> - Develop policy and guidelines for adaptation in all industrial sectors - Development of climate resilience plan for each societal components like – Community based adaptation; Ecosystem based adaptation; Adaptation in industry; Transformational adaptation (innovation) etc. - Mandatory implementation of State Action Plan on Climate Change - Facilitate the development of State specific climate change impacts, vulnerability assessment and management plans - Facilitate the preparation of Adaptation plan for each state (according to their geography, climatic and economic conditions) - Development of direct policies on climate change and natural resources (thru policy reforms) - Ensure the acceptance of only green and durable technology in India and develop the norms / standards for the same.
Ministry of Finance	<ul style="list-style-type: none"> - Formulation of national level ‘Sustainability Fund Pool’ to facilitate the adaptation actions - Identification of ‘Regional Climate Centers’ (including public and private organizations/ banks to enhance the working capacity) to screen and identify the strong adaptation pilot projects and their funding requirements
Ministry of Commerce and Industry	<ul style="list-style-type: none"> - Explore the possibility of leveraging the benefits for ‘Green & Environment Friendly Business’ and WTO policies - Consider providing financial incentives and opportunities to stimulate the uptake of climate-resilient technologies and services, such as subsidies for sustainable agricultural equipment, resilient design competitions, micro-insurance for smallholder farmers, co-financing for research and development of new products and services or preferential tariffs for sustainably sourced products.
Ministry of Science and Technology	<ul style="list-style-type: none"> - Facilitate the vulnerability assessment of each state in the country each state in the country and inform the states to take appropriate action within set time frame (based on vulnerability status) - To promote the research on low carbon Indian technologies - Develop strategies for leveraging and mobilizing private sector expertise and resources in building climate resilience and develop sector-specific solutions. - Promote research on ‘climate change adaptation’ in various industrial sectors (to identify the initiatives that can be taken in each sector) - Technology to forecast and SMS (in advance) to all the industries in coastal areas to be made as mandatory, in order to deal with any disaster like floods, hurricane, typhoon etc.

Planning Commission	<ul style="list-style-type: none"> - Five year plans shall include the major 'State specific climate change impacts' and 'policy decisions for incentivizing / facilitating the low carbon growth and development of the country - Attention towards safeguarding the nation's land from sea level rise.
Ministry of Consumer Affairs, Food and Public Distribution	<ul style="list-style-type: none"> - Facilitate the development of 'carbon footprint standard and label' for each product - Awareness on climate adaptation / climate resilience among consumers to adopt low carbon lifestyles - Awareness / Standards for producers to manufacture low carbon products
Industry Associations	<ul style="list-style-type: none"> - Intensify knowledge transfer and sharing to reduce GHG emissions - Mandatory GHG accounting and management among all SMEs, MSMEs and large industries - Promote the integrated Environment, Energy and GHG Management System among industries to take appropriate adaptation and mitigation actions (as per suitability) - Niche R&D for low carbon technologies, adaptation practices and renewable energy - Drive industry towards carbon neutrality
Conglomerates	<ul style="list-style-type: none"> - Initiate the appropriate steps for greening supply chain - Capacity building of suppliers to implement the natural resource conservation practices - Implement the integrated Environment, Energy and GHG Management System among industries. CSR wing can be an attached to the same department. - Implement Green Procurement Policy - Initiate 'Internal / Group Level Carbon Fund Pool' (fiscal instruments) for greening all industries owned by the conglomerate. - Industries to build 'Sustainable Business Excellence Models' for sustaining their operations and profitability.
Industrial Parks/ Clusters at River banks/ Coastal areas	<ul style="list-style-type: none"> - Special precaution and environment management system as recommended by the Government of India should be followed by industrial clusters on / near river bed or coastal areas. - Information and Communication Technology (ICT) should be established and maintained to alert industrial clusters in advance, to take appropriate action to safeguard their operations. - Business risk report / Annual report/ Sustainability reports - should include the possibility of any climate change related issues and the management measures taken / planned against.

