Increasing Climate Change Demands High System Resilience and Sustainable Practices

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Research projects undertaken by the author duo

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Prospect of low-cost energy conservation in residential energy consumption

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Recent presentations by the author duo

Increasing Climate Change Impacts on Power System Demands High System Resilience and Trained Workforce

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Sep 27, 2023

Institution of Engineers (India)
Delhi State Centre, India

Integrating Behavior Change in Energy Conservation Measures

Dec 30, 2022

4. *The Energy Conservation (Amendment) Bill, 2022*

3. Is a "nudge" enough?

2. Why do we focus today on "Energy Conservation Behaviour"?

1. Crowdsourcing on World by 2050 and G20 presidency- *priority areas- accelerating the achievement of SDGs, green development and LiFE (Lifestyle for Environment), and Sustainable Growth*

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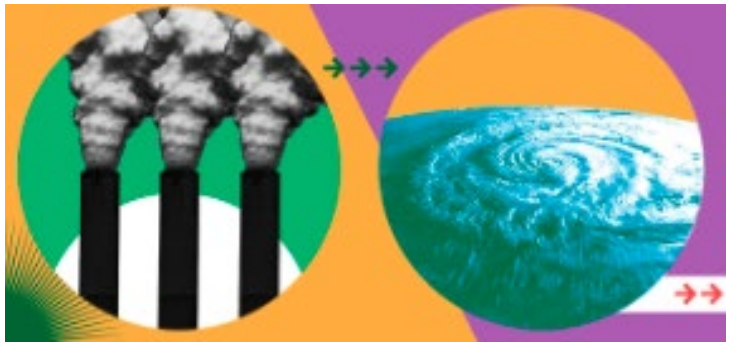
Agenda

- About Climate Change
- Impacts of Climate Change
- Impacts on Utilities worldwide
- Need for System Resilience
- Need for Sustainable Practices
- Suggested Sustainable Practices
- Final Note

About Climate change



- Climate change refers to long-term shifts in temperatures and weather patterns. Such shifts can be natural, due to changes in the sun's activity or large volcanic eruptions.
- Since 1800s, human activities mainly drove climate change, primarily due to burning fossil fuels.
- Climate change can affect our health, ability to grow food, housing, safety and work.
- Small island nations and developing countries are already more vulnerable to climate impacts.
- Sea-level rise and saltwater intrusion have advanced to the point where whole communities have had to relocate, and protracted droughts are putting people at risk of famine.

In the future, the number of "climate refugees" is expected to rise. **(United Nations)**

Impacts of Climate change - losses and damages

Slow onset changes

- Creeping rise of sea levels as glaciers and ice sheets melt and the warming ocean's volume expands.
- Rising seas infiltrate groundwater and salinize the earth of low-lying areas, destroying freshwater supplies for residents and rendering land useless for farming.

Rapid onset changes

- Frequent and intense extreme events such as heat waves, droughts, wildfires, tropical storms, floods and storm surges.
- From 2000-2019, floods, droughts and storms together accounted for 86% of 46,000 lives lost in Africa to natural hazards.

40% of humanity is now living in 'climate change hotspots' that are highly vulnerable to these phenomena.

Intergovernmental Panel on Climate Change

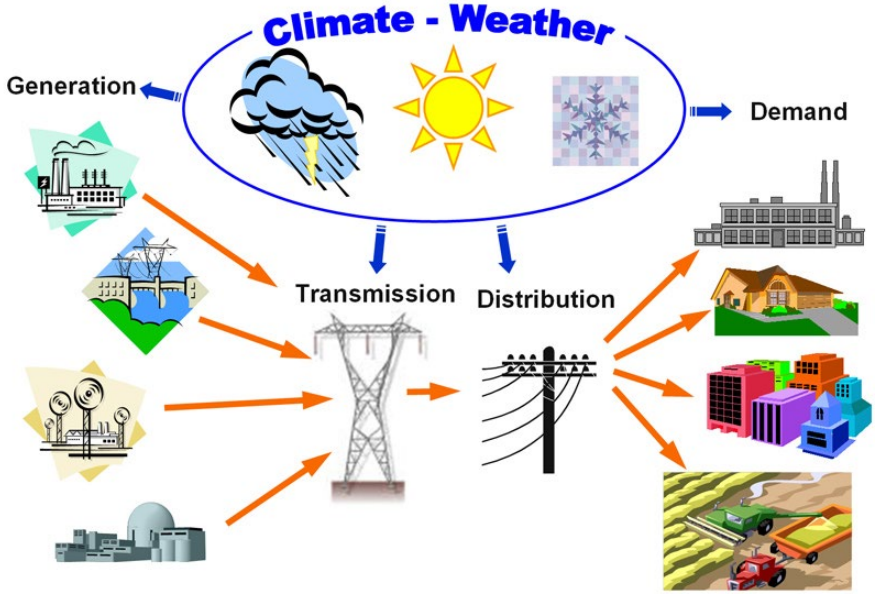
Top 15 Crowdsources answers to the question "What do you think the world will be like in 2050?"

