SMART GRID

Building T&D Climate Resilience

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Technical Expert, Coalition for Disaster Resiliency Infrastructure (CDRI)
Executive Chairman, Biosirus Inc.

About GSEF

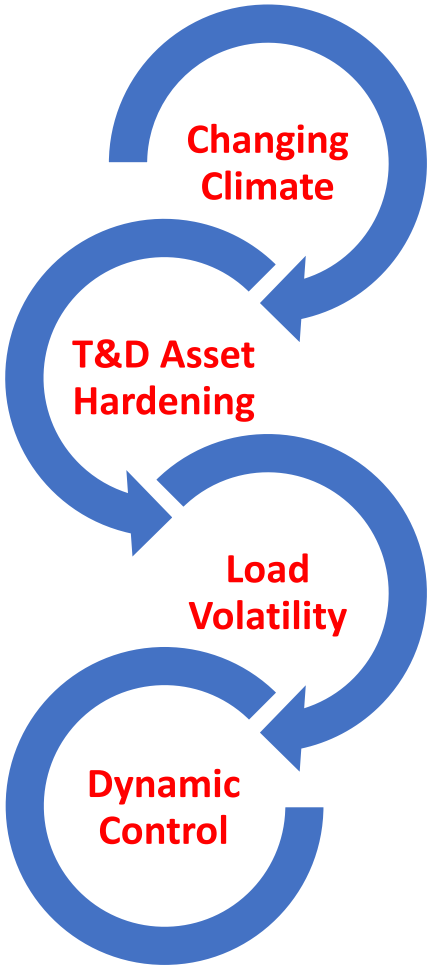
Global Smart Energy Federation

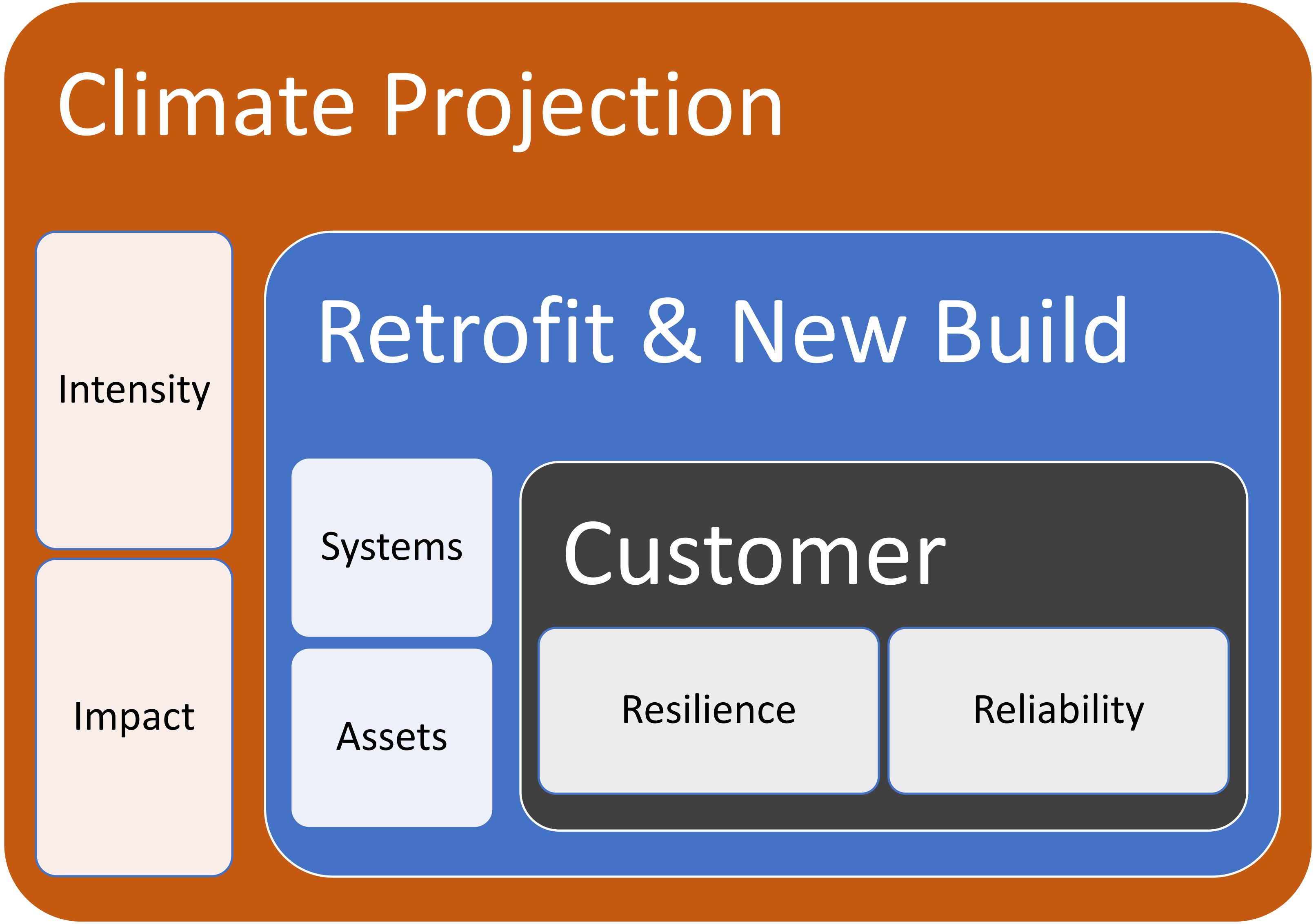
Global Think Tank
Advocacy
Joint Projects
Shared Experts

