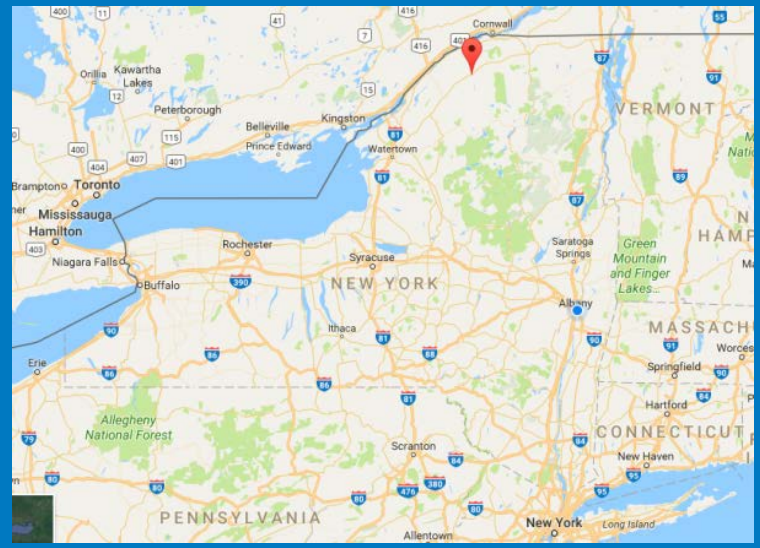
MICROGRIDS: Community Resiliency, Potsdam NY



Arun Vedhathiri, Director, New Energy Solutions
Advanced Energy Conference, New York, March 27, 2018

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REV Project Demonstration Goals

- Develop and test four utility services serving a multi-customer Microgrid for a 2-week outage scenario in Village of Potsdam:

A. Tiered recovery for new storm-hardened underground wires

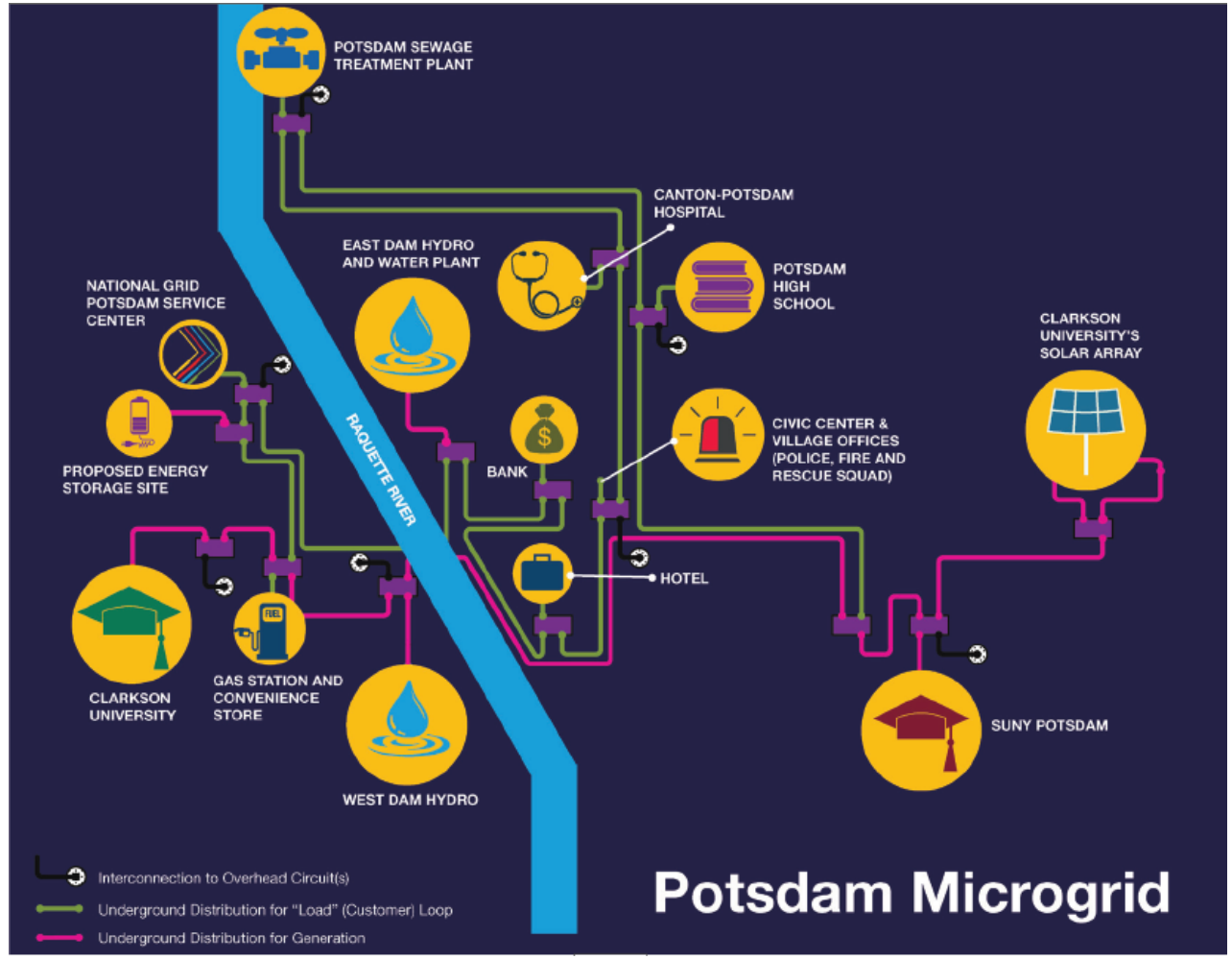
B. Central procurement of DER

C. Microgrid control and operations

D. Billing and financial transaction (settlement) services

Critical and Essential Facilities

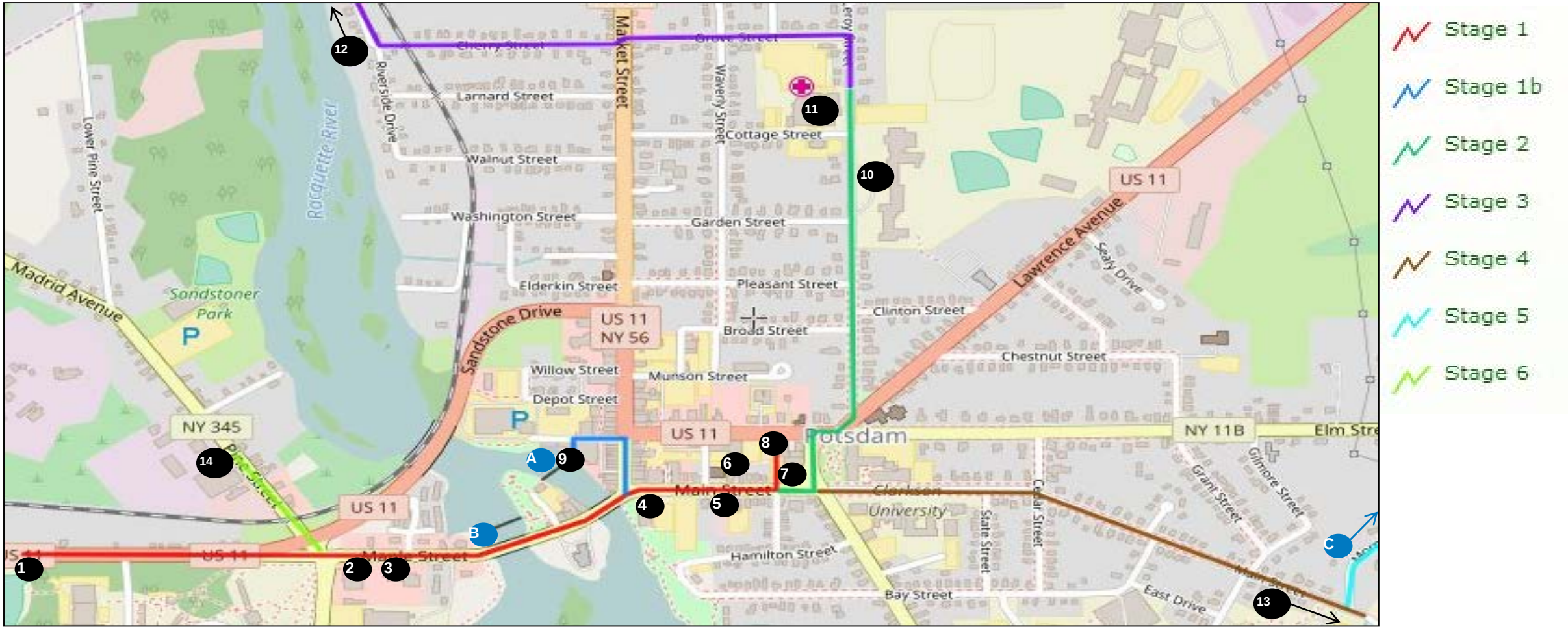
- Hospital
- Universities (2)
- Police Dept.
- Fire Dept.
- Rescue Squad
- Pharmacy
- Gas Station
- Grocery Store
- Bank
- Hotel
- Water Treatment Plant
- Wastewater Plant
- Utility Service Garage



