A Policy Framework for a Bottom-Up Clean Energy Transition

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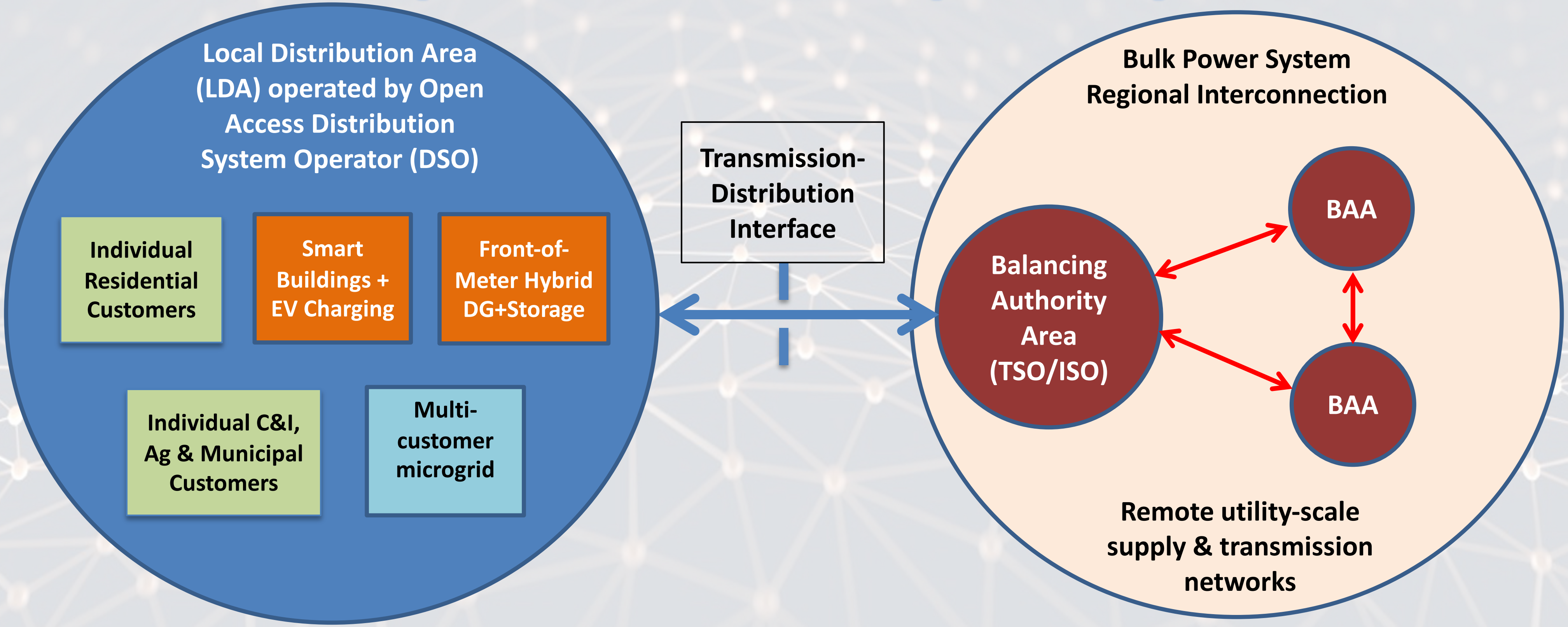
The future electricity system:
An open-access transactive distribution network complements the bulk power system



- Distribution network enables diverse customers & local DERs to transact
- Open-access DSO manages local network & local markets to integrate DERs & microgrids in coordination with bulk power market
- Locally-owned & operated DERs support local decarb & resilience projects, power new electrification demand, benefit local economy & sustainability

- Bulk power system moves renewable energy from production areas to load centers
- Supplements local production with regional energy diversity & bulk transactions
- Responsible for real-time system balancing