ACCELERATING
SMART ENERGY SYSTEMS
AROUND THE GLOBE

www.globalsmartenergy.org

Context


Changing Climate
T&D Asset Hardening
Load Volatility
Dynamic Control


Climate Projection
Intensity
Impact
Retrofit & New Build
Systems
Assets
Customer
Resilience
Reliability

1. Resiliency and Reliability

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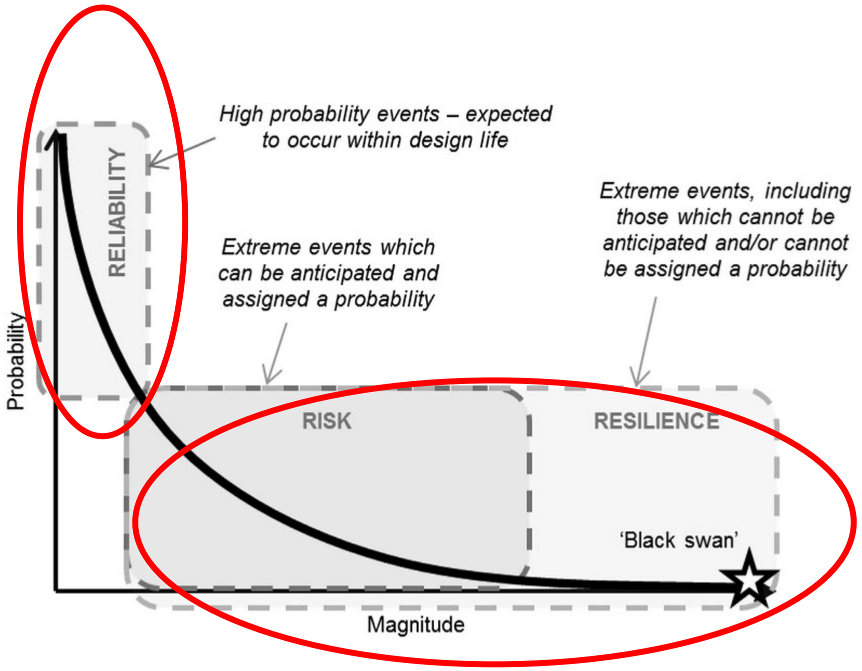
	Grid Resiliency	Grid Reliability
Definition	Ability to Recover Quickly from Disruptions	Consistence Performance and Delivery
Focus	Withstanding/Recovering from extreme events	Maintaining stable and continuous power supply
Metric	Recovery time	Frequency and duration of outages (SAIDI, SAIFI)
Importance	Handling extreme events	Handling daily operations and consumer satisfaction
Examples	Recovery from hurricanes	Handling routine equipment failures, maintaining power quality



