



Cities Leading The Way to “Sustainability”:

One (Burlington Electric) Story

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Photo: www.burlingtonelectric.com/history

About Your Presenter



Image: Z Nelson, Burlington Free Press



Why I am here...

Cities are
working to...



Image: Shutterstock.com

While forward-thinking
utilities are trying to...

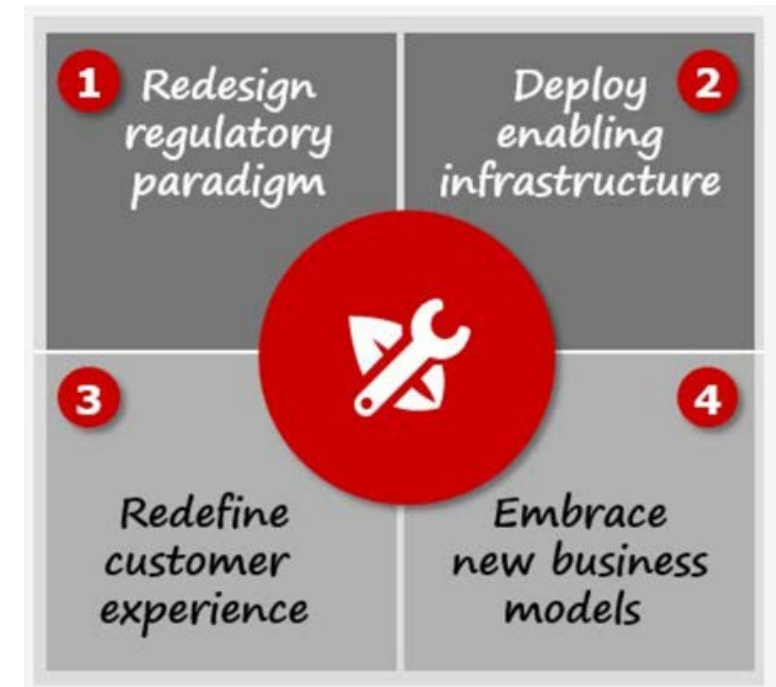


Image: World Economic Forum

Context

Vermont and Burlington

- State ethos
- State energy policy & landscape
- City ethos
- Small Size

Burlington Electric Department Statistics (1905)

- 20,000 meters
- 345,000 MWh/yr
- 84.7 MW capacity obligation
- \$60 million “retail cost-of-service” utility