Distributed Energy Resources

- Existing firm generation sources:
  - One 500 kW hydro generating facility
  - One 2 MW solar PV array
  - Two 1.4 MW CHP facilities
  - Numerous Diesel, Nat. Gas <500 kW engines
- Some renewables unreliable during storms
- Need additional ~3 MW firm generation
- Limited hours for economic discharge of CHP

Staged Roll Out Map



Tier 1 Customers: Hospital, Universities, Town Hall

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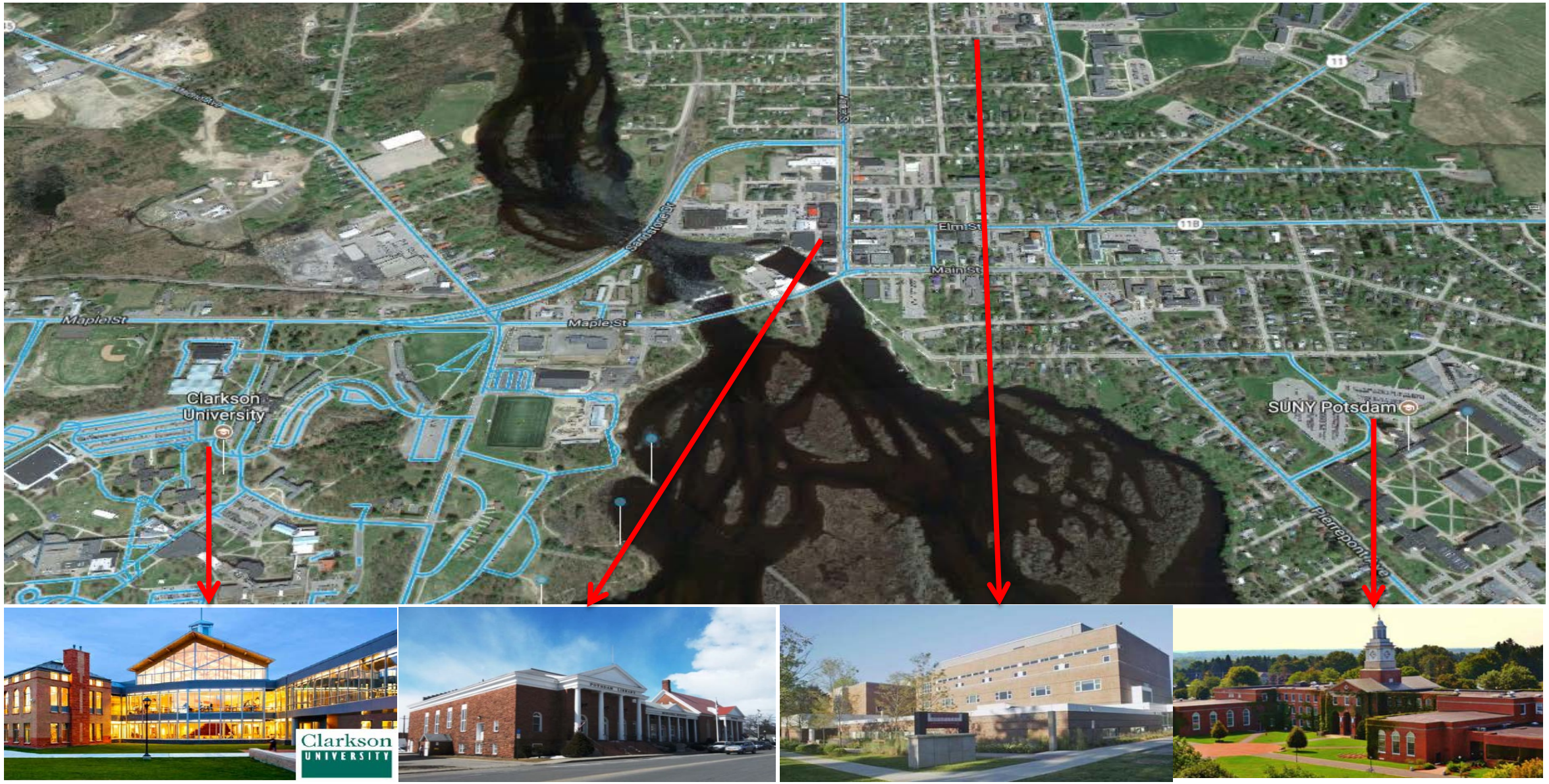