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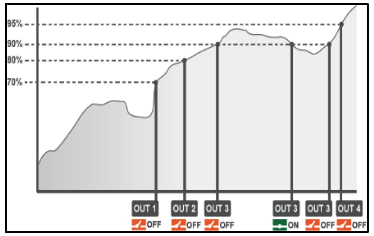
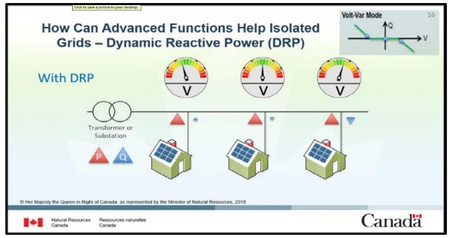
2. Grid Flexibility Essential for Resiliency

Situational Awareness (Beyond Grid)

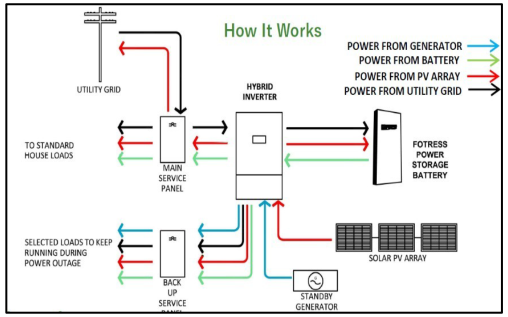


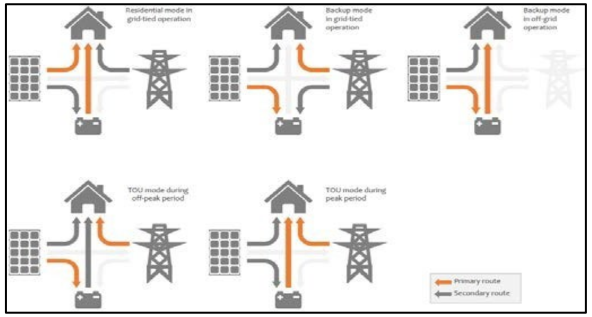

Adaptive – Autonomous Load & VAR Control

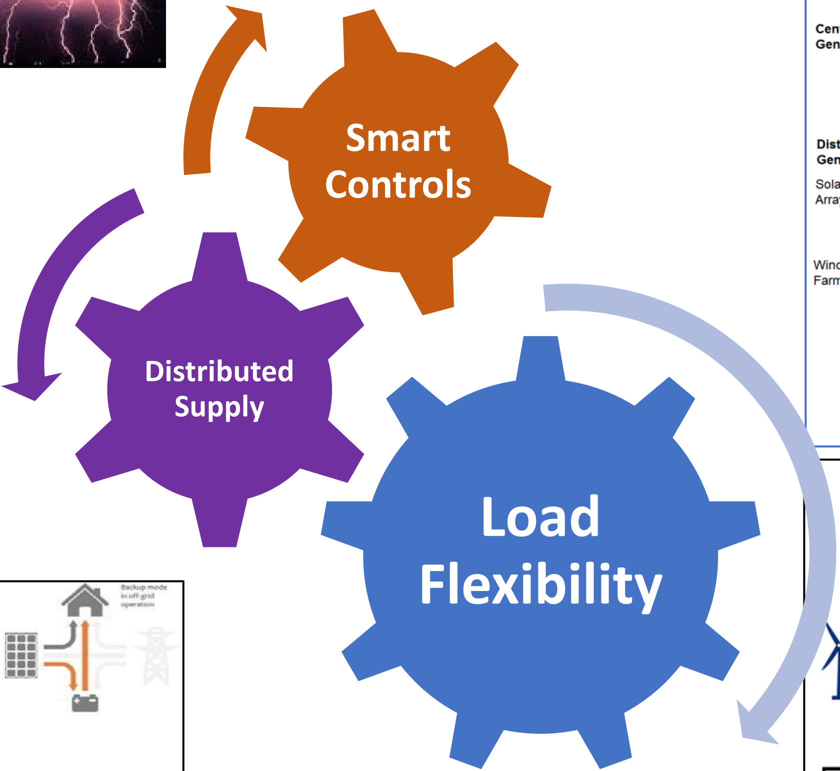




