Requalification of Energy Systems For Energy Transition

A Five-Themed Focus For Latin America

GSEF
Global Smart Energy Federation

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Latin America Highlights

The Right to Economic Developement
Global Energy Transition Needs Latin America

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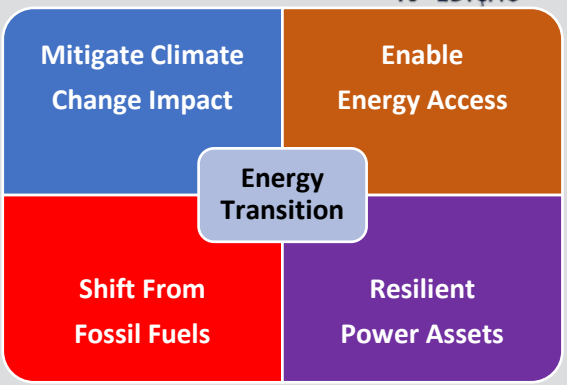

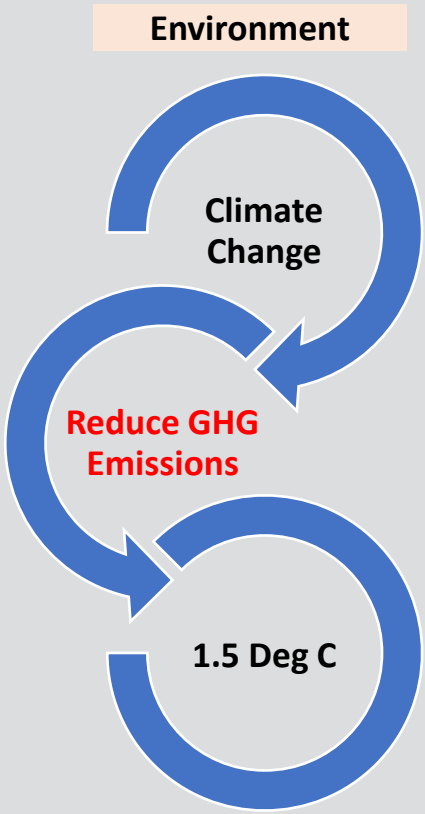

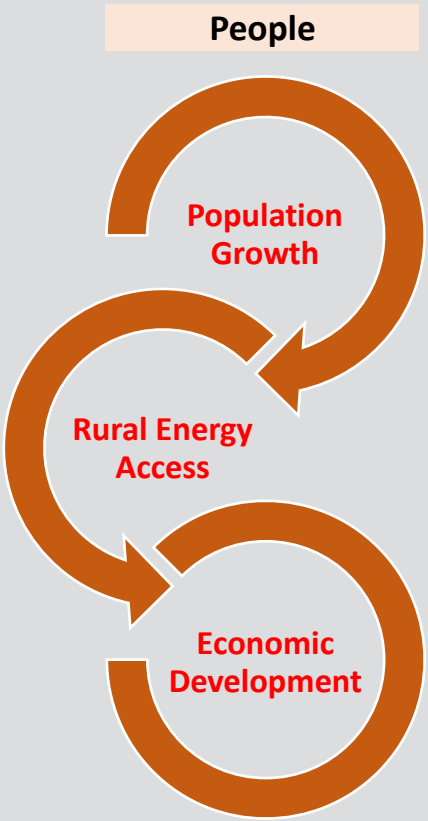

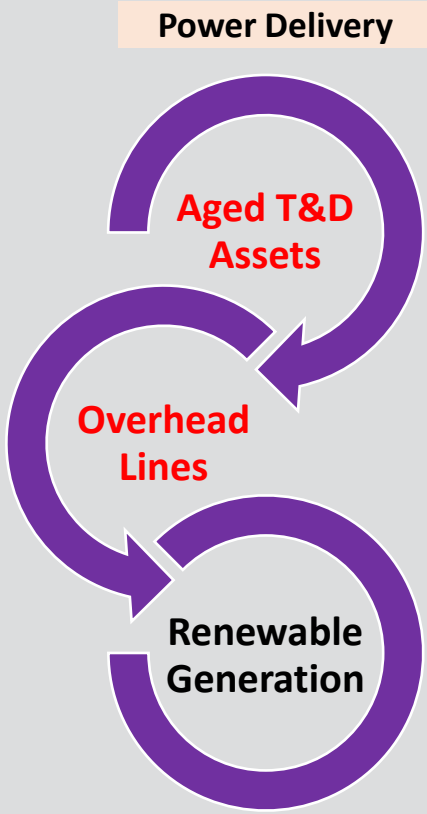

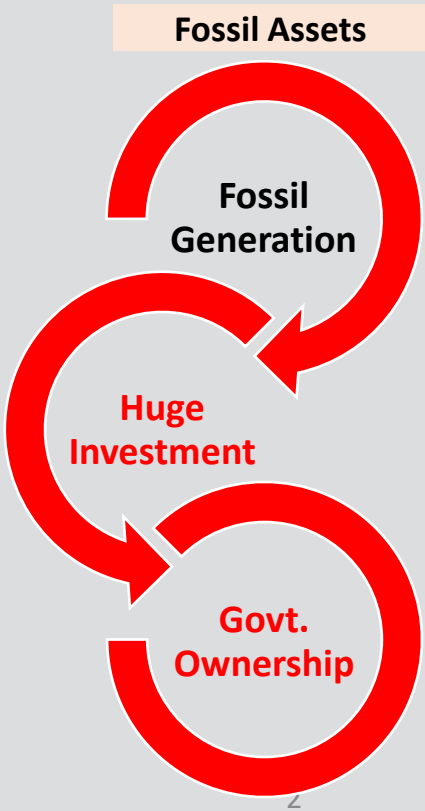

Business Challenge

Not Paid Off Yesterday's Assets - Can We Afford to Double-Dip?

