Genesee/Finger Lakes Regional Planning Council

Vision Into Action

Reforming the Energy Vision (REV) and You:

The 3 smartest cost-saving energy opportunities every municipality could act on this year

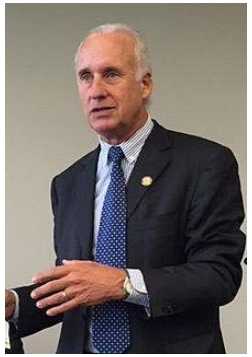
November 14, 2018

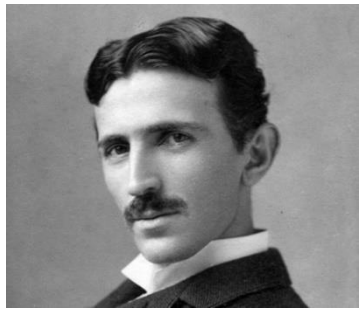
Value Stack Energy™

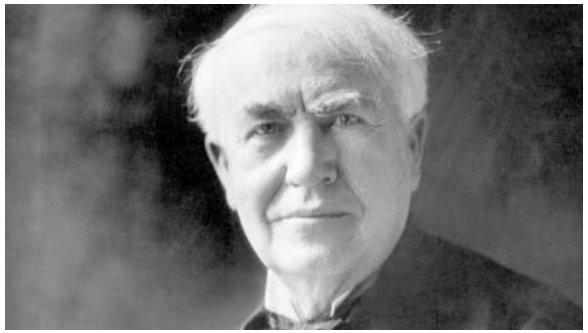
REV– Reforming the Energy Vision

NEW YORK STATE OF OPPORTUNITY. | Reforming the Energy Vision

REV is as much about innovative new MARKET MECHANISMS as it is about clean, resilient and affordable energy goals.