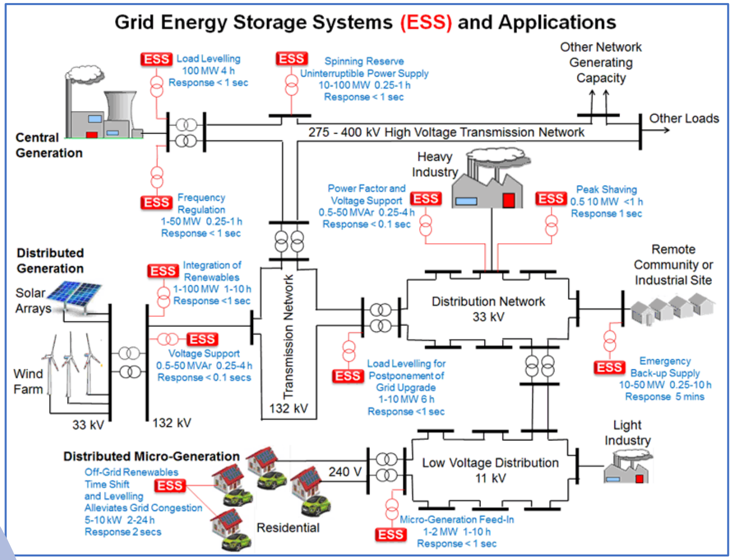
Customer Load Flexibility

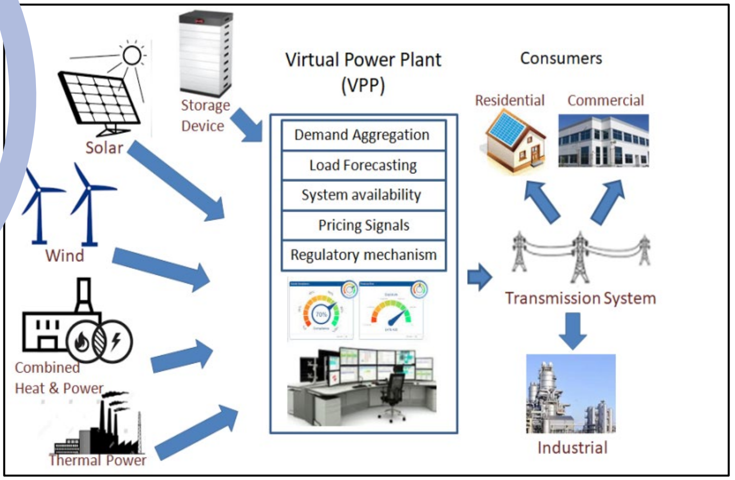






Distributed Energy Resources & Management





3. Model Dynamic Thermal Limits of Assets

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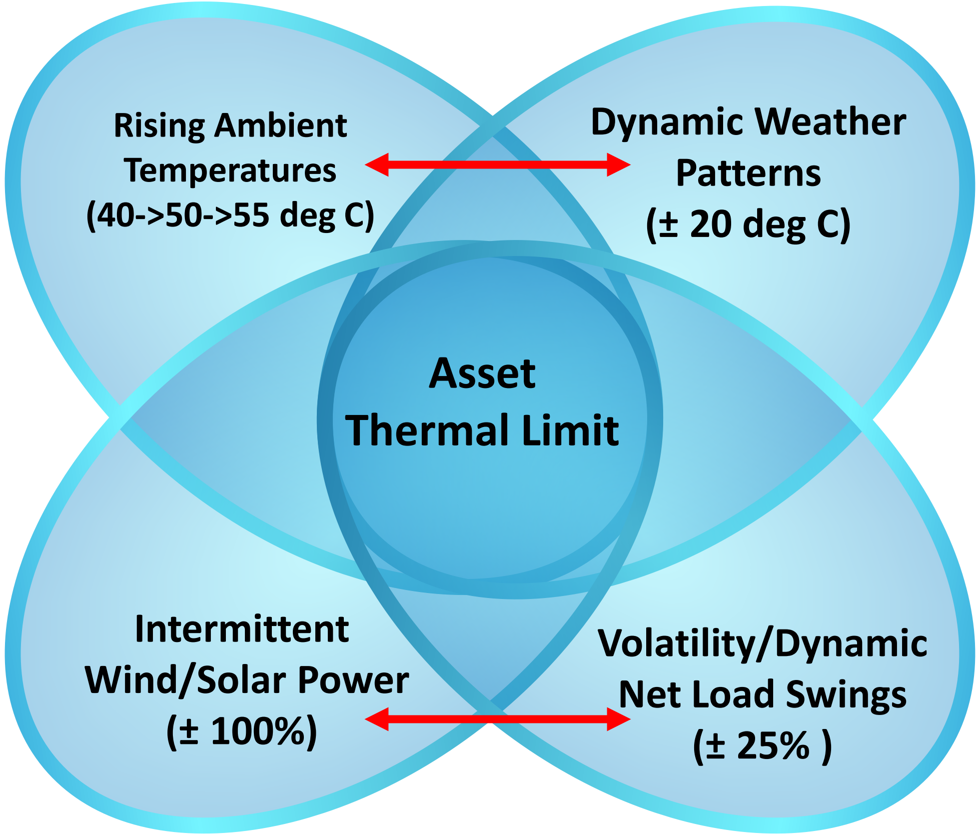
Avoid 10-15% Name-Plate Derating



Ambient Adjusted Rating

Dynamic Rating

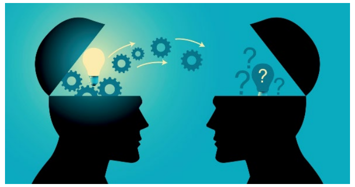
Status Quo – Asset Temperature
- Loading and Asset Δ-temp. Limit
- Ambient Temp.

Forecasted 4-Hour Load
- New Loading
- Forecasted Ambient Temp.

Asset Capability to take New Load (Yes/No)
- Projected Asset Δ-Temp. Rise
- New Δ-Temp. Thermal Limit

Ambient Temp. + Internal Temp. + 4-hour Load Forecast + Ramp Rate + 4-hour Ambient Temp. Forecast = Asset Capability to meet load