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Stranding Fossil Assets

- Coal, Oil, Gas and Downstream industries
- Huge Govt. Stake and Ownership

People's Impatience For Progress

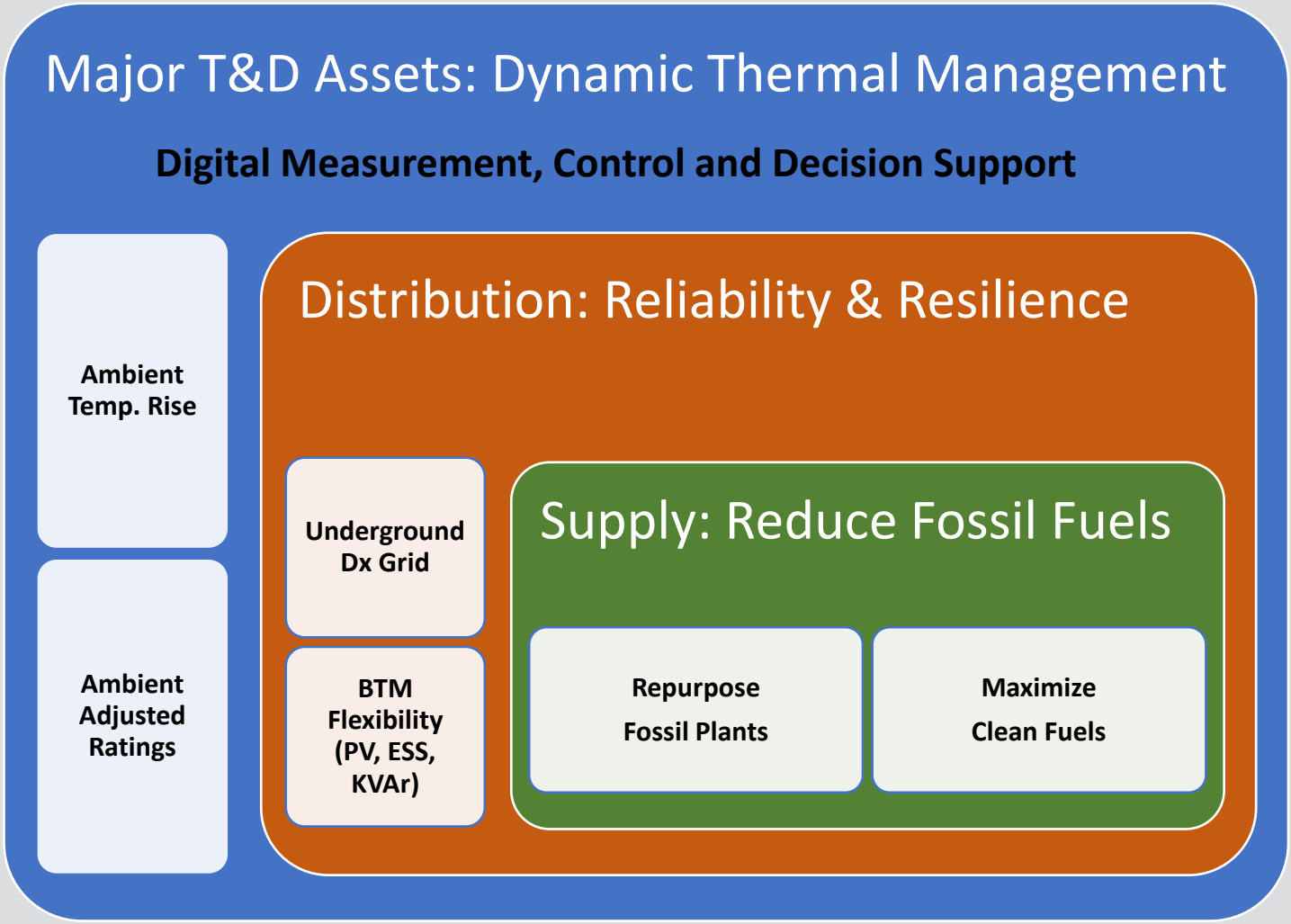
- Energy Access & Economic Development
- Social Cost of Power Disruptions

Managing Climate Change

- Temp. Rise, Weather Disruption
- Improving Resilience & Reliability

Affordable Climate Change Strategy

Leverage Existing Assets With Digital Technology
Repurpose Existing Fossil Generation