Idea	Score
Global collapse of ocean fisheries before 2050	90
Accelerating climate change	89
There will be increasing inequity, tension and social strife	86
Global society will create a better life for most, but not all, primarily through continued economic growth	86
Persistent poverty and hunger amid riches	86
Humanity will avoid "collapse induced by nature" and has rather embarked on a path of "managed decline"	83
Two-thirds of world population will be under water stress	83
Urbanization will reach 70 per cent (+2.8 billion people in urban areas, -0.6 billion in rural areas)	83
The number of people going hungry will be reduced by 500 million people, still leaving 250 million with insufficient food	83
Continued lack of understanding of the complex non-linear dynamics of ecosystems	80
Food production peaks around 2040 at a level 60 per cent above today's current levels, in terms of tonnes of food per year	75
Gross world product keeps growing until the second half of the twenty-first century, but at an ever-decreasing rate	75
Temperatures and sea levels will continue rising, as will the share of renewable energy use	75
Massive human interference with phosphorus and nitrogen cycles well beyond safe thresholds	75
Greenhouse gas (GHG) emissions will increase by 70 per cent, from 48 to 83 GtCO2-equivalent. Most of the increase will be in Brazil, Russia, India, China and South Africa (BRICS).	75

Source: UNDESA, 2014a

Global impacts, the recent Energy Crisis and the disruption triggered by Climate Change compel us to integrate sustainability and reflect on the energy conservation behaviour that is needed to support humanity

Impacts of Climate Change on Utilities Worldwide



In Canada, damage to electrical transmission and distribution infrastructure due to climate change impacts could triple to $4.1 billion a year by 2100, the new report found.
(Scott Clause /The Daily Advertiser/The Associated Press)

- Industries companies worldwide are scrambling to keep up with a barrage of extreme weather from a rapidly warming climate.
- System's demand is changing with increase in heating and cooling.
- Changes in regional temperature and precipitation patterns can have significant implications for our existing and future power system infrastructure.
- Thermal expansion of lines causing sag, decrease power transfer.
- Thermal plants less efficient when ambient temperature increases.
- Hydro plants get affected by precipitation, snowpack levels, timing of snow melting affect stream flow and reservoir levels.
- Cloud cover, solar insolation, changed wind pattern affect RE.

Climate change challenges demand system resilience

Intergovernmental Panel on Climate Change's report highlights a solutions framework that we call Climate Resilient Development. It combines strategies to adapt to climate change with actions to reduce greenhouse gas emissions to support sustainable development for everyone. (IPCC, 2023)

- Climate change is now presenting risks to nature, people, and infrastructure around the globe.
- Risks will increase with every small increase in warming, and reducing them is made more complicated by other global trends such as over-consumption, population growth, rapid urbanization, land degradation, biodiversity loss, poverty, inequity, etc.
- Ongoing climate change scenario and the weather of the past is no longer a true representative of future conditions.
- World is facing a long list of complex and interactive challenges that need to be dealt with simultaneously.
- There is a need for high system resilience to adapt to the changing climate while working to mitigate its worst impacts.

System resilience essential to face climate change challenges

Key aspects and considerations associated with high system resilience:

Diversity: Resilient systems often exhibit diversity in terms of resources, components, or strategies. Diversity can enhance a system's ability to adapt and recover because it provides multiple options to respond to changing conditions. In ecological systems, biodiversity can contribute to resilience, while in organizations, having a diverse workforce can lead to more robust decision-making.

Redundancy: Having backup components, resources, or processes that can take over when primary elements fail. Redundancy helps prevent cascading failures and ensures that the system can continue functioning even when parts of it are compromised.

Adaptability: Resilient systems can adapt to changing circumstances. Adaptability includes flexibility in decision-making, the ability to reconfigure resources or processes, and the capacity to learn from past events to improve future responses.

Robustness: Robust system withstands shocks without significant degradation in performance. System can absorb stress without failing or undergoing a major change.

Risk Assessment and Management: Involves understanding the threats a system faces, evaluating their potential impacts, and developing strategies to mitigate risks.

System resilience essential to face climate change challenges

Key aspects and considerations associated with high system resilience:

Monitoring and Early Warning: Monitoring mechanisms detect emerging threats or issues early. Early warning systems allow enough time to prepare and respond before a crisis occurs.

Community and Stakeholder Engagement: Resilience involves engaging and involving relevant stakeholders. Community participation, transparency, and collaboration are crucial for building resilience at various scales.

Resource Management: Managing resources sustainably is integral to resilience in the context of climate change. Sustainable resource management ensures availability of resources for the long term, reducing vulnerabilities to resource scarcity.