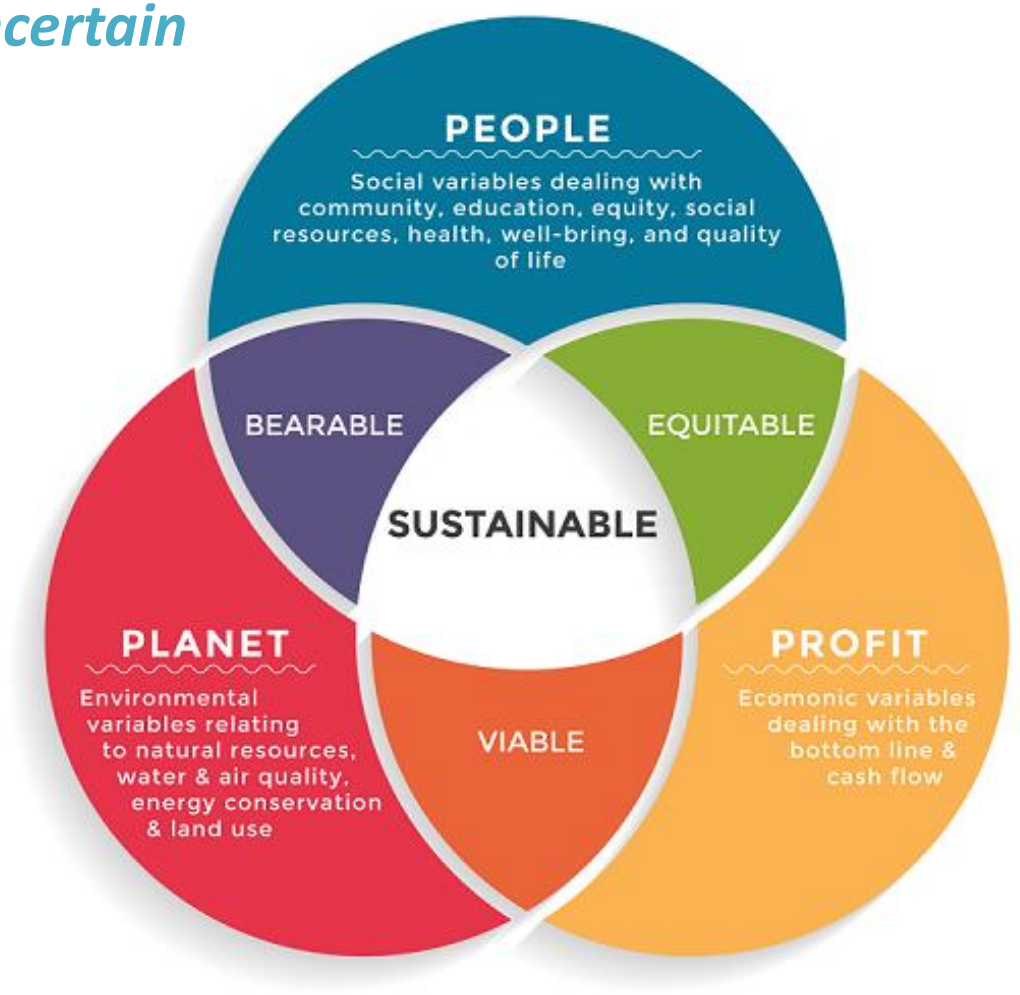


"Vision without execution is just hallucination."

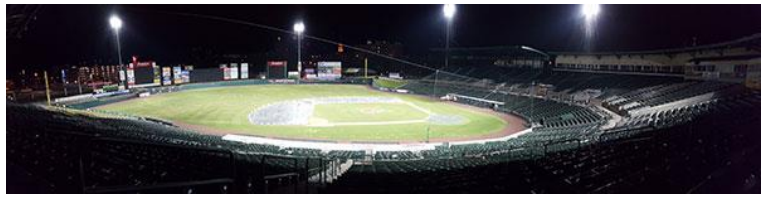
-- Thomas Edison

Triple Bottom Line (3BL)

The destination is clear – the road is uncertain



Prepared for the Future?



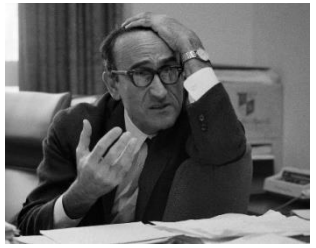
A Clear Mission: To weave economic, environmental and social sustainability into Monroe County government and its operations in a manner that preserves the County's natural resources, protects its budget and enhances the long-term well-being of its residents.

The destination is clear – the road is uncertain

- **How "smart" is your Energy Plan?**
- **How prepared is your municipality to understand and respond to 3BL opportunities associated with energy and the coming Smart Grid?**

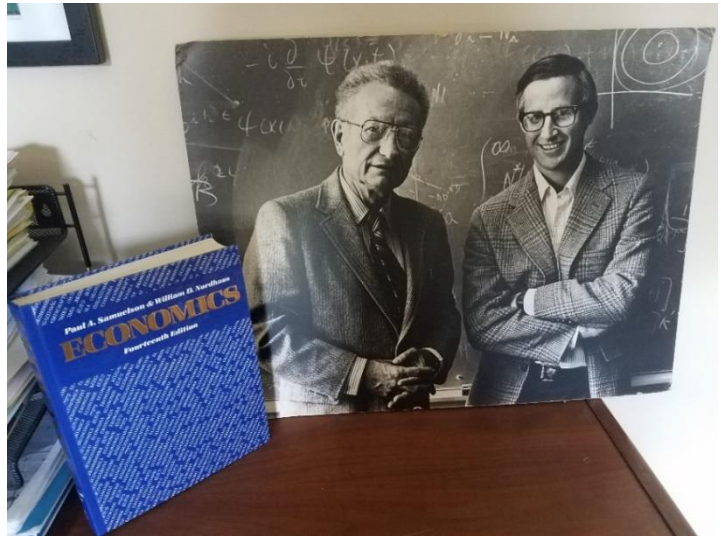
Inertia is the silent killer

An ECON 101 Approach to Energy



REV: Building a more sustainable New York begins with building more sustainable communities integrated with a more sustainable Electric Grid

"Efficiency is the absence of waste, or the use of economic resources that produces the maximum level of satisfaction possible with the given inputs and technology"