1. T&D: Dynamic Thermal Management

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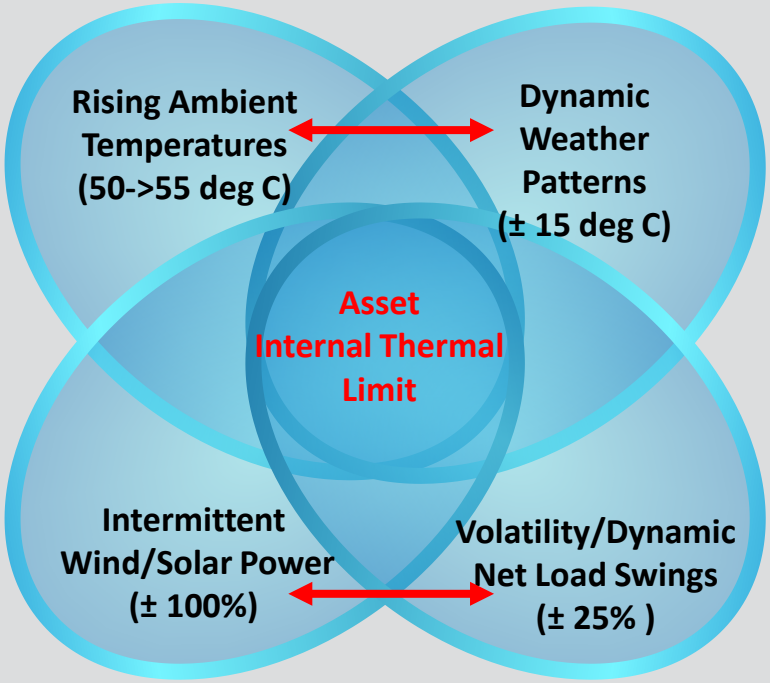
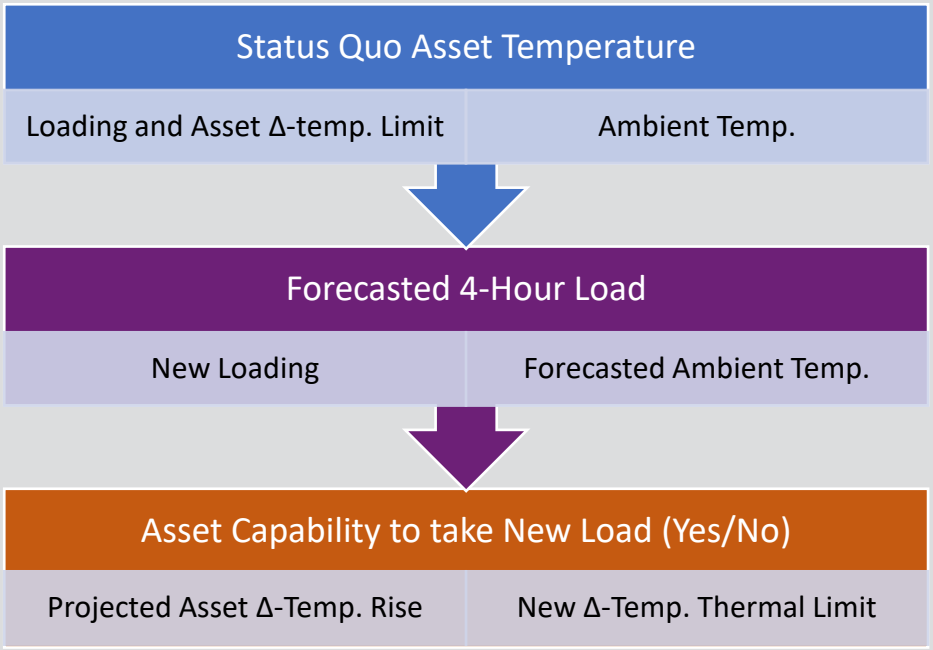
Avoid 10-15% Name-Plate Derating

Fiber-optic Digital Temperature Measurement

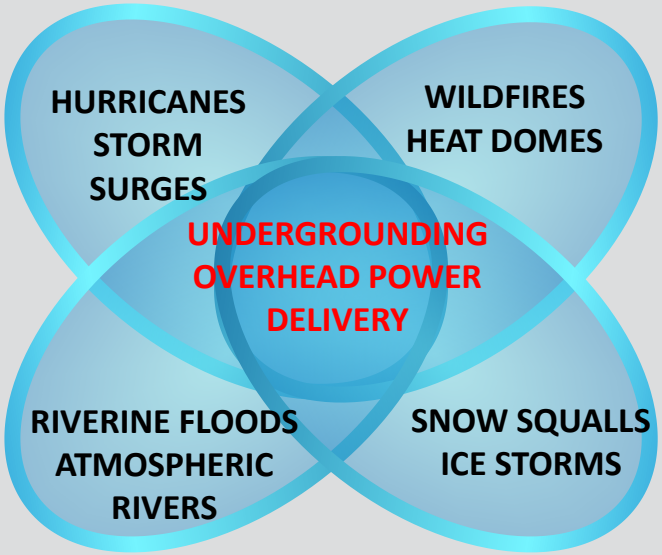




2. Undergrounding Dx Grid

Re-Imagining Undergrounding to Reduce Cost

Snap-Pipe Technology



Underground Cables

Good for Climate Resiliency	High Cost (4x – 7x OH)

Reduce Cabling Costs

Shallow Trenching	Eliminate "Fill" Materials	Use Unarmored Cable
• Less Excavation • Less Backfill • Save Labour • Fast Execution	• Sand Beds • Brick Covers • Save Labour • Save Time	• If Cable better protected • Cost saving on Cable