Today's challenges require local solutions

Sustainability & Decarbonization => **Stop making climate chaos worse**

- Emissions result from activities shaped by local systems & structures
- Urban planning => zoning; land use; housing; building codes; mobility services; economic development; habitat; urban forestry

Resilience => **Prepare to maintain electric service when the grid fails**

- Carbon-free microgrids to power critical services & resilience centers

Energy Justice => **Promote locally-owned energy supply**

- Energy is a key social determinant of health
- Locally energy supply businesses build local wealth & economic vitality
- Target vulnerable neighborhoods — health, economy & resilience
- Mitigate historic harms & inequities due to energy practices

Local energy systems are essential to meet today's urgent needs

DER technologies offer competitive local solutions

DERs now challenge the utility system to compete to retain customers

- DER cost-effectiveness trends are rapidly surpassing the grid
- Customers who can afford DERs no longer need the grid
- Policies to suppress DER adoption increase incentives for grid defection
- Grid defection by affluent customers will worsen energy inequities

Needed => A policy/regulatory framework to realize the greatest total benefits from DERs, facilitating & leveraging local, non-utility DER investment

Some local energy possibilities

- **Compensate individual customers & local solar sites** to over-size solar+battery systems to provide energy to their neighbors & to the grid
- **Enable locally-owned businesses & co-ops** to supply electricity & electric vehicle charging to support the local economy
- **Deploy municipal electrification projects** — public mobility fleets & school buses, powered by publicly-owned local renewable energy assets
- **Retrofit neighborhood "resilience centers"** to provide emergency shelter, warmth, cooling, food, medical care, phone/internet service, & zero energy costs year-round
- **Build local energy planning capacity** to co-optimize local power production with tree canopy, land use, public space, stormwater capture at neighborhood level.

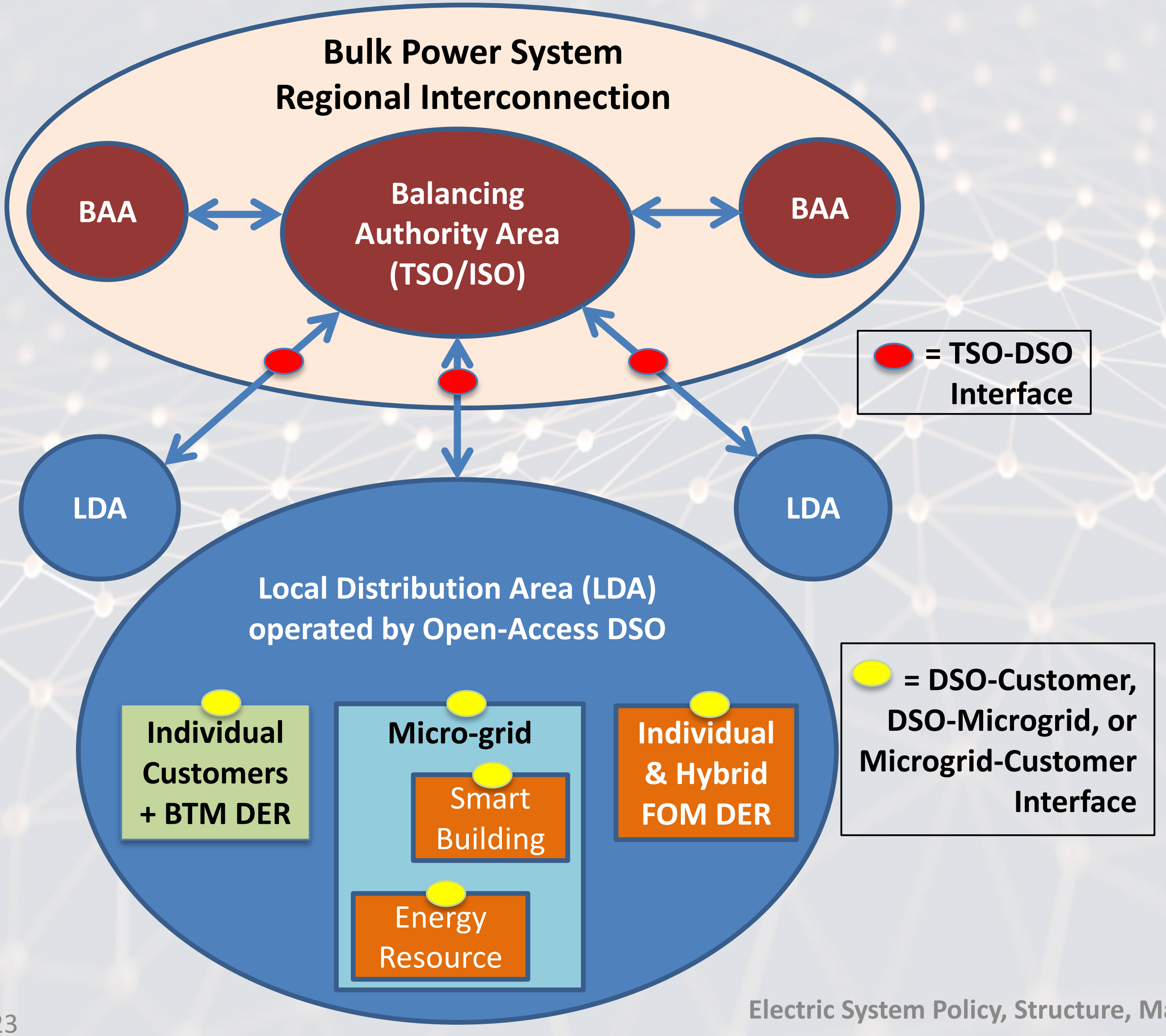
Local electricity systems are needed, feasible & cost-effective