Community Resiliency – Potsdam Microgrid Engineering Plan & Financial Model

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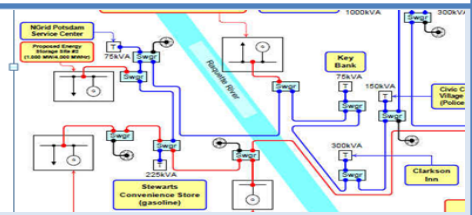
Essential Loads	Required Firm Generation	Engineering Plan / Detailed Design	Financial Model / Rate Designs	Customer Value Proposition
				
Conduct energy audits of large users - two universities and the hospital; quantify energy efficiency (EE) and demand response (DR) opportunities.	*Determine amount of existing DER available to Microgrid; determine quantity and type of additional DER needed for Microgrid.*	*Design underground storm-hardened wire system; ID equipment types and quantity needed. Develop standard interconnection and operating protocols.*	*Develop tiered financial recovery plan and calculate bill impacts using costs developed in engineering design. Seek funding for capital project.*	*Present service options to stakeholders; obtain feedback; make refinements to contract models.*
Optimal DER Sizing Determined per Customer	**Completed, Staged Roll-out Model**	**Phased Model, Detailed Design in Development**	**Tiered Recovery Modelled**	**Customer Value Determination, Value of "R"**

Community Resiliency – Potsdam Microgrid
Lessons from Stakeholders

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Microgrid Customers (Those directly connected to Microgrid)	▪ Support Microgrid as critical to Potsdam area resiliency. ▪ Open to pay for resiliency, value-R varies by type of facility ▪ Loads will evolve over time due to numerous variables. ▪ Preference for utility ownership & control of MG assets. ▪ Need economic model to curtail load during emergency ▪ Benefits should exceed customer's back up generators
Microgrid DER Owners	▪ Low energy prices in Potsdam makes any DER operation economically challenging. ▪ Need guaranteed revenue model for capacity and energy ▪ Prefer to outsource operation and maintenance of DER

Community Resiliency – Potsdam Microgrid
Lessons from Stakeholders

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Utility	▪ Staged construction of underground distribution necessary to balance costs and benefits ▪ Ownership of Microgrid wires and controller ▪ Safe and stable transition and operation of Microgrid ▪ Standardize system Microgrid components and controller minimizes costs and risks ▪ Regular operational drill for MG scenario required ▪ Tariff changes will be required to address regulatory compliance provisions and pricing. ▪ External funds critical to MG financial acceptance ▪ Need firm generator capacity for all essential loads
Residents (Rate Payer)	▪ Essential services valued most during an outage ▪ Sensitive to electric rate increase of any amount