4. Reduce Weather Impact on T&D Assets

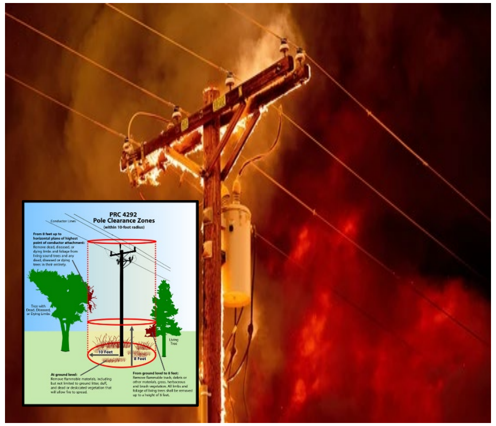


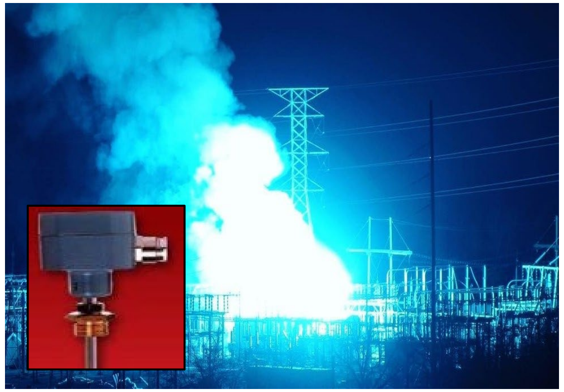
Flood

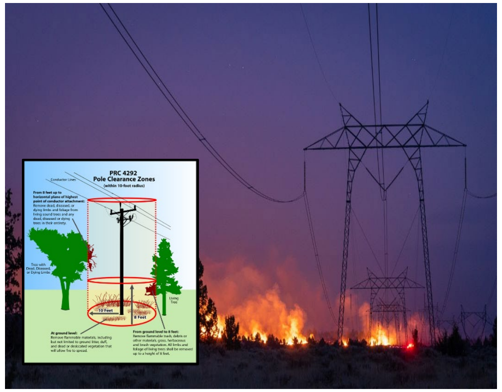
Wind/Ice

Temperature

Wildfire







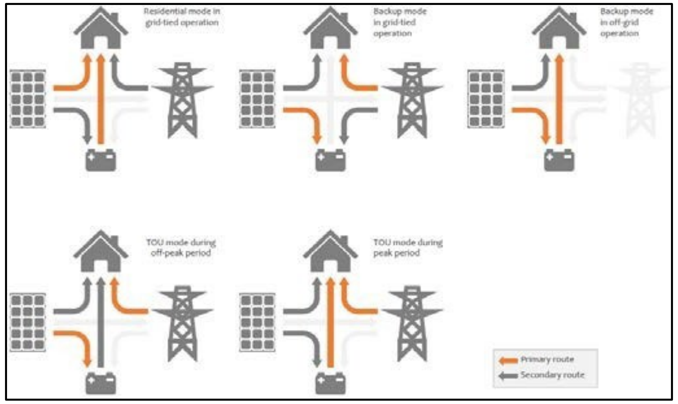
5. Ensure Last Mile Delivery Alternatives

Underground: Reduce Trenching and Cabling Costs

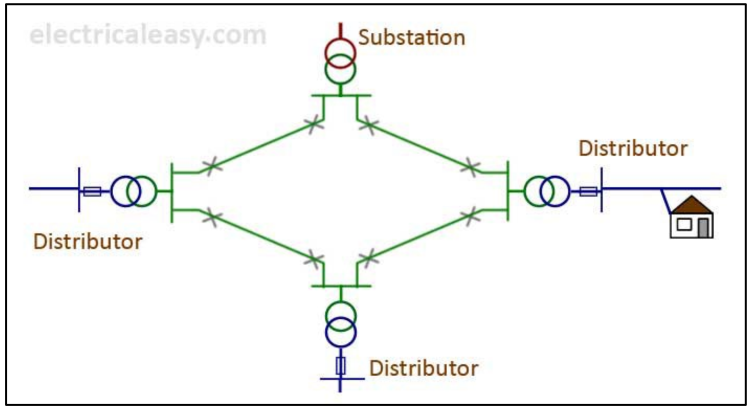
Shallow Trenching	Eliminate "Fill" Materials	No Vegetation Management
• Less Digging • Less Backfill • Save Labour	• Sand Beds • Brick Covers • Save Labour	• Large savings

