Energy Systems Transformation Framework – Notes from the Boulder Convening 8.5.15

Meeting Participants

City of Boulder
- David Driskell, Executive Director, Community Planning & Sustainability
- Brett KenCairn, Senior Environmental Planner
- Jonathan Koehn, Regional Sustainability Coordinator
- Heather Bailey, Executive Director, Energy Strategy and Utility Development
- Kendra Tupper, Energy Services Manager
- Yael Gichon, Residential Energy Coordinator
- Matt Lehrman, Energy Strategy Coordinator

City of Boston
- Brad Swing, Director of Energy Policy and Programs
- Travis Sheehan, Ecodistrict Energy Fellow

City of San Francisco
- Debbie Raphael, Director, Department of Environment
- Barbara Hale, Assistant General Manager, SFPUC Power Enterprise

City of Minneapolis
- Gayle Prest, Sustainability Manager
- Brendon Slotterback, Sustainability Program Coordinator

City of Portland
- Susan Anderson, Director, Bureau of Planning and Sustainability
- Michael Armstrong, Senior Sustainability Manager

City of Seattle
- Christie Baumel, Climate and Energy Advisor

Other
- John Cleveland, President, Innovation Network for Communities
- Greg Kandankulan, Sustainability Specialist, NRG
- Daniel Gregory, CEO, Pos-En

Meeting Discussion Highlights

Framework Materials

- The materials provide a good synthesis of the rationale for municipal engagement in energy system transformation, and the core strategies for approaching this work.
- The city-specific materials in the framework need to be edited by the cities for accuracy and completeness.
- Material on the City of Seattle needs to be added to the Framework document.
- There are several areas of the framework where additional detail will need to be added over time, including:

    - Demand reduction and its impact on the design of the energy system
    - Thermal de-carbonization
    - Transportation de-carbonization
    - Energy system security and resilience
- When the required edits have been made, the document can be shared within USDN and with external stakeholders.
- It would help to have a "layperson" communications document that frames the energy system transformation opportunity for key external stakeholders.
- Some specific notes on edits:
    - In terms of outcomes, "resilience" should include safety and security (including cyber security).
    - The fact that most cities don't include airports in their inventories should be referenced in the transportation de-carbonization discussion.
    - An ongoing theme is how energy systems planning gets integrated into other city planning processes.
    - It would be good to have some general principles established on "additionality" and REC ownership.
    - Thermal de-carbonization has to deal with the danger of "locking in" fossil fuel use, such as natural gas, which leads to short term GHG emission gains, but no long-term de-carbonization "pathway".

<u>High-Level Market Trends</u>

- **Grid Reliability.** The current grid "…is like a car going down the highway in second gear at 70 mph. It is continuously redlining. This is not sustainable. The grid was not designed to perform at this level. At some point it will crash. We need to 'offload' a lot of demand from the central grid so that it is operating in the 1970s parameters it was designed to operate in. We need to calm the grid down." (Dan)

- **Energy Efficiency as a Grid Planning Tool.** As energy efficiency programs achieve scale, they are in a position to begin to influence the Integrated Resource Planning undertaken by utilities and ISOs. Energy efficiency is becoming a "dispatchable" energy source. The same can also be true of aggregated microgrids – they can eventually be treated as a dispatchable power source.

- **Creating Climate Plans with "Teeth"**. At both the state and city level, climate plans are often documents without any legal standing – they cannot be litigated. Especially at the state level, the plans do not sufficiently influence PUC policy.

- **Impact of Storage Technologies.** The cost of power storage is rapidly dropping and the efficiency and reliability of the technology is rapidly increasing. When it is cheap enough to deploy at scale, utility-scale storage will significantly affect the dynamics of energy markets. They will bring down overall energy prices (by reducing peak load requirements) and enable higher levels of renewable energy integration (by solving the intermittency problem).

- **Clean Power Plan Opportunities.** The EPA Clean Power Plan creates and opportunity for states and cities to advance their energy systems strategies.

- **AC to DC Conversion.** Conversion of power systems to DC power from AC power can result in substantial reductions in overall power requirements (up to 50% according to Dan). This level of increased energy efficiency changes the economics of distributed energy projects and the use of renewable energy to power them.