Drawing: Mullan Illustration

Timeline towards sustainability

Photo: Crudeoilpeak.info



\$11.3 million energy efficiency bond

100% renewable goal set

@winooskidam

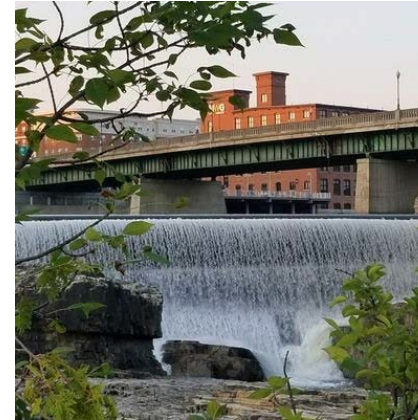


Photo: James Buck

Goal date to achieve Net Zero Energy city

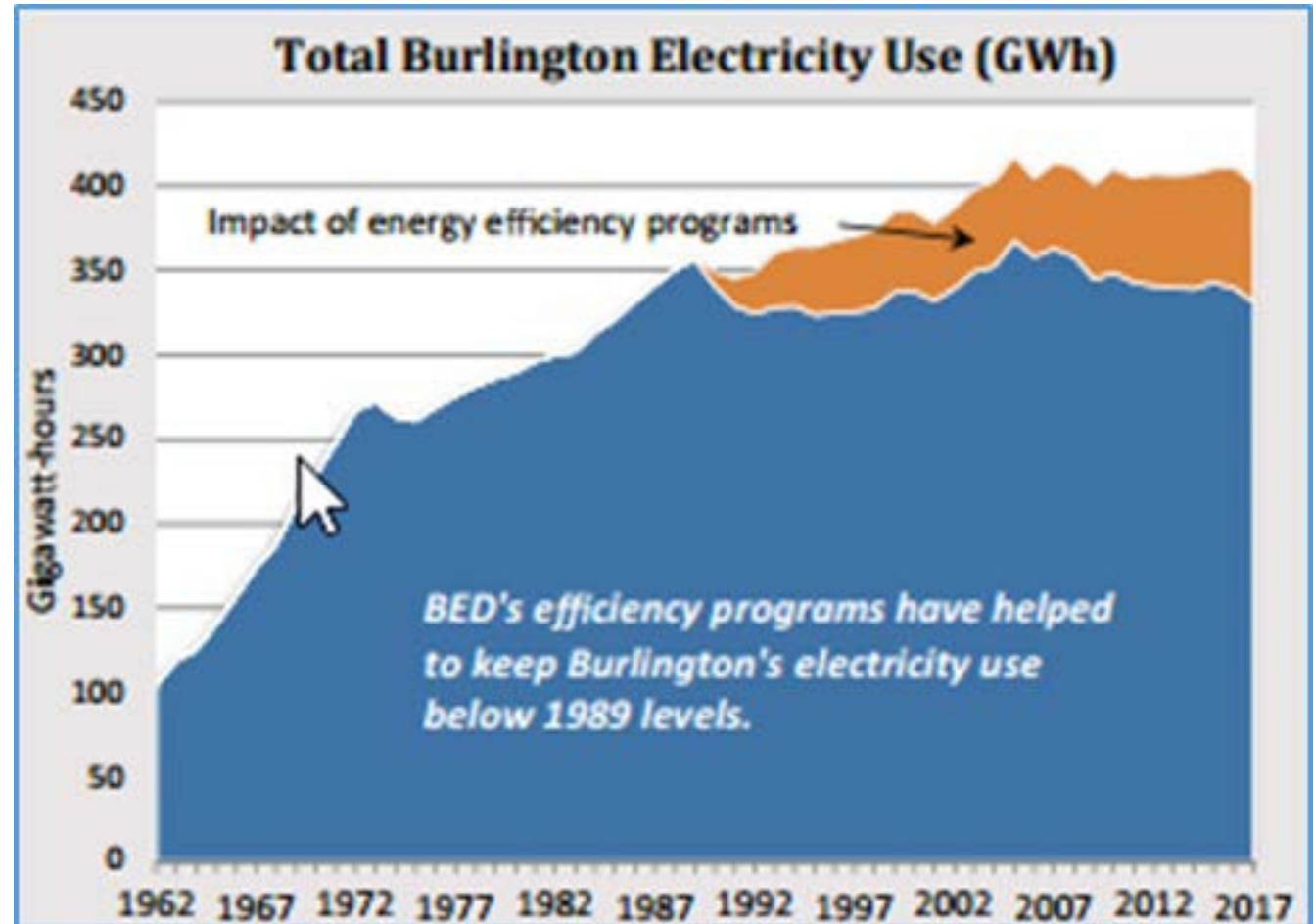
Strategy #1: Use Less

Electricity usage: 1989 – 2017

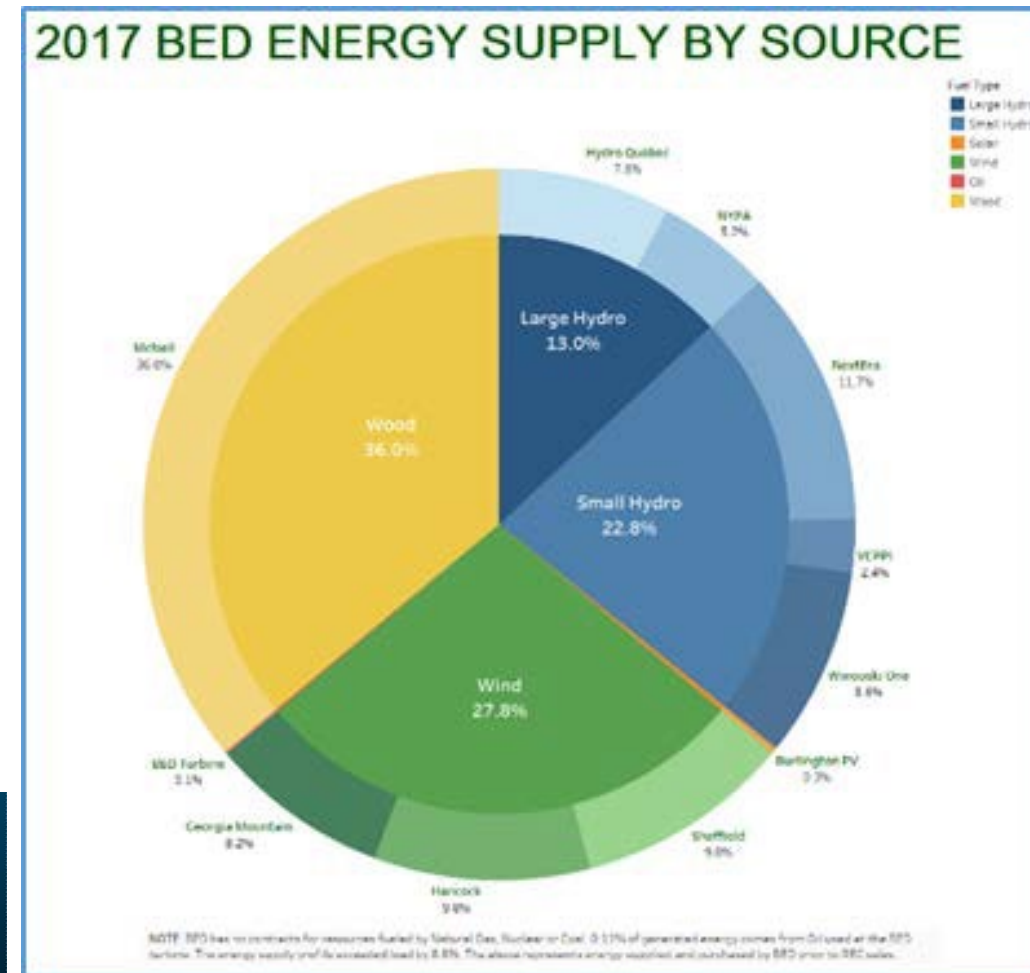
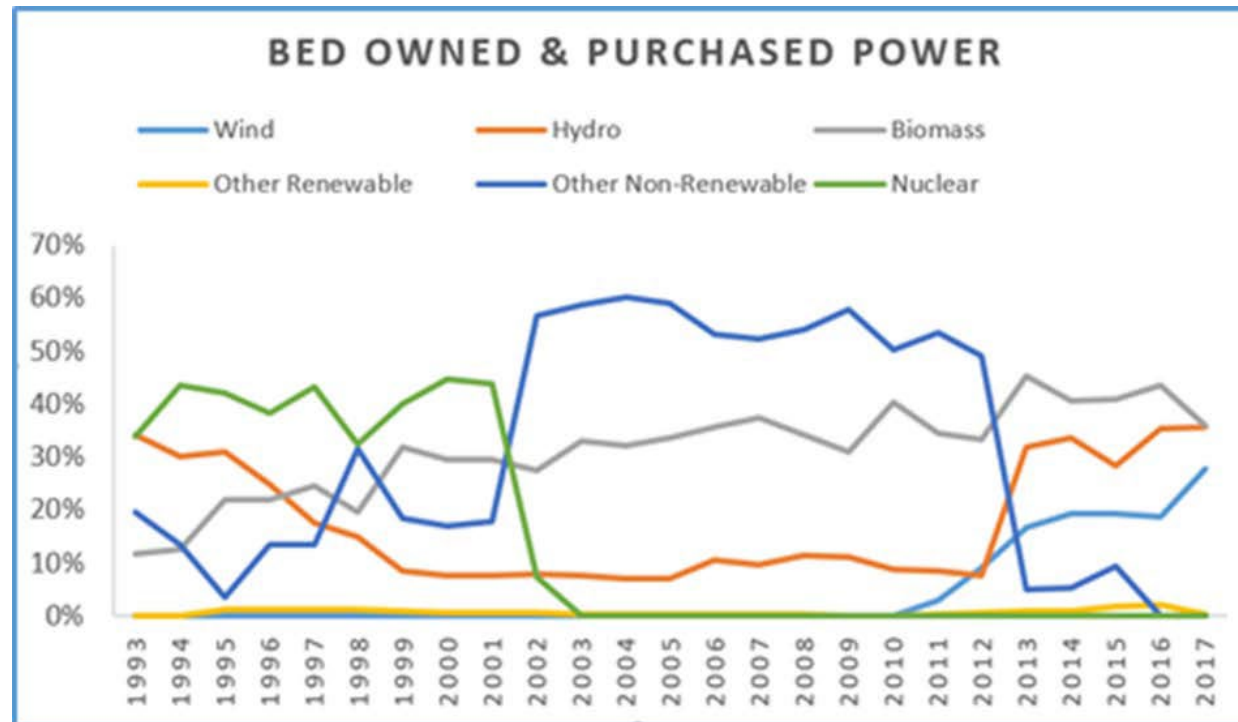
- Burlington: 4% less
- State of Vermont: 10.5% more
- USA: 27.9% more