TV

References

1. Assessing Climate Change Risks and Opportunities for Investors Industrials, Manufacturing and Materials Sector (2015), A Report by Dr Michael A. Smith; Australian National University and Investor Group on Climate Change; Responsible Investment Association Australasia (riaa); CDP; Funded by ClimateWorks Australia.
2. Frey, B., Gardaz, A., Karbass, L., Goldberg, M., Luboyera, F., Fischer, R., ... Coffee, J. (2015). The Business Case for Responsible Corporate Adaptation: Strengthening Private Sector and Community Resilience.: A Caring for Climate Report. UN Global Compact.
3. BASF, <http://www.polyurethanes.basf.de/pu/Coastal-Defense/index>
4. BSKyB, UK, <https://corporate.sky.com/media-centre/news-page/2012/european-supply-chain-excellence-awards>
5. BASF, http://www.agricentre.basf.co.uk/agroportal/uk/en/products/featured_products/cereals_2/tracker_5/agcelence_benefits.html
6. BT.Com, UK; <http://www.theguardian.com/bt-partner-zone/2015/oct/28/how-cloud-computing-is-becoming-more-sustainable>
7. Cisco Systems (2012). De-Risking the Supply Chain: Cisco's Risk Intelligence and Analytic Tools.
8. Frances G. Sussman & J. Randall Freed, Adapting to Climate Change – A Business Approach, Pew Centre on Global Climate Change, 2008.
9. Fujimoto, T. (2011) "Supply Chain Competitiveness and Robustness: A Lesson from the 2011 Tohoku Earthquake and Supply Chain "Virtual Dualization"." MMRC Discussion Paper Series ible
10. Greenhouse Gas (GHG) Emission Profile, India Ministry of Environment, Forest and Climate Change (MoEF&CC), 2009
11. India's Intended Nationally determined Contributions (INDCs), 2015, Ministry of Environment, Forest and Climate Change (MoEF&CC), 2009
12. India's Biennial Report to UNFCCC (year 2010), Released in Jan 2016, Ministry of Environment, Forest and Climate Change, Government of India
13. Industrial Water Reuse: A Financial and Social Win-Win; The Business Case for Responsible Corporate Adaptation: Strengthening Private Sector and Community Resilience; *A Caring for Climate Report; UN Compact, UNFCCC, UNEP, UNEP-DTU, CDP, The CEO Water Mandate, ND Gain, Oxfam America, rainwater Alliance, 2015*
14. Insights into Climate Change Adaptation by UK Companies, A report prepared for Defra by the Carbon Disclosure Project, 2012
15. Masahiko Haraguchi, and Upmanu Lall, 2013, Flood Risks and Impacts Future Research Questions and Implication to Private Investment Decision-Making for Supply Chain Networks, UNISDR and Global Assessment Report of Disaster Risk Reduction, 2013, Geneva.
16. O'Connor, J. (2009). Innovating Through Supply Chain Risk Management. 94th Annual International Supply Management Conference.
17. ClimaGrid, Brazil, 2013, Private Sector Initiative Actions on Adaptation, Nairobi Work Programme, United Nations Framework Convention on Climate Change (UNFCCC)

18. Weather Index Insurance to Enhance Resilience of Agriculture in Developing Countries, Sompo Japan Nipponkoa Group Sompo Japan Nipponkoa Group; The Business Case for Responsible Corporate Adaptation: Strengthening Private Sector and Community Resilience; *A Caring for Climate Report*; UN Compact, UNFCCC, UNEP, UNEP-DTU, CDP, *The CEO Water Mandate*, ND Gain, Oxfam America, Rainwater Alliance, 2015
19. Wright, J. N. (2012, January 1). "Insurance capacity shrinks after Thai floods - Reinsurers pull back as businesses struggle to quantify losses." Retrieved July 10th, 2012, from <http://www.businessinsurance.com/article/20120101/NEWS04/301019977?tags=|306|64>.
20. Starbucks, <http://www.starbucks.in/responsibility/environment/water> and <http://www.triplepundit.com/2011/10/starbucks-worries-climate-change-will-disrupt-coffee-production/>
21. **SUEZ:** *Circular Water Economy – Beyond Adaptation, a Way to Secure and Renew Water Resources*; The Business Case for Responsible Corporate Adaptation: Strengthening Private Sector and Community Resilience; *A Caring for Climate Report*; UN Compact, UNFCCC, UNEP, UNEP-DTU, CDP, *The CEO Water Mandate*, ND Gain, Oxfam America, rainwater Alliance, 2015
22. **Vale:** Nowcasting System for Harbor Operations in Brazil ; The Business Case for Responsible Corporate Adaptation: Strengthening Private Sector and Community Resilience; *A Caring for Climate Report*; UN Compact, UNFCCC, UNEP, UNEP-DTU, CDP, *The CEO Water Mandate*, ND Gain, Oxfam America, rainwater Alliance, 2015