3. Behind the Meter Flexibility

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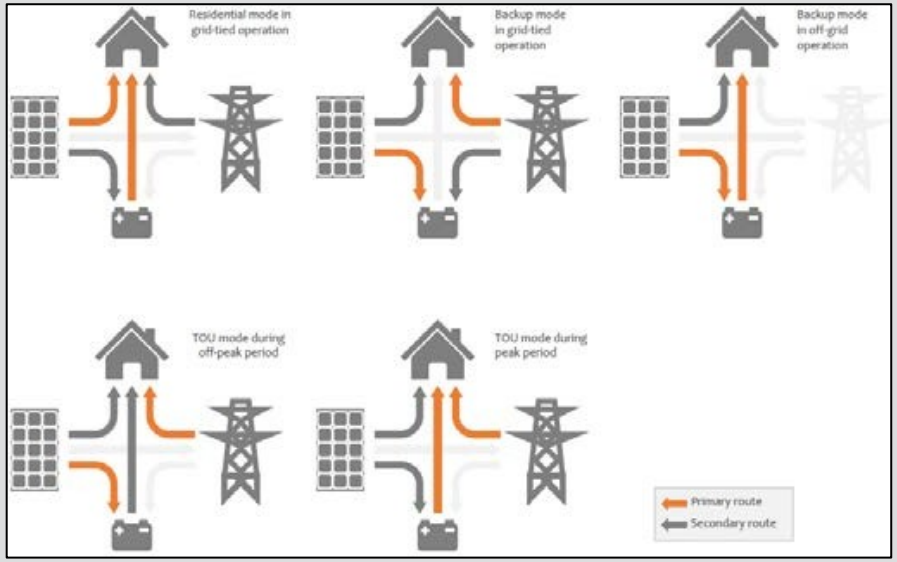
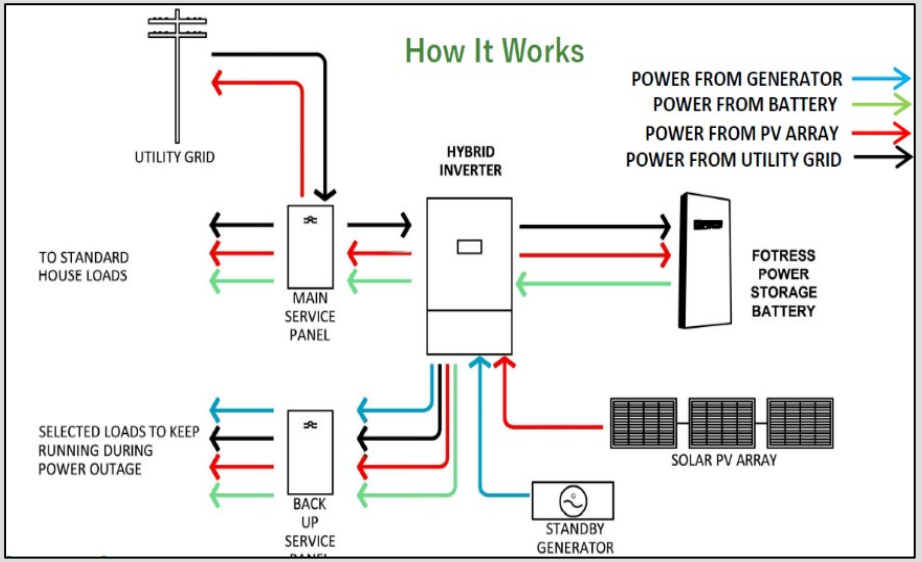