Financial statistics:

- Since 1989: invested \$31 million, leveraging \$32 million from customers
- Annual savings: \$4.1 million in direct utility costs; customers save \$11 million
- EE delivered at \$0.037/kWh



Strategy #2: Shift towards Renewables



What is renewable? Wood, Hydro, Renewable Energy Credits
Ironies and Challenges

Strategy #3: Control Load Flexibly

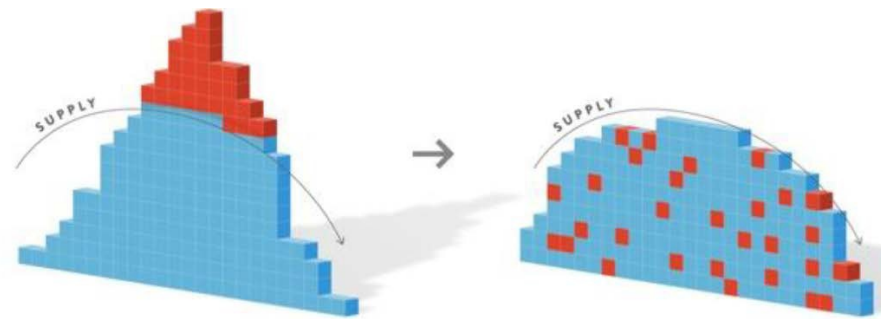
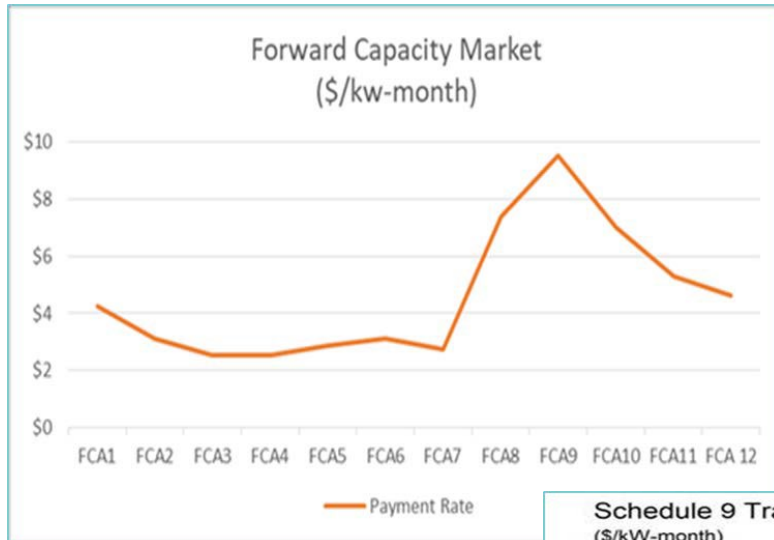
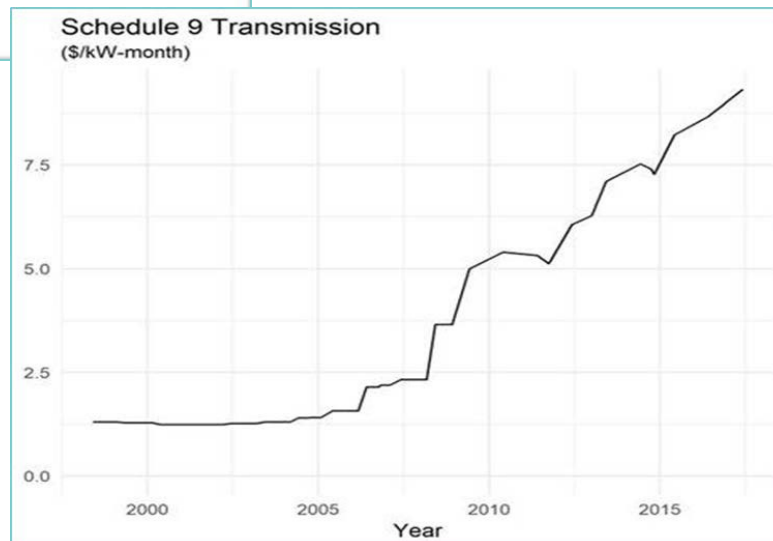


Photo: packetizedenergy.com



Evolving learning curve...

- Enernoc
- Packetized Energy
- Solar Shopper
- Defeat the Peak
- Microgrid and storage

Strategy #4: Embrace Advanced Metering Infrastructure



Photo: hismomjourney.blogspot.com

Strategy #5: Address the thermal sector

Sample programs

- energyChamp
- Net Zero Energy Home Program
- District Energy 2030
- Cold climate air source heat pumps
- On-bill financing
- Minimum efficiency standards in rental units