V

Glossary

Adaptation - Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation (IPCC TAR, 2001 a)

Adaptation - The process or outcome of a process that leads to a reduction in harm or risk of harm, or realisation of benefits associated with climate variability and climate change (UK Climate Impact Programme (UKCIP, 2003)

Adaptive capacity - Adaptive capacity refers to the potential or capability of a system to adjust to climate change, including climate variability and extremes, so as to moderate potential damages, to take advantage of opportunities, or to cope with consequences (Smit and Pilifosova, 2001). As the name suggests, adaptive capacity is the capability of a system to adapt to impacts of climate change.

Afforestation - Planting of new forests on lands that historically have not contained forests.

Alternative Energy - Energy derived from nontraditional sources (e.g., compressed natural gas, solar, hydroelectric, wind)

Annex I Countries/Parties - Group of countries included in Annex I (as amended in 1998) to the United Nations Framework Convention on Climate Change, including all the developed countries in the Organization of Economic Co-operation and Development, and economies in transition. By default, the other countries are referred to as Non-Annex I countries. Under Articles 4.2 (a) and 4.2 (b) of the Convention, Annex I countries commit themselves specifically to the aim of returning individually or jointly to their 1990 levels of greenhouse gas emissions by the year 2000. ^[2]

Anthropogenic - Made by people or resulting from human activities. Usually used in the context of emissions that are produced as a result of human activities. ^[3]

Atmosphere - The gaseous envelope surrounding the Earth. The dry atmosphere consists almost entirely of nitrogen (78.1% volume mixing ratio) and oxygen (20.9% volume mixing ratio), together with a number of trace gases, such as argon (0.93% volume mixing ratio), helium, radiatively active greenhouse gases such as carbon dioxide (0.035% volume mixing ratio), and ozone. In addition the atmosphere contains water vapor, whose amount is highly variable but typically 1% volume mixing ratio. The atmosphere also contains clouds and aerosols.

Carbon Dioxide - A naturally occurring gas, and also a by-product of burning fossil fuels and biomass, as well as land-use changes and other industrial processes. It is the principal human caused greenhouse gas that affects the Earth's radiative balance. It is the reference gas against which other greenhouse gases are measured and therefore has a Global Warming Potential of 1. See climate change and global warming. ^[5]

Carbon Dioxide Equivalent - A metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP). Carbon dioxide equivalents are commonly expressed as "million metric tons of carbon dioxide equivalents (MMTCO₂Eq)." The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP. Arithmetically it can be represented as: $MMTCO_2Eq = (\text{million metric tons of a gas}) * (\text{GWP of the gas})$

Climate Change - Climate change is a change in the statistical distribution of weather patterns when that change lasts for an extended period of time (i.e., decades to millions of years).

Carbon intensity - A unit of measure. The amount of carbon emitted by a country per unit of Gross Domestic Product.

Carbon sequestration- The process of removing carbon from the atmosphere and depositing it in a reservoir.

Climate Risk - Climate risk means a risk resulting from climate change and affecting natural and human systems and regions.

Climate change vulnerability - According to IPCC, vulnerability is a function of the character, magnitude and rate of climate variation to which a system is exposed; its sensitivity; and adaptive capacity (IPCC, 2001). Mathematically it can be denoted as: $Vulnerability = f(Exposure, Sensitivity, Adaptive Capacity)$

Climate resilience - the capacity for a socio-ecological system to: (1) absorb stresses and maintain function in the face of external stresses imposed upon it by climate change and (2) adapt, reorganize, and evolve into more desirable configurations that improve the sustainability of the system, leaving it better prepared for future climate change impacts.

Climate sensitivity - how responsive the temperature of the climate system is to a change in radiative forcing. Also: the temperature change in °C associated with a doubling of the concentration of CO₂ in atmosphere (as the single most important factor of radiative forcing).

Climate variability - climate change, with no presumption of cause.

Carbon offset - a mechanism for individuals and businesses to neutralize rather than actually reduce their greenhouse gas emissions, by purchasing the right to claim someone else's reductions as their own.