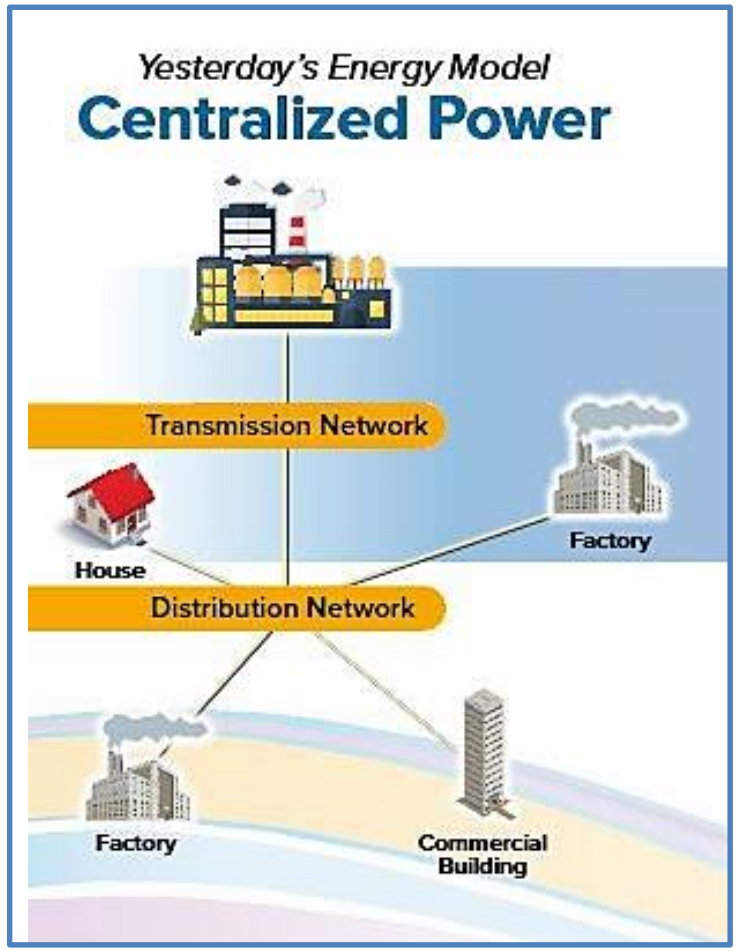
Paul Samuelson won the first Nobel prize awarded in Economic Sciences while Bill Nordhaus recently won the 2018 Nobel Prize for "for integrating climate change into long-run macroeconomic analysis."

- Public utilities and private regulated monopolies – *Inefficiencies run amok*
- Government's role is to bring optimal efficiency to markets in support of the public good
- Use government to fix not replace markets: *Hamiltonian means to Jeffersonian ends*
- REV is focused on market-based rather than ratepayer-funded approaches to market opportunities and needs
- Richard Kauffman: New York State's "energy czar" (Chairman of Energy and Finance for New York)
- Alfred E. Kahn's *The Economics of Regulation: Principles and Institutions*

"Best possible mix of inevitably imperfect regulation and inevitably imperfect competition."

