HOW SMALL GRIDS COULD BECOME A BIG DEAL

MIGHTY MICROGRIDS

John Farrell & Matt Grimley

March 15, 2016

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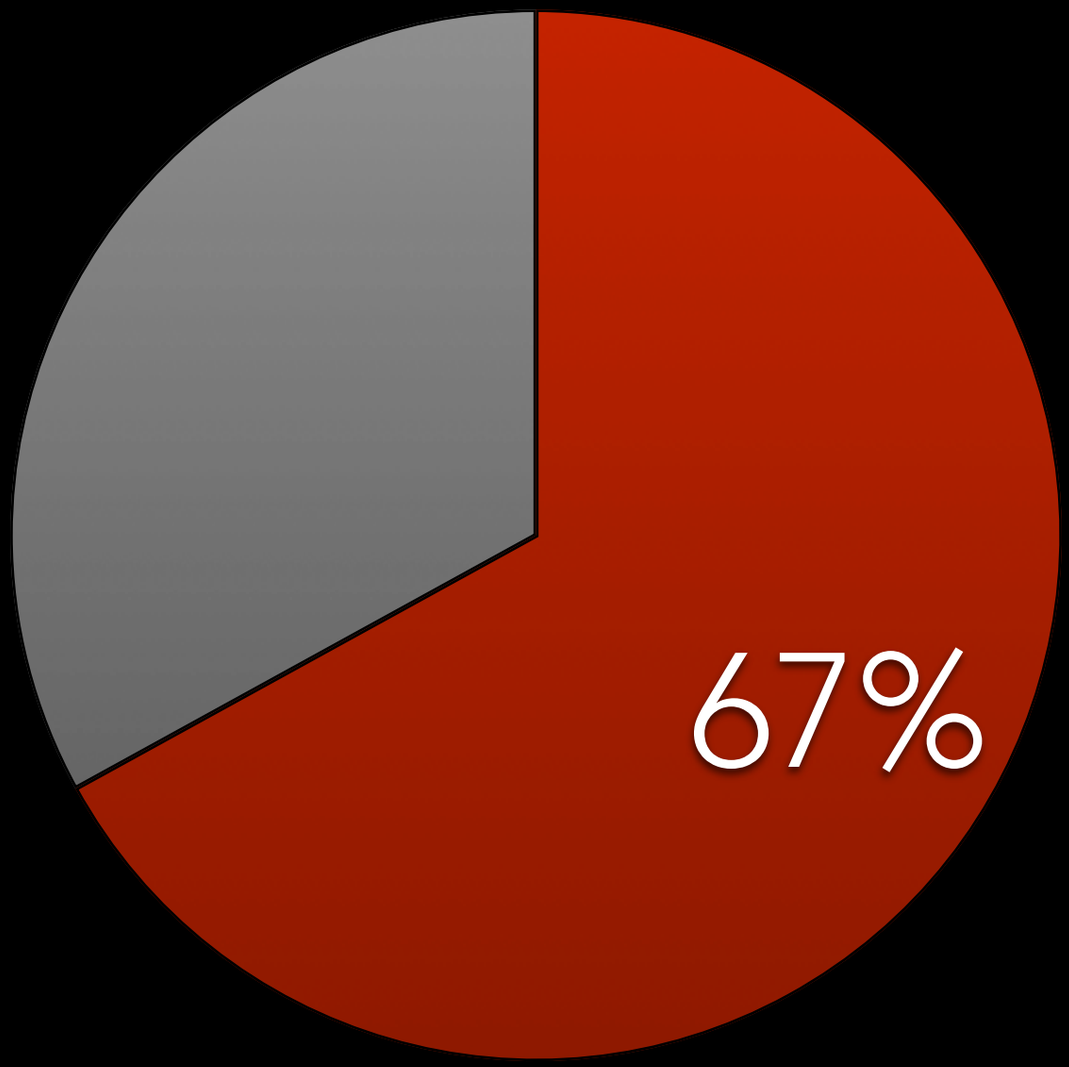
A QUESTION

How much do Americans spend on electricity each year?