Customer Energy Storage

Flexible Load-Balance



Feeder Routes & Backup



Potential Joint Work Program

Global Smart Energy Federation

Brazilian Partners

- Form Joint Working Committee
- Create Weather Impact Use Cases
- Recommend/Remedy Immediate Fixes
- Recommend Revision to Standards & Codes

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THANK YOU

Brief CV

Ravi Seethapathy

Life Fellow, Canadian Academy of Engineering Life Senior Member, IEEE
Professional Engineer, Ontario B.Tech (Hons), M.Eng, MBA ravi.seethapathy@gmail.com

Ravi Seethapathy, serves as the Executive Chairman of Biosirus Inc., Canada and also serves as the “Ambassador for the Americas”, for the Global Smart Energy Federation; as Technical Expert, for the Coalition for Disaster Resilient Infrastructure (CDRI); as an Advisor to the India Smart Grid Forum (ISGF) and the India Energy Storage Alliance (IESA). He is an Expert Advisor to the Utilities/Industry in the Energy and Power Systems area with over 35+ years of experience.

His contributions in the Canadian utility sector includes Systems Innovation & Advanced Grid Development at Hydro One Networks, Canada. At Hydro One Networks, he led the power systems technical architecture of its RD&D Programs (2009-2014); Advanced Grid (Smart Grid) Pilot Project (2009-2011), the Corporate Smart Grid Strategy Taskforce (2008) and from 2006 the initial efforts in the integration of DER in the Hydro One Distribution System. His 29+ years of experience at Hydro One/Ontario Hydro has been in almost all fields of electric utility business and he has progressively held leading positions in Protection & Control, Field Operations, Hydraulic Generation and Transmission Operations, Generation Performance, Distribution Strategy/Planning, Mergers & Acquisition, Corporate Audit, Asset Management and Asset Strategies Divisions and most recently in Corporate Research.

His current/past international technical activities include (1) Canada Expert Member, (a) IEC SEG 13 “Electrical Equipment Under Extreme Climate, Environmental and Disaster Conditions”; (b) IEC SEG 12 “Bio-digital Convergence”; (c) IEC SEG 11 “Future Sustainable Transportation”; (2) CSA/IEC TC 120 - Energy Storage; (3) CSA SysC LVDC Committee; and (4) Chair, India Smart Grid Forum WG 5 (Renewables & Microgrid). He is an invited speaker in the international Smart Energy /Infrastructure /Mobility areas, having co-authored over 50 technical papers.

is prior professional engagements include Advisory Council of EPRI’s Power Delivery and Utilization Division (2010-2014); Governing Council, Energy Research Initiative, Semi-Conductor Research Corporation (2012-2014); CEATI’s Smart Grid Taskforce (2012-2014) and SOIG WG (2009-2011); Corporate Directorships at Larson & Toubro’s Power Transmission & Distribution IC (2018-2024); Smart Grid Canada (2012-2019), India Smart Grid Forum (2015-2018), Toronto Atmospheric Fund (2015-2017), Ryerson University (2007-2010), TV Ontario (2001-2007), Scarborough Hospital (2002-2004) and as Chair of Engineers Without Borders (2000-2006), Canadian Club of Toronto (2003-2004) and President Indo-Canada Chamber of Commerce (1998-2000).

He is a Senior Life Member of the IEEE; a Life Fellow of the Canadian Academy of Engineering; and a registered Professional Engineer in Ontario. He actively lectures at Conferences, Utilities, Universities and mentors small technology companies. He was honoured with the ISGF President’s Award (2023), IEEE Life Member Service Award (2021) and Queen Elizabeth II Diamond Jubilee Medal in 2012, among other numerous citations and awards. He holds a B.Tech (Hons) in Electrical Power from IIT Kharagpur, India, an M. Eng in Electrical Power from University of Toronto and an MBA from the Schulich School of Business, York University, Toronto. He/ family have endowed an IEEE Award in "Rural Electrification Excellence".