DERs: Distributed Energy Resources

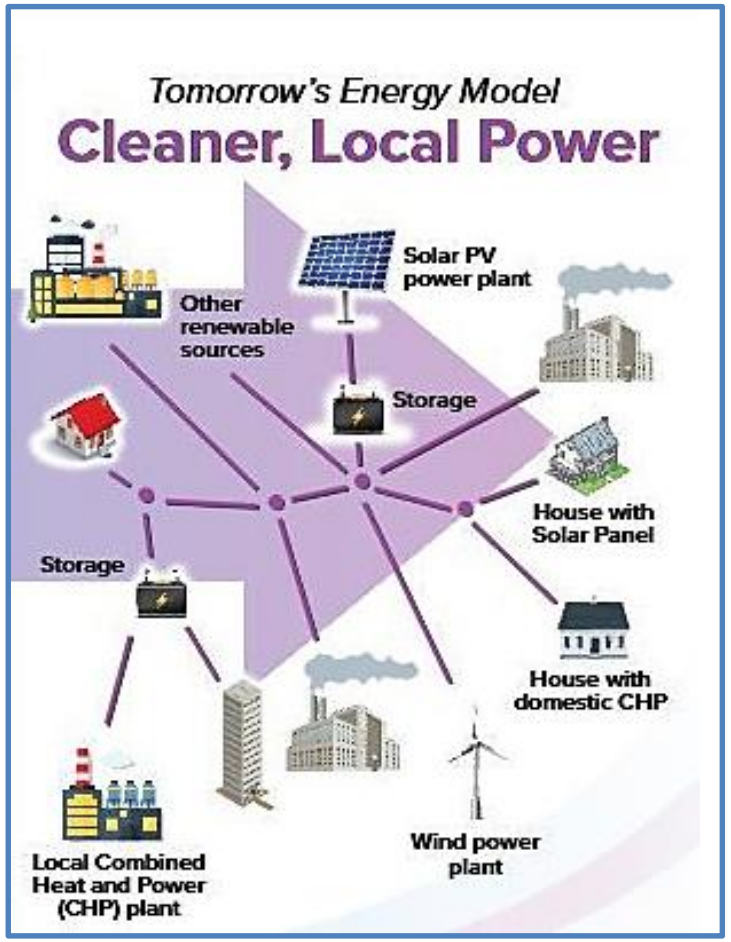
Essential microgrid elements of a "distributed, transactive, and integrated" electric system



- **Decarbonization, decentralization and digitization**
- **Market-driven innovation requiring utility reform and new business models**

DER technologies are defined as "behind-the-meter" (BTM) power generation and storage resources typically located on an end-use customer's premises and operated for the purpose of supplying all or a portion of the customer's electric load. Such resources may also be capable of injecting power into the transmission and/or distribution system, or into a non-utility local network in parallel with the utility grid.

These DERs include such technologies as solar photovoltaic (PV), combined heat and power (CHP) or cogeneration systems, microgrids, wind turbines, micro turbines, back-up generators and energy storage. The New York Public Service Commission (PSC), has defined DERs more broadly to include energy efficiency and demand response.



DSP, EAM, PSR, MAI, VDER & NWA

"***The public interest requires the development of and prompt transition to more accurate valuation and compensation mechanisms for DER***, particularly for project types currently compensated through NEM, that accurately reflect and properly reward DER's actual value to the electric system and that ensure all customers pay their fair share for the costs of grid operation and benefit from the value they provide."

– Order on Net Energy Metering Transition, Phase One of Value of Distributed Energy Resources, and Related Matters, March 9, 2017

NYSEG RG&E nationalgrid

Distributed System Platform

"The Smart Integrator"

Serve as a platform for customers and third-party service providers, enabling growth, integration, and optimization of DERs

EAMs: Earning Adjustment Mechanisms

A wide range of EAMs are in development to offer utilities new means to encourage innovative utility business models in alignment with REV goals

PSRs: Platform Service Revenue

PSRs are new forms of revenues utilities will earn from displacing traditional infrastructure projects with non-wires alternatives

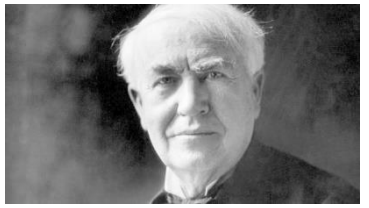
MAIs: Market Acceleration Bridge Incentives

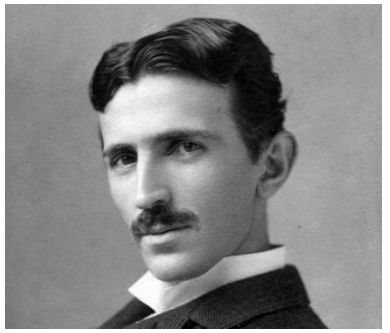
MAIs would speed adoption of customer-sited storage and storage sited on the distribution or bulk systems

VDER: Valuing Distributed Energy Resources

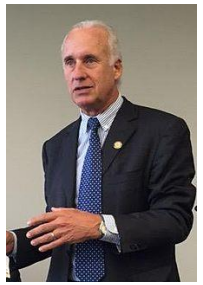
VDER compensates distributed energy resources based on when and where they provide electricity to the grid