Challenges

- Natural gas presence
- High rental population

Ongoing effort

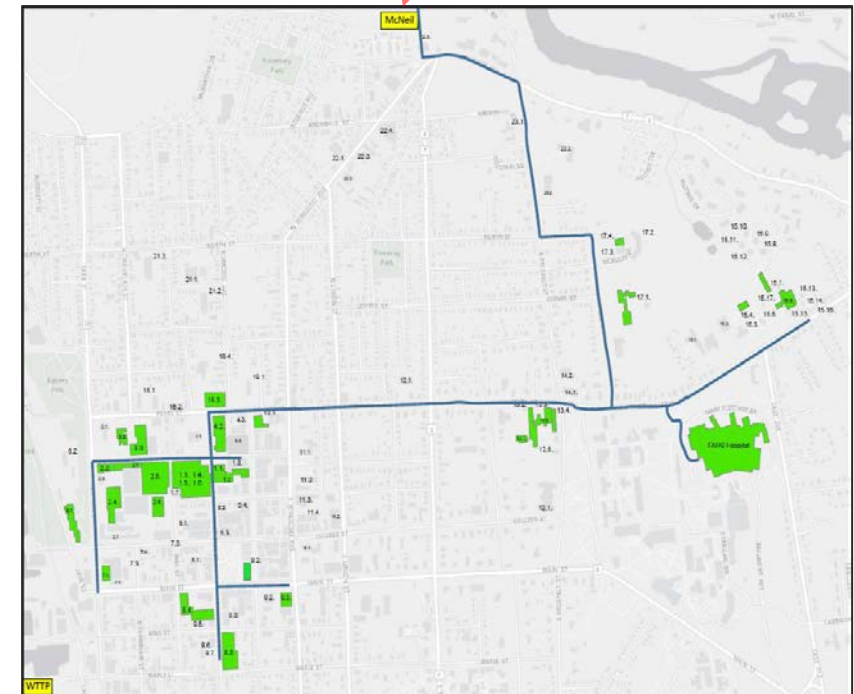
- District heat from McNeil



Photo: www.wbur.org



McNeil Proposed Central Energy Center Location



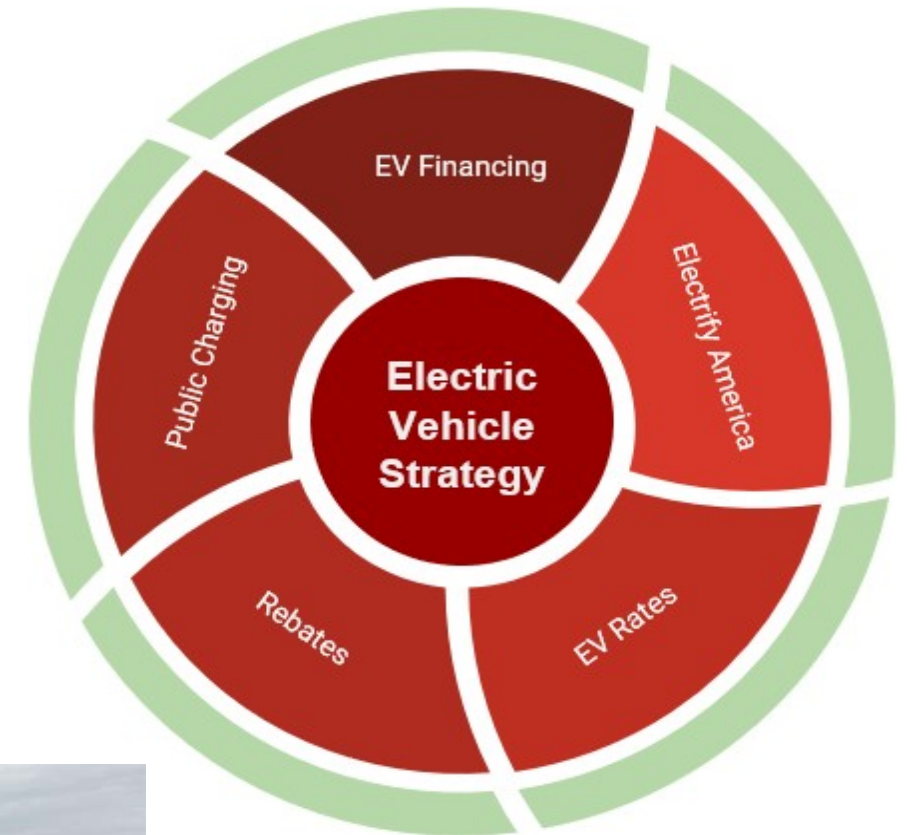
Strategy #6: Strategically Electrify the Transportation Sector

Technologies


- 8 E-buses
- E-vehicles
- 14 Electric vehicle supply equipment
- E-bikes

Strategies

- Rates
- Incentives
- Financing
- Partnerships
- Loaner Programs



Six strategies = needed a strategic plan / direction



**BURLINGTON
ELECTRIC
DEPARTMENT**

**2019–2020
STRATEGIC DIRECTION**

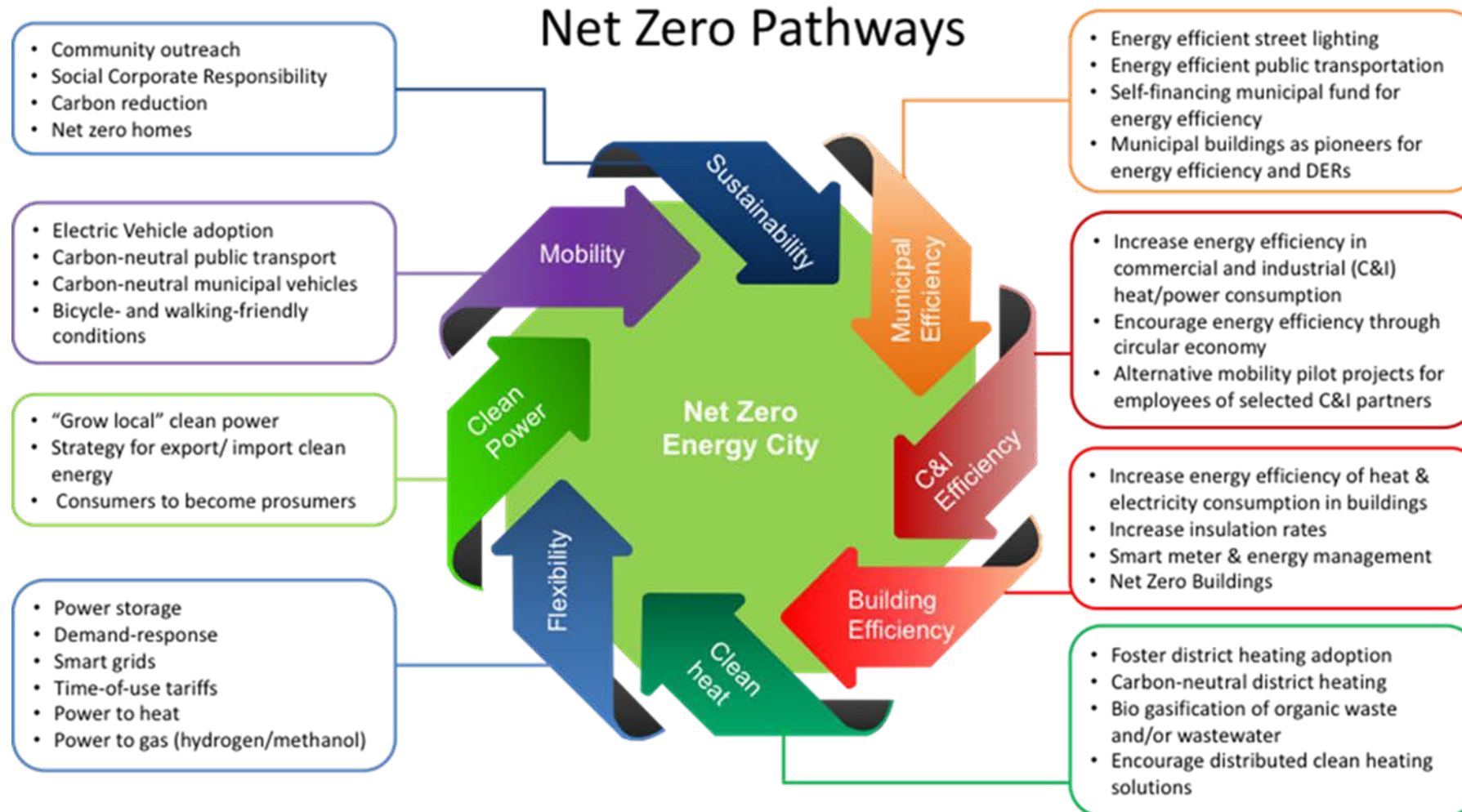
MISSION		VALUES	
To serve the energy needs of our customers in a safe, reliable, affordable, and socially responsible manner.		Safety, Reliability, Community, Innovation	