- **Microgrids.** There are several types of microgrids that cities can experiment with. The results of these experiments can further inform the design of city energy systems. These include:

    - "Behind the grid" projects where the microgrid serves a single customer that is "on the other side" of the utility meter. These are the easiest to manage because they do not present any regulatory issues. The primary customers would be campus-like operations, such as higher education, health care, corporate campuses, etc.
    - "Multi-user Microgrids", or MUMs, which are grids that serve multiple property owners. These can present regulatory constraints due to utility franchise laws.
    - Neighborhood-level micro grids that serve a geographic district. (It was noted that there is some possibility of creating neighborhood microgrids by "moving the meter" – i.e. having one entity serve as the official meter for purposes of the utility, and then sub-metering to downstream users. This is legal in some jurisdictions but not in others. This option was also referred to as the "Urban Electricity Coop" for shorthand.)

Potential Next Steps

The potential next steps for this project fall into three general categories:

1. Finalize the Framework document. The framework would be updated as new information tools are developed.

2. Create new knowledge products. A number of ideas about new information products emerged from the convening. Some of these will be created through funded projects and some would require new funding.

3. Build an on-going network of cities focused on energy systems transformation. The model for this approach is the City Energy Project that has a shared framework for building energy efficiency strategy, funding to support the customized implementation in member cities, and a core set of NGO partners that provide technical support to the cities.

The possible next steps are summarized in the table on the following page.

Energy System Transformation Project Next Steps

Item	Description	Next Steps
Finalize the Framework		
Framework Edits	Edit the Framework document so that it is ready for publishing and distribution to the USDN network.	• **Lead: John** • Get edits from cities on their content. • Get any other content edits. • Update to include Seattle; Boulder discussions; and next steps.
Framework Communications Document	A short document based on the Framework that describes the value of city work on energy system transformation to use with external stakeholders	• **Lead: Boulder** • Develop a scope for this document (contents; length; graphic layout) and secure a mini-grant for its development.
Create Additional Knowledge Products		
Urban Energy System Architecture	High-level system architecture for future urban energy systems that can be used to model the impact of different energy demand and supply choices.	• **Lead: Dan** • Dan has offered to design a half-day workshop with cities to develop this.
DC Conversion Opportunities	A white paper describing the role that DC power can play in reducing energy consumptions and enabling renewable energy sources.	• **Lead: Dan** • Develop an outline and scope of work. • Connect with the Galvin Institute and other players to find out what is already available.
State Policy Agenda	A summary of the changes in state policy that cities can advocate for to support their energy system work.	• **Lead: TBD** • Develop an outline and scope of work.
Energy System Security Framework	A background paper on how cities can contribute to the increased security and resilience of the national energy system, and their local systems.	• **Lead: TBD** • Develop an outline and scope of work.
Storage Technology Impact	A background paper on emerging energy storage technologies and how they are likely to impact the design of city energy systems.	• **Lead: TBD** • Develop and outline and scope of work.
Thermal De-carbonization	A framework for city strategies to convert thermal energy sources (e.g. natural gas and fuel oil) to renewable sources.	• **Lead: Boulder** • Will be developed through the USDN-funded project.
Transportation De-carbonization	A framework for city strategies to convert transportation energy sources to renewable power.	• **Lead: Will** • Develop an outline and scope of work.
Energy Systems and Equity	A framing of the equity issues presented by energy systems transformation and how cities can best incorporate equity principles into their energy work.	• **Lead: TBD** • Develop an outline and scope of work.
Stranded Assets	Framing document on utility stranded assets and choices for addressing them.	• **Lead: TBD** • TBD
Evolve the Network		
Network for Urban Energy System Transformation (NUEST)	Develop a formal multi-year collaboration of cities to advance the work of energy systems change through pilot projects, shared technical resources, policy advocacy and knowledge creation.	• **Lead: John** • Develop a concept document on the network. • Iterate with members of the USDN project. • Work with USDN to explore funding options.
City Applied R&D Network	An extension of the Network concept to include private sector partners and structured applied R&D relationships.	• **Lead: TBD**
NRG Workshop	A workshop with NRG to explore how they might be able to structure collaboration with city partners.	• **Lead: Greg** • Develop workshop scope