Vision *Into Action*





The 3 smartest cost-saving energy opportunities every municipality could act on before the end of this year



1) Electrification of Transportation
2) Smart Streetlighting
3) Networked Smart Controls

Simple, practical next steps toward lowering taxes and energy costs

#1) EV Charging Stations

Charge Ready NY

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

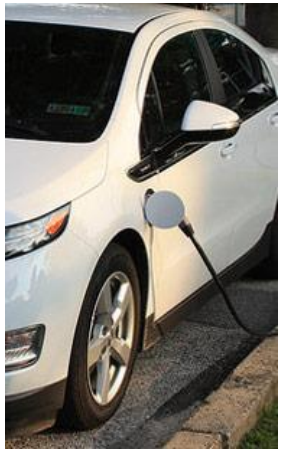
nationalgrid

Chicken or Egg? ***It's the eggs!!***

- The electrification of transportation
- NYSERDA ***Charge Ready NY*** program incentives for EV charging equipment
- National Grid incentives for the make-ready and electrical installation costs associated with the charging stations

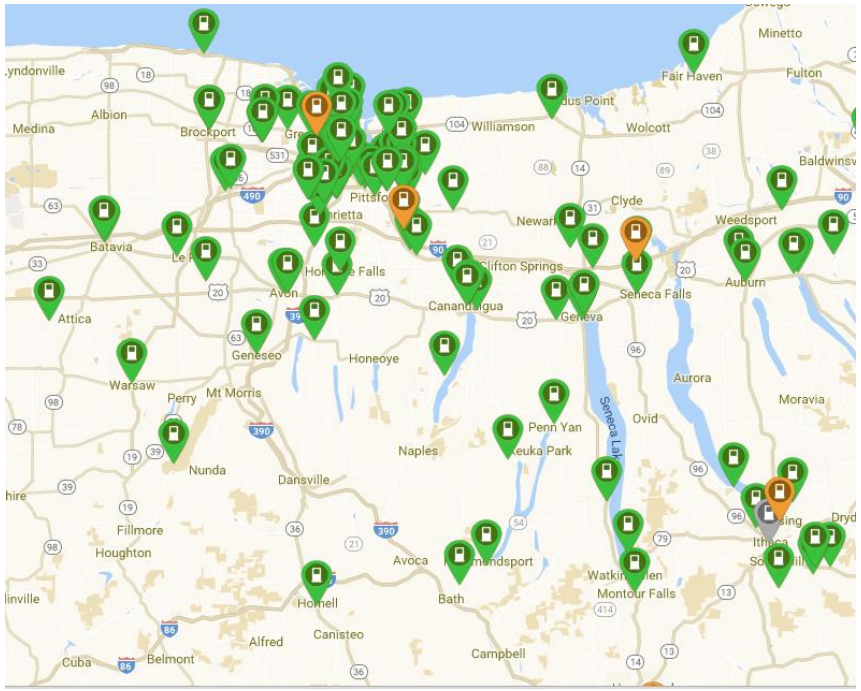
EVs: Why Now?

www.nyserda.ny.gov/Researchers-and-Policymakers/Electric-Vehicles



All of the historical reasons to not want to buy electric cars just aren't true for the vast majority of people anymore:

1) Look great
2) EVs often cost less (lifetime cost of ownership)
3) Perform better (regenerative braking lower center of gravity)
4) 99% of the time EVs have more than enough range
5) Do what people need done
6) Way more environmental friendly
7) AV's to the point of self-driving next year
8) Future NY State funding tied to EVs