Planning and Preparedness: Developing and testing contingency plans is essential for resilience. Whether it's a disaster recovery plan for a business or an emergency response plan for a community, having pre-established protocols can greatly improve the ability to respond effectively when needed.

Continuous Learning: Resilience is an ongoing process. Systems should continuously learn from their experiences, both positive and negative, to improve their resilience.

Need for integrating behaviour change in managing assets sustainably

The Institute of Asset Management

CANADIAN CLIMATE INSTITUTE / L'INSTITUT CLIMATIQUE DU CANADA

Asset management is not something that you 'do', but is rather 'the way you do things', and shouldn't be thought of as a separate entity or department. If we focus on the wrong measures or allow the measures to drive the wrong actions, then we drive the wrong behaviours. There is therefore a need to integrate behaviour change to manage assets sustainbly.

Need for Sustainable Asset Management Practices

- Sustainable asset management is the process of overseeing and maintaining physical assets (such as machinery and infrastructure) in a manner that is both socially and ecologically responsible.
- Sustainable asset management practices are the strategies and approaches used to invest and manage assets, such as financial portfolios or physical assets in a manner that integrates environmental, social, and governance (ESG) considerations.
- These practices not only generate financial returns but also contribute to broader sustainability goals and mitigate risks associated with environmental and social issues.

Suggested Sustainable Asset Management Practices

ESG Integration: Integrating environmental, social, and governance factors into the investment decision-making process is fundamental to sustainable asset management. Investors analyze how these factors can impact the performance and risk of their assets.

Thematic Investing: Focusing on specific sustainability themes, such as clean energy, water conservation, or healthcare, allows asset managers to target investments that align with their clients' values and sustainability objectives.

Impact Investing: Impact investing goes beyond financial returns to seek measurable positive social and environmental outcomes. Investors actively allocate capital to projects or companies with the intention of generating positive, measurable impact alongside financial returns.

Negative Screening: This practice involves excluding certain investments or industries that are deemed socially or environmentally harmful. Common exclusions include tobacco, weapons, and fossil fuels.

Positive Screening: Positive screening involves actively selecting investments based on ESG criteria. Asset managers seek out companies and projects with strong sustainability performance or potential for positive impact.

Engagement and Proxy Voting: Active engagement with companies in an investment portfolio is a key practice. Asset managers use their influence to encourage better ESG practices within these companies. They may also exercise voting rights in line with sustainability objectives during shareholder meetings.

Sustainability Reporting: Asset managers often require portfolio companies to disclose ESG-related information and provide regular sustainability reports. This transparency helps assess ESG risks and opportunities.

Suggested Sustainable Asset Management Practices

Risk Assessment: Evaluating and managing ESG-related risks, such as climate change, supply chain issues, or social unrest, is critical. These risks can have significant financial implications and need to be factored into investment decisions.

Diversification: Diversifying investments across various asset classes and geographies can help reduce risk and enhance long-term returns while still adhering to sustainability principles.

Stakeholder Engagement: Engaging with stakeholders, including clients, regulatory bodies, and advocacy groups, to understand their sustainability expectations and incorporate their input into asset management strategies.

Long-Term Perspective: Sustainable asset management often involves taking a longer-term view of investments. This aligns with the idea that sustainable practices are more likely to generate lasting value over time.

Benchmarking and Measurement: Establishing clear benchmarks and metrics for evaluating the sustainability performance of assets is essential. Investors use these metrics to assess progress toward sustainability goals.

Education and Training: Keeping asset managers and investors informed about emerging sustainability trends, regulations, and best practices is crucial to effective sustainable asset management.

Compliance and Regulation: Staying compliant with evolving sustainability regulations and reporting requirements is essential. Asset managers need to be aware of and adhere to ESG-related laws and standards.

Final Note

- High system resilience is crucial not only for surviving unexpected challenges but also for thriving and evolving in a dynamic and uncertain world. It involves a combination of strategic planning, proactive measures, adaptability, and a commitment to sustainability and sustainability practices.

- Sustainable asset management practices are gaining momentum as investors recognize the importance of aligning financial goals with broader sustainability objectives. These practices not only contribute to a more sustainable future but can also help mitigate risks and enhance the resilience of investment portfolios in an increasingly interconnected and environmentally challenged world.

Thank You

Understanding

What you have

- Asset inventory
- Facility Condition Assessment
- Remaining useful life
- Data systems

Analyzing

How you use it

- Meeting stakeholder needs
- Current space use
- Maintenance & renewal approaches
- Physical security posture

Planning

For your future needs

- Master planning
- Efficient space use
- Effective life cycle engineering and facility management

To enable facilities that are . . .

- Resilient
- Safe
- Healthy
- Productive
- Efficient

Question Time

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