We need policy & planning frameworks to enable them.

Elements of the needed policy/regulatory framework

- **Economic transaction opportunities, to deter grid defection**
  - Local energy supply to serve local customers — aligned with physics
  - Provide distribution grid services; flatten net load profiles
  - Assign Resource Adequacy capacity value
- **Reform the distribution utility as an open-access DSO**
  - Create distribution-level counterpart to open-access transmission
  - Two core functions: 1 Provide non-discriminatory network service
    - 2 Coordinate operations, markets & planning with bulk system
  - DSO revenue model & incentives based on services & performance
  - Separate competitive functions from regulated monopoly
- **Layered architecture for Operations, Markets, Resource Adequacy**
  - DSO market serves electrification load locally; flattens net load at T-D interfaces to minimize TSO operational challenges

Layered Architecture for a Resilient High-DER Electricity System



- Main layers = Bulk System; Distribution System; Network Customer/DER
  - Multi-customer microgrid may exist in between Dist. System & Customers
- Unit of analysis is the Local Distribution Area (LDA) associated with a single T-D interface (ISO/RTO pricing node)
- Each layer needs to manage its interfaces with adjacent layers above & below
- Focus on interfaces => Operator of each layer does not need visibility or control of assets within the layer below
- Interfaces allow for bi-directional flows
- Each layer can “island” from layer above at the interface point
- Layering has implications for technical implementation requirements

A policy framework for a bottom-up energy transition

1. **Adopt a Community Energy Bill of Rights (CEBOR)**
   – Right to deploy DERs to meet local needs & interconnect/transact with the grid
2. **Reform the distribution utility to be an open-access network**
   – Provide the electric network to enable the CEBOR; support local entities to design & implement DER projects; compensate based on performance
3. **Adopt rules to allow local electricity transactions**
   – Allow community DERs to serve local customers without going through the transmission system & wholesale market — the way power physically flows
4. **Invest in local energy planning capability**
   – State funding & support to integrate energy planning into urban/county planning
5. **Dedicate state agency staff to ongoing collaboration with LGs, Tribes, CBOs**
   – Permanent staff maintain ongoing relationships with local leaders

Thank you!

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