OCPP: Why It Matters

OPEN CHARGE ALLIANCE

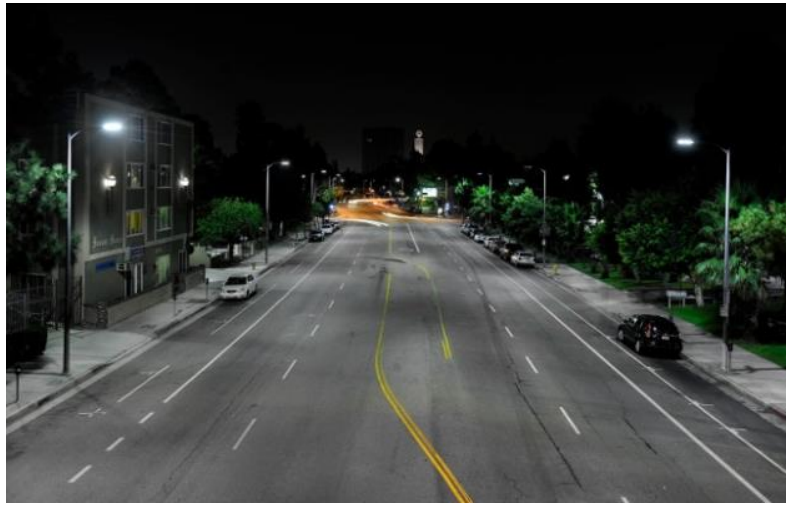
OCPP

Open Charge Point Protocol

- Remember when you first bought a cell phone and it only worked with one carrier?
- You were locked in to their service package no matter what
- **The Open Charge Point Protocol makes sure that you can switch between hardware and software providers *without* your investment becoming obsolete**
- It's as simple as switching the SIM card in your phone

OCPP

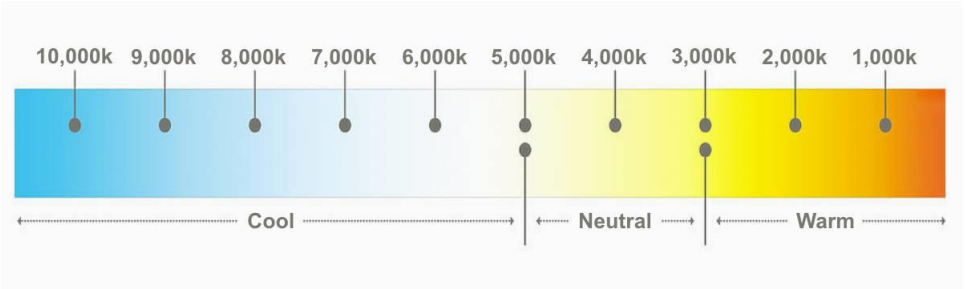
#2) Smart Streetlighting

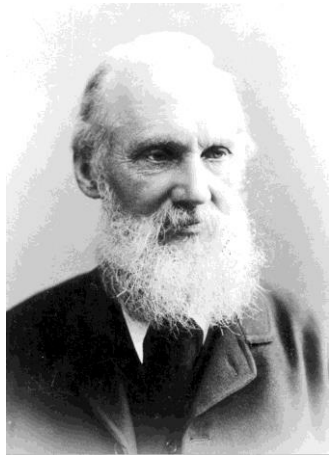


Now is the time….

- Reduce street light energy use and save money
- Create a well-lit, safer, and more attractive community
- Energy and maintenance savings more than offset retrofit costs
- Reduce your carbon footprint
- 175kw x $.10kWh x 3,650 AHO = **$64** vs. 65kw x $.10kWh x 3,650 AHO = **$24**
- Essential first nodes of the networked “Smart City” – no one wants to be a “Dumb City”
- Municipal Purchase Option vs. Utility Ownership Option
- Drive energy savings ASAP!

Lord Kelvin: *"To measure is to know."*





"I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science, whatever the matter may be."

-- Lecture on "Electrical Units of Measurement" (1883), Lord Kelvin, Scottish Physicist