Community Resiliency – Potsdam Microgrid
Proposed Governance / Business Model

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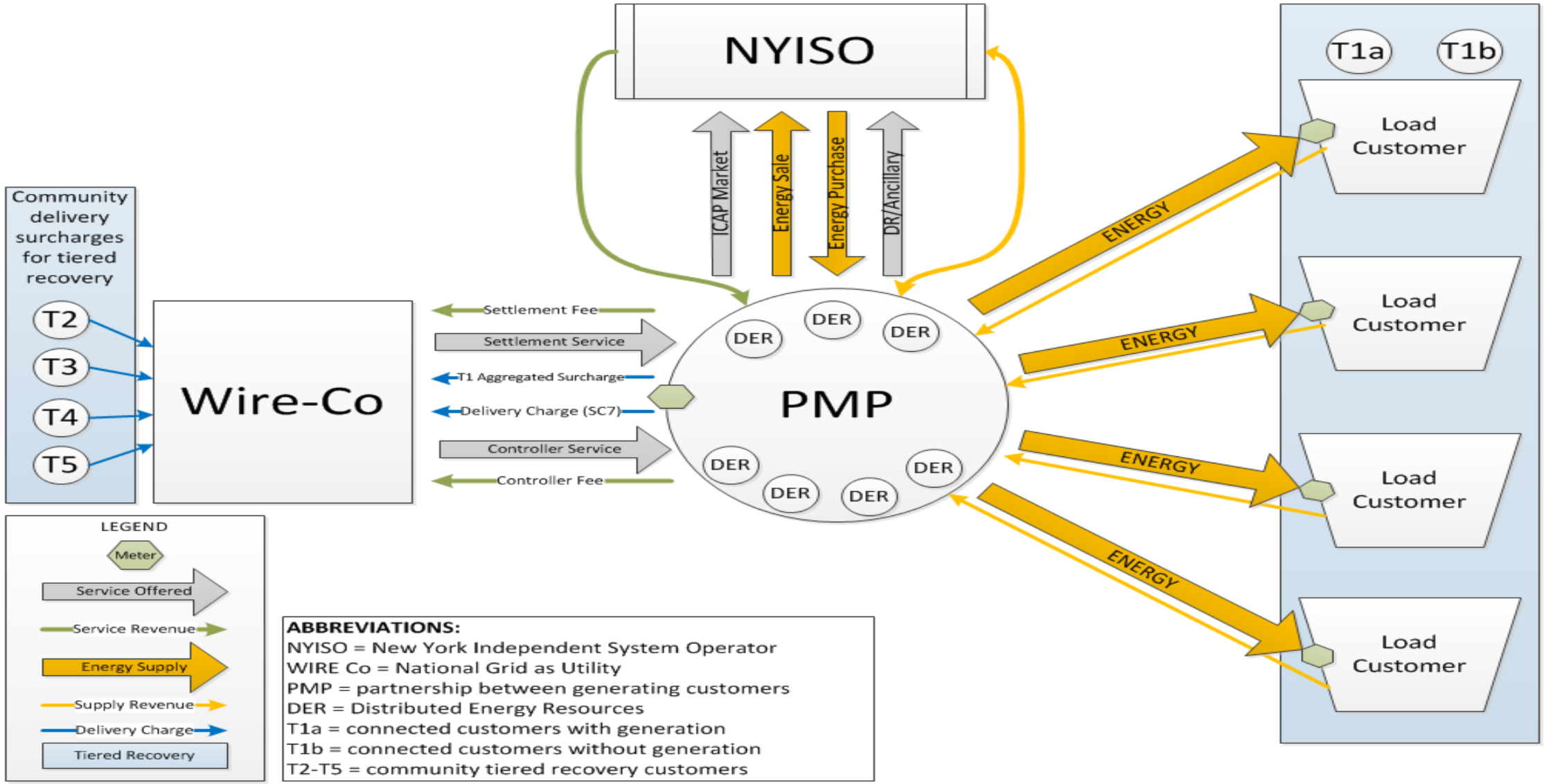

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