2030 VISION
 Make Burlington a Net Zero Energy city across electric, thermal, and ground transportation sectors by managing demand, realizing efficiency gains, and expanding local renewable generation, while increasing system resilience.

SAFETY	RELIABILITY	COMMUNITY	INNOVATION
Make safety the number one focus of everything we do as we pledge to promote safety awareness and commit to continuous improvement.	Maintain and improve the reliability and integrity of the Distribution and Generation systems, and ensure safe and timely restoration of service.	Deliver exceptional customer care, increase engagement, and proactively promote energy programs.	Advance nationally significant energy innovation that reduces fossil fuel use, transforms BED into a utility of the future, and helps achieve the Net Zero Energy City vision.

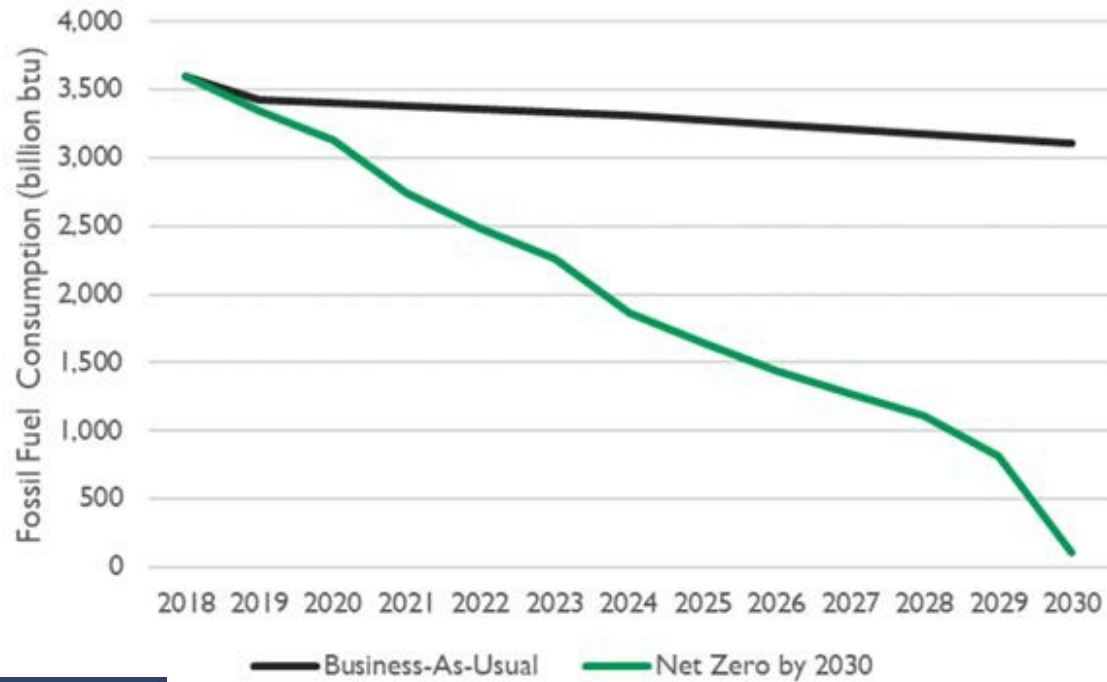
STRATEGIC INITIATIVES				
Engage Customers and Community	Strengthen Reliability	Modernize Core Technology and Business Processes	Promote Innovation	Manage Budget and Risks Responsibly
Focus on Customer Care first-call resolution	Update five-year Distribution System and Generation maintenance and upgrade plan to improve safety, reliability and efficiency	Upgrade customer, financial, and meter data management information systems and ensure modern, simple, full-function customer care platforms	Maintain quality facilities and use to showcase new technologies	Create financially responsible and sustainable budgets that balance the need for stable rates, investment in core infrastructure, and strong credit rating factors
Develop cutting edge marketing, and web and social media platforms	Develop Gas Turbine asset maintenance and major overhaul plans	Enhance cyber security capabilities	Advance district energy and microgrid projects	Ensure compliance with risk, safety and environmental regulatory standards
Create more equitable and accessible programs with a priority given to low-to-moderate income, rental, and first generation American populations	Implement maintenance plan for McNeil, Wilcoxon One and the Distribution System	Promote teamwork, strategic problem solving and lean process improvement	Serve more customers through electrification programs across all modes of transportation	Update BED Operating Guidelines to align fees and services with current technology
Evolve energy efficiency model to create more customer value and complement greenhouse gas and strategic electrification efforts	Continue to automate distribution devices to improve system reliability	Develop a culture of integrity and support comprehensive learning to enhance employee engagement, knowledge transfer, education, safety and training	Develop dynamic rates to achieve Net Zero Energy goal	Efficiently and effectively manage procurement of goods and services
Drive more savings and customer engagement through Demand the Peak	Implement and use grid analytics to improve system reliability and efficiency and enable end use technologies		Refine and implement recommendations from Net Zero Energy roadmap	
			Develop a Net Zero Energy home program	
			Launch lean equipment electrification program	