175kw x $.10kWh x 3,650 AHO = **$64** vs. 65kw x $.10kWh x 3,650 AHO = **$24**

Service class … Tariffs … Rate case … Ownership … Maintenance … Other variables

Smart, Networked LED Streetlighting

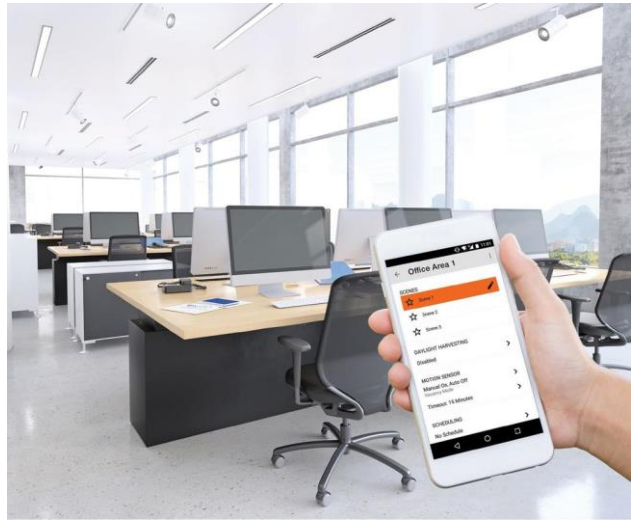
The cost of delay is tantamount to governing negligence

- LED roadway luminaires require virtually no maintenance, last a decade or more, and deliver an abundance of energy savings to offset their costs
- Total cost of ownership pretty much demands that each municipality purchase their streetlights
- Networked LEDs with smart controls – mature technology that's cost-effective and flexible (0-10 dimming, Big Data)
- A once-in-a-decade opportunity – *do it right, and smart*

SIDEWALK TORONTO

- ***2020 is too late***
- ***To measure is to know***
- ***Choose smart and start now***

#3) Networked Smart Controls



When creating a digital platform for smart towns and villages, and their smart buildings, connected LED lighting with smart controls is the key

- **Streetlighting is a great example and when implemented well can be more cost effective than less intelligent lighting solutions**
- **The future of energy and energy efficiency is inextricably tied to the Internet of Things (IoT)**
- **An IoT solution is something that consists of various technologies connected together to deliver entirely new value**
- **LED light fixtures with networked smart controls are the perfect conduit for revolutionizing the management of buildings and facilities, driving new levels of energy efficiency, air quality, comfort, maintenance savings and security**
- **Smart, networked LED lighting systems can enable a wide range of future IoT solutions, using sensors and software to collect, manage and send data**
- **Data can help identify trends and patterns that can be used to make data-driven decisions that realize greater efficiencies**
- **Smart lighting can serve as an enabling infrastructure for IoT capabilities that go far beyond lighting and energy savings**
- **The Smart Grid will make all of the above increasingly important**

Vision Into *Action*

The 3 smartest cost-saving energy opportunities every municipality could act on before the end of this year

Simple, practical next steps toward lowering taxes and energy costs

1) Participate in the NYSERDA Charge Ready NY program to install EV charging stations

2) Issue an RFP for your smart streetlight retrofit project

3) Qualify and quantify a networked, smart controlled, cost-effective LED retrofit opportunity

How prepared is your municipality to understand and respond to 3BL opportunities associated with energy and the coming Smart Grid?

Climate Change: An Existential Threat

nature
International weekly journal of science

New research finds large buildup of heat in the oceans, suggesting a faster rate of global warming

The most worrisome predictions about climate change are coming true…

Global temperature rise

Shrinking ice sheets

Sea level rise

Warming oceans

Extreme events

Ocean acidification

A systemic threat to humankind

Bill Nordhaus winning the Nobel Prize coincided with the release of a hugely important UN Intergovernmental Panel on Climate Change report on what will happen to the world when it gets 1.5°C (2.7°F) warmer than preindustrial levels

- The report puts the cost of a 1.5°C increase at $54 trillion, in today's money
- A 2.0°C increase will cause $69 trillion of damage, and a 3.7°C increase will cause a stunning $551 trillion in damage
- It’s taken civilization 7,000 years to create $500 trillion in wealth (~$230 trillion in land and property, $200 trillion in debt and $70 trillion in equity)
- Human civilization has reached the very end of reaping the dividends from a stable climate

ES: Energy Storage

A transformational technology that turns electricity from a perishable good into a flexible resource

The Next Big Thing: Energy Storage

New York Governor Andrew Cuomo kicked off 2018 with a groundbreaking energy storage pledge: to deploy **1,500 megawatts by 2025** as the state works toward 50 percent renewable energy by 2030.