Carbon sequestration - proposals for removing CO₂ from the atmosphere, or for preventing CO₂ from fossil fuel combustion from reaching the atmosphere.

Carbon sink - a natural or artificial reservoir that accumulates and stores some carbon-containing chemical compound for an indefinite period

Carbon tax - a tax on energy sources which emit carbon dioxide.

Deforestation - Conversion of forest to non-forest.

Greenhouse gas inventory - a type of emission inventory that includes greenhouse gas emissions from source categories as well as removal by carbon sinks.

Global warming - the warming trend over the past century or so; also: any period in which the temperature of the Earth's atmosphere increases; also the theory of such changes.

Greenhouse gas - Natural and industrial gases that trap heat from the Earth and warm the surface. The Kyoto Protocol restricts emissions of six greenhouse gases: natural (carbon dioxide, nitrous oxide, and methane) and industrial (perfluorocarbons, hydrofluorocarbons, and sulphur hexafluoride)

Intergovernmental Panel on Climate Change (IPCC) - Established in 1988 by the World Meteorological Organization and the UN Environment Programme, the IPCC surveys world-wide scientific and technical literature and publishes assessment reports that are widely recognized as the most credible existing sources of information on climate change. The IPCC also works on methodologies and responds to specific requests from the Convention's subsidiary bodies. The IPCC is independent of the Convention.

Innovation- The act or process of inventing or introducing something new. Leveraging insights into consumer needs to develop fresh thinking and unique solutions that create meaningful distinctions in brands, products and services, and enhances the consumer/end user's experience.

Mitigation - In the context of climate change, a human intervention to reduce the sources or enhance the sinks of greenhouse gases. Examples include using fossil fuels more efficiently for industrial processes or electricity generation, switching to solar energy or wind power, improving the insulation of buildings, and expanding forests and other "sinks" to remove greater amounts of carbon dioxide from the atmosphere.

Supply chain - (1) Starting with unprocessed raw materials and ending with the final customer using the finished goods, the supply chain links many companies together. (2) The material and informational interchanges in the logistical process, stretching from acquisition of raw materials to delivery of finished products to the end user. All vendors, service providers, and customers are links in the supply chain.



Confederation of Indian Industry

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering industry, Government, and civil society, through advisory and consultative processes.

CII is a non-government, not-for-profit, industry-led and industry-managed organization, playing a proactive role in India's development process. Founded in 1895, India's premier business association has over 7,900 members, from the private as well as public sectors,

About CII - Sohrabji Godrej Green Business Centre

CII - Sohrabji Godrej Green Business Centre (CII - Godrej GBC) is one of the 10 Centres of Excellences of the Confederation of Indian Industry (CII).

CII-Sohrabji Godrej Green Business Centre offers advisory services to the industry in the areas of Green buildings, energy efficiency, water management, environmental management, renewable energy, green business incubation, climate change, GHG accounting and management, Carbon sequestration etc. and climate change activities.

The Centre sensitises key stakeholders to embrace Green practices and facilitates market

including SMEs and MNCs, and an indirect membership of over 2,00,000 enterprises from around 240 national and regional sectoral industry bodies.

With 66 offices, including 9 Centres of Excellence, in India, and 8 overseas offices in Australia, Bahrain, China, Egypt, France, Singapore, UK, and USA, as well as institutional partnerships with 312 counterpart organizations in 106 countries, CII serves as a reference point for Indian industry and the international business community.

transformation, paving way for India to become one of the global leaders in Green businesses by 2015.

The Centre is housed in a Green Building which received the prestigious LEED (Leadership in Energy and Environmental Design) Platinum Rating in 2003. This was the first Platinum rated Green Building outside of U.S.A and the third in the world. The Centre was inaugurated by H.E Dr A P J Abdul Kalam, the then President of India, on July 14, 2004.



Confederation of Indian Industry

Confederation of Indian Industry CII-Sohrabji Godrej Green Business Centre

Survey No. 64, Kothaguda Post,
Near HITEC City, Hyderabad - 500 084
Tel: + 91 40 44185111, Fax: 040-44185189

For further information, kindly contact:

P V Kiran Ananth
Senior Counsellor
Kiran.ananth@cii.in
Ph. No. +91 40 4418 5152

Dr Shalini Sharma
Senior Counsellor
Email ID: Sharma.Shalini@cii.in
Phone: +91 40 4418 5138

cii.in