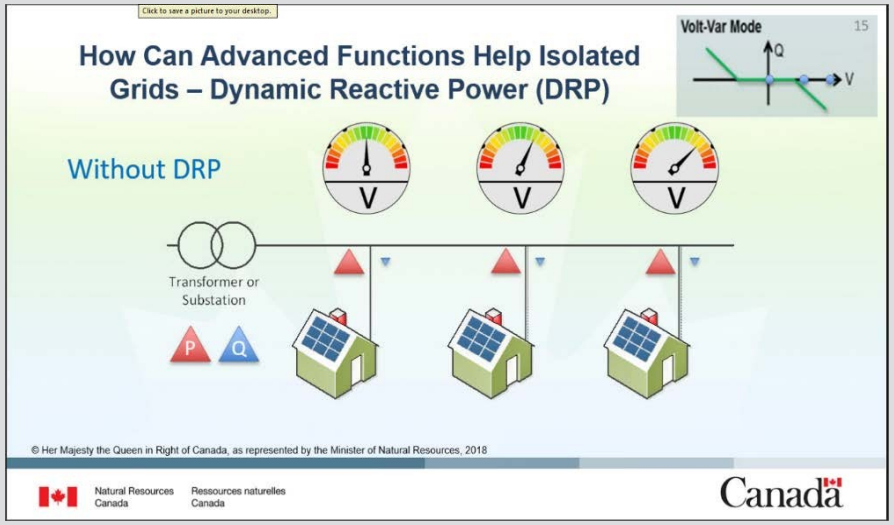
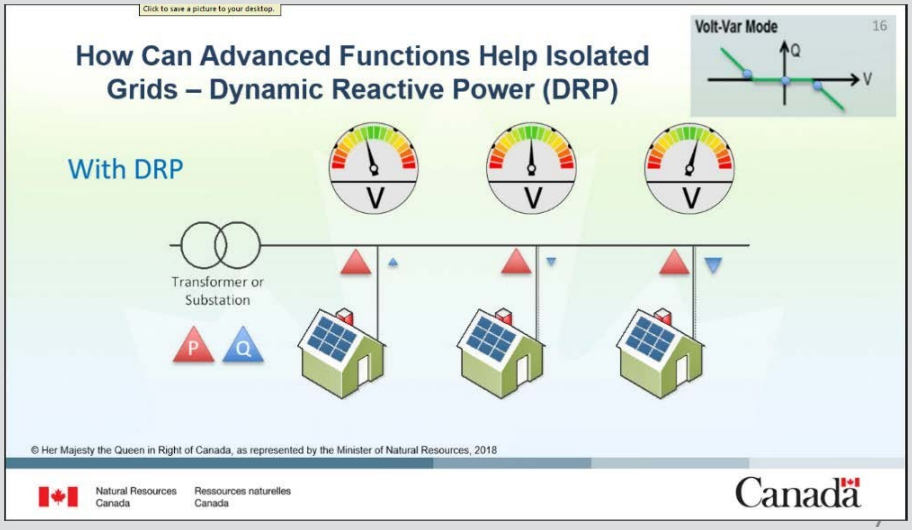
Energy Storage, Dynamic Reactive Power (DRP)