1) Peak Shaving
2) Load Shifting
3) Emergency Backup
4) Demand Response

Charge when energy prices are low and discharge during peak demand when utility rates are high

DERs: Solar + Energy Storage

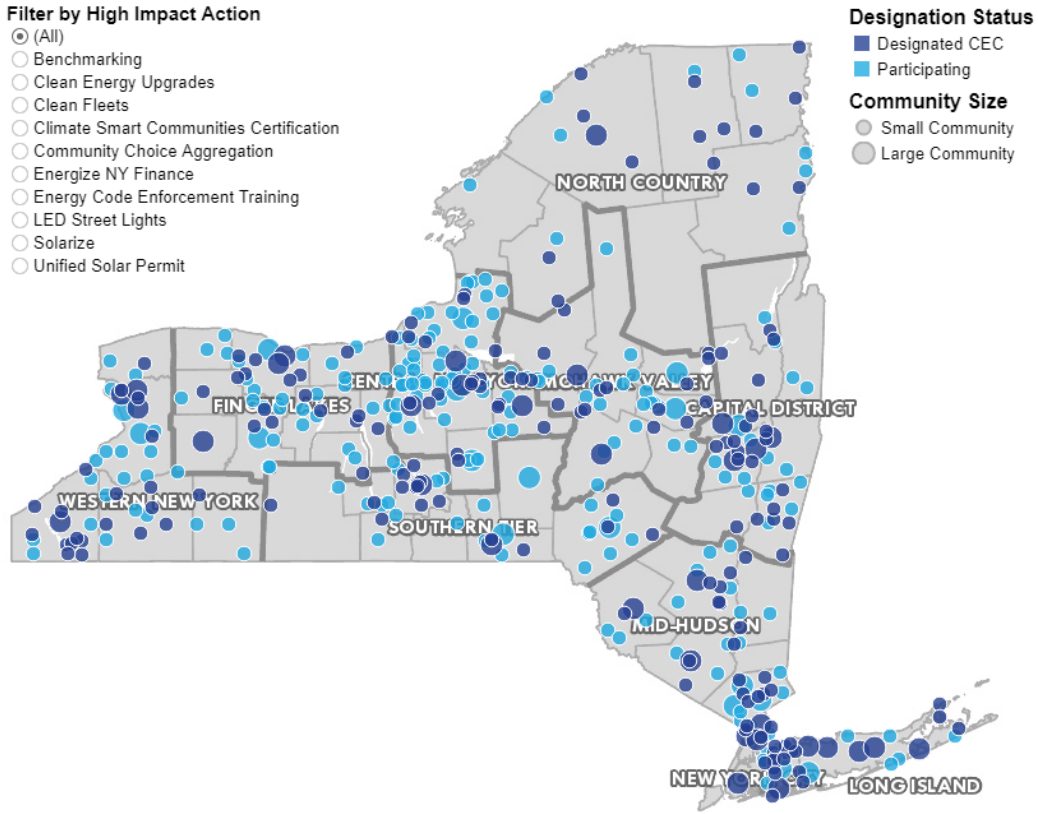
Designated Clean Energy Communities Map

The communities highlighted on this map are demonstrating their commitment to clean energy by participating in the Clean Energy Communities Program. A community must complete at least four High Impact Actions to earn the Clean Energy Communities designation.

420 Participating Communities

199 Designated Communities

1,175 Actions Completed



Vision Into Action … Questions?

- **How “smart” is your Energy Plan?**
- **How prepared is your municipality to understand and respond to 3BL opportunities associated with energy and the coming Smart Grid?**

Value Stack Energy™

Jim Bittker is an independent consultant in the energy efficiency and innovation space having worked on behalf of NYSERDA outreach programs, RG&E and NYSEG utility energy efficiency programs, and with energy service companies where he's helped qualify, quantify and deliver more than 10,000 successful energy efficiency projects.

Jim also has experience as a textbook editor, having worked with Paul Samuelson and William D. Nordhaus on their classic ECON 101 textbook. Paul Samuelson won the first Nobel prize awarded in Economic Sciences while Bill Nordhaus recently won the 2018 Nobel Prize for "for integrating climate change into long-run macroeconomic analysis."

c: 585.943.7604
jim.bittker@gmail.com