Six strategies = needed a strategic plan / direction







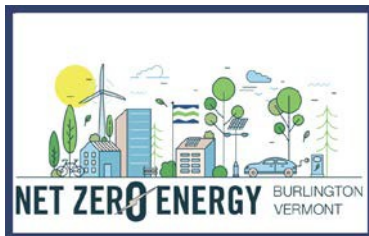
Six strategies = needed an integrated, strategic, data-driven roadmap

Figure ES 1: NZE by 2030 relative to the BAU



4 Fossil Fuel Energy Reduction Pathways

1 Efficient electric buildings	60%	40% of commercial floor space and 95% of households are heated by electric heat pump and water heating systems	
2 Electric vehicles	20%	80% of vehicles are battery electric (and 10% plug-in-hybrid)	
3 District energy	15%	40% of commercial floor space is heated by a district energy system	
4 Alternative transport	5%	Household annual vehicle miles traveled decrease 15%	



"Net Zero Energy City" by 2030 Roadmap

Where to from here for Burlington, Vermont?



Image: Frank and Ernest cartoon by Bob and Tom Thaves

Take aways...

Interdependency: the new norm

Modeling & analysis: revisit regularly

Partnerships & sister cities/municipalities: find & share

Set aside staff capacity to see this through

Electrification: seek strategic opportunities

Going “renewable” doesn’t necessarily = raising rates

No one-size fits all

Get to know (and plan to share benefits) with rural neighbors

Expect to compromise

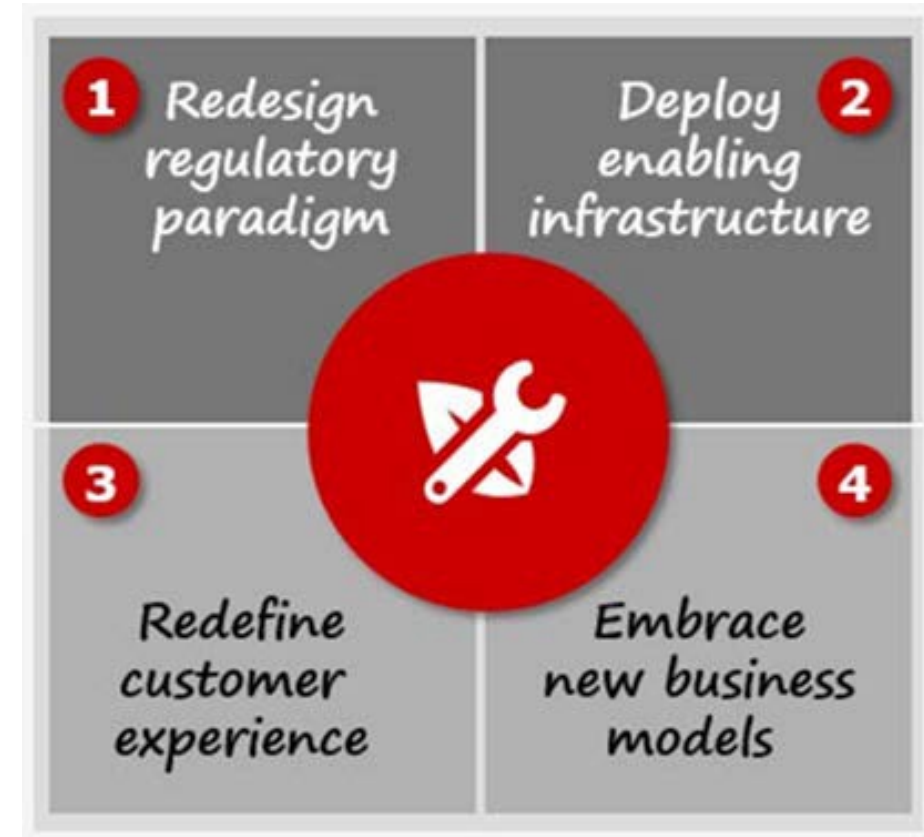
Diversify! Beware of stranded assets

Regulatory and policy reform is critical

Take the long-term view but plan and act now

Plan-do-check-act-plan-do-check-act...