Smart Hybrid Inverters - Vital Investment For Customer Options









4. Rural/Remote “Nano” Energy Access

1-5 KW Scalable Miniaturized Design

Plug-and-Play Architecture

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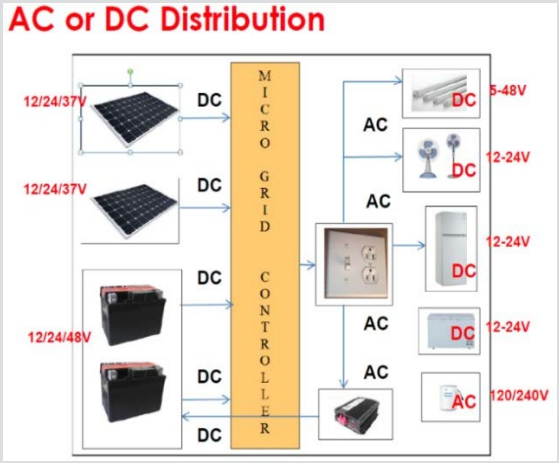
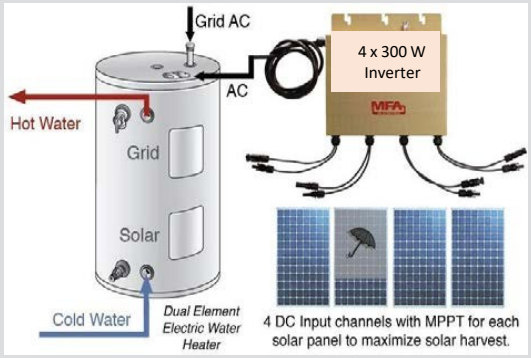
Hybrid PV-Battery System:

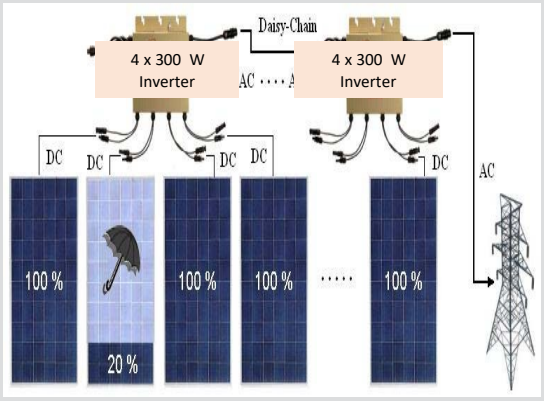


Off-Grid: PV Hot water system

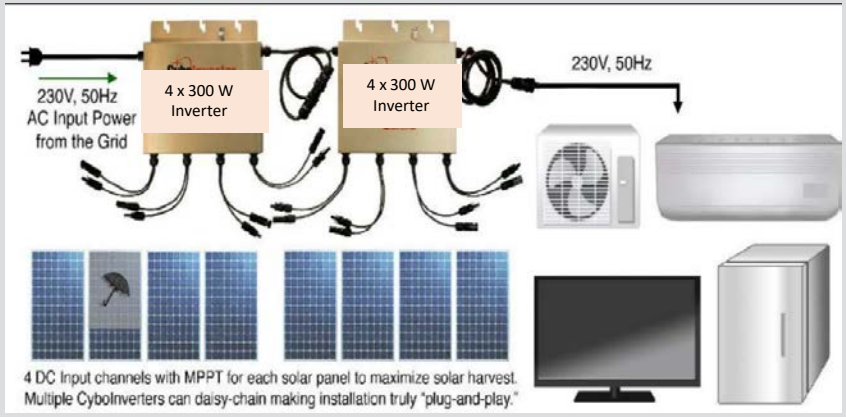


Rural Energy Bazaar

Hybrid: Rooftop PV



Hybrid: Load Management

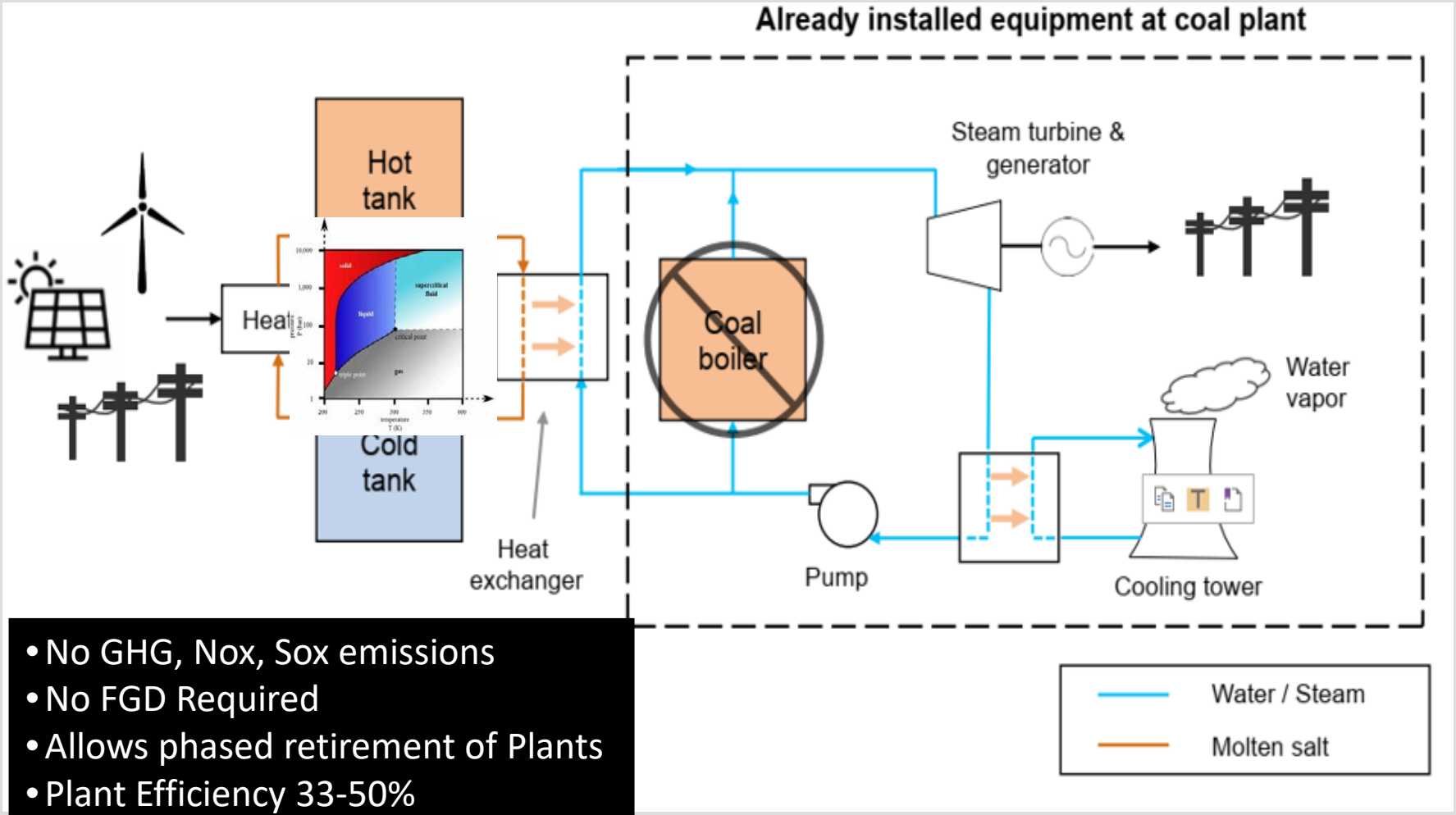


5. Repurpose Fossil Plants

Replace Fossil Boiler with Supercritical CO2 Steam Cycle

Allows For Phased Plant Retirements

Ideal for <100 MW Coal/Oil Fired Plants



- No GHG, Nox, Sox emissions
- No FGD Required
- Allows phased retirement of Plants
- Plant Efficiency 33-50%

In Closing

- **Leverage Existing Assets with Digital Technology**
  - Digital Measurements, Controls, Decision Support Systems
  - Allows for a Distributed Architecture
  - Easy communications across

- **Most Solutions Available Commercially**
  - Fiber Optic Temperature Measurement (Dynamic Rating)
  - Snap-Pipe Cable Protection (HV/MV/LV Cables)
  - Behind-the-Meter Smart Hybrid Inverters (10-30KW with ESS)
  - Micro-Scale Hybrid Inverter (<5 KW Rural Energy Access)
  - sCO2 Steam Cycle will require R&D (<100 MW)

- **Collaboration Welcome**

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Thank You

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GSEF
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Brief CV

Ravi Seethapathy
Life Fellow, Canadian Academy of Engineering
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Ravi Seethapathy, serves as the Executive Chairman of Biosirus Inc., Canada and sits as a Corporate Director on the Board of Power Transmission & Distribution Division (IC) of Larsen & Toubro, India. He also serves as the "Ambassador for the Americas", for the Global Smart Energy Federation, USA, and an Advisor to the India Smart Grid Forum and the India Energy Storage Alliance. 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. He/ family have endowed an IEEE Award in "Rural Electrification Excellence". His 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 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.