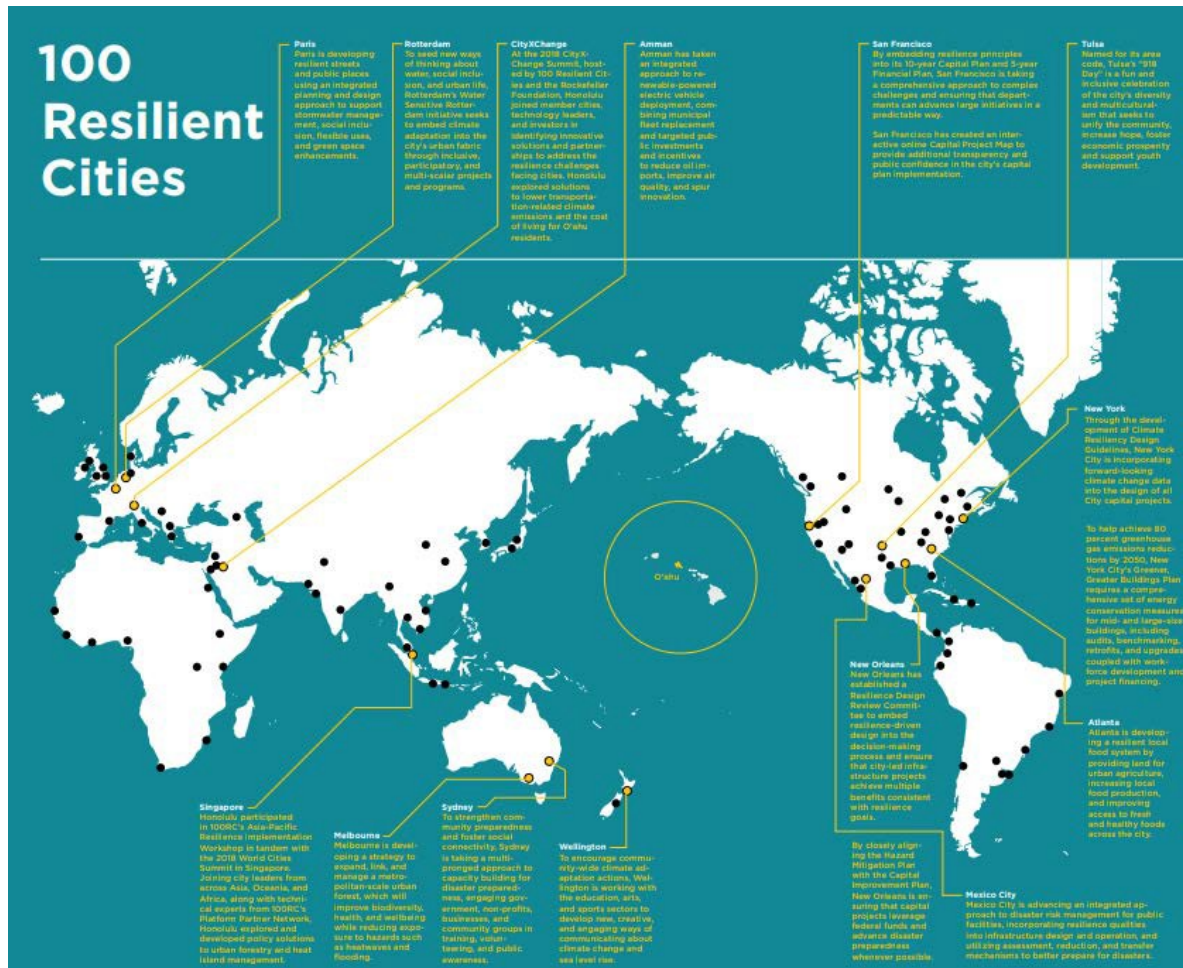
No one knows everything



Other cities

and

Other municipal utilities



- Sacramento Municipal Utility District, CA
- Austin Energy, TX
- City of Fort Collins, CO
- Burlington Electric Department, VT
- Others
 - Island of Samsø (Denmark)

Other resources

- <https://www.usdn.org/cnca.html>
 - Urban Sustainability Directors Network Carbon Neutral Cities Alliance
- [Cdp.net/en/cities/sustainable-cities](https://cdp.net/en/cities/sustainable-cities)
- [Climate mayors.org](https://climate-mayors.org)
- globalcovenantofmayors.org
- [Cityrenewables.org](https://cityrenewables.org)
 - American Cities Climate Challenge

Energy Futures Group

Vermont-based clean energy consulting firm established in 2010

Areas of Expertise

- Energy efficiency & renewable energy
- Program design
- Integrated resource planning
- Long-range Energy Alternatives Planning (LEAP modeling)
- Policy development
- Expert witness testimony
- Building codes
- Evaluation
- Cost-effectiveness

Range of Clients

- Government agencies
- Advocates
- Regulators
- Utilities

Clients in 45 states and provinces plus regional, national and international organizations.



Discussion, Questions & Answers



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