A(N) (INEFFICIENT)

MARVEL

PORTION OF ELECTRIC GENERATION LOST AS HEAT



Electric outage rate

2005

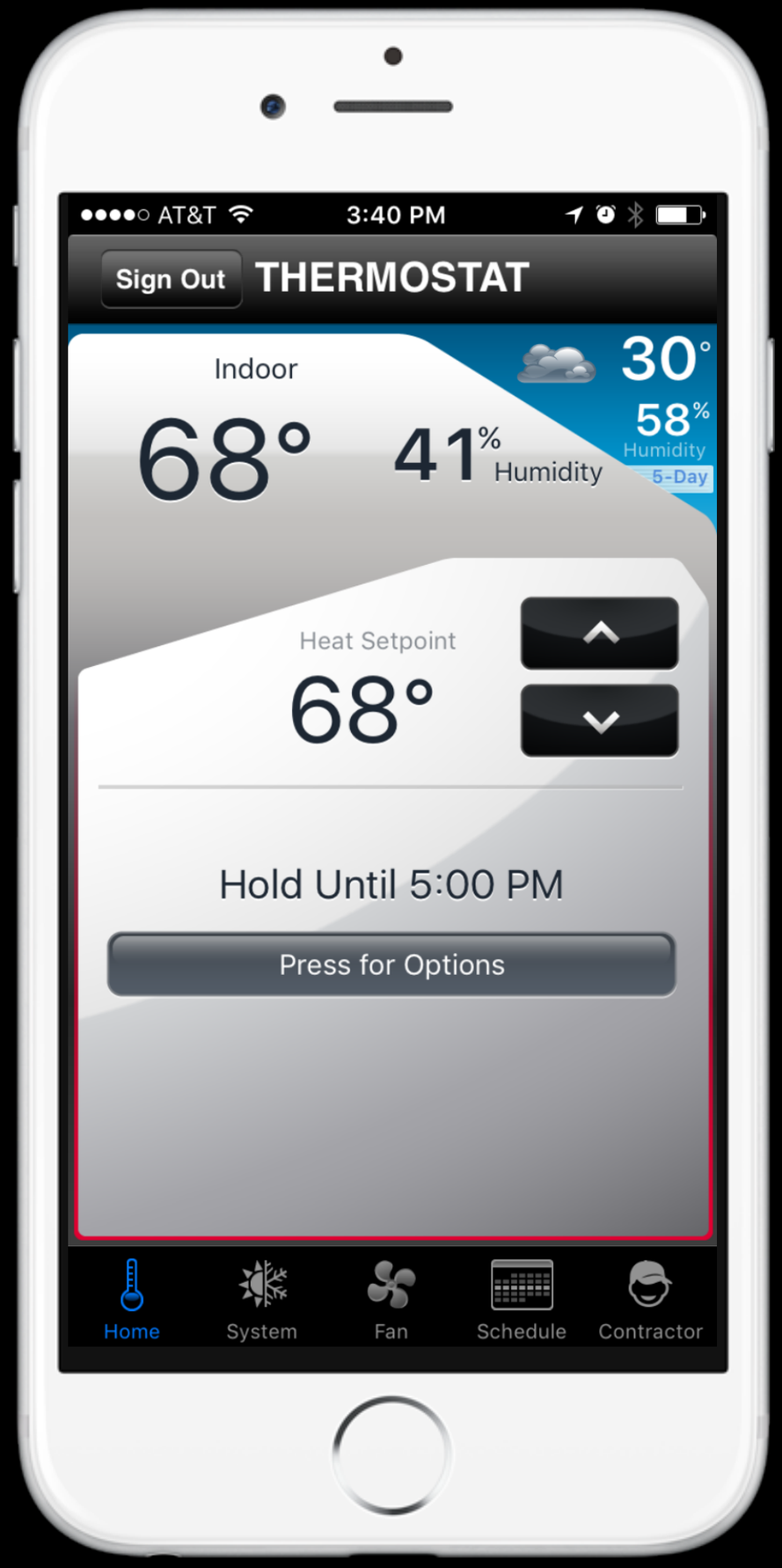
2015

Photo: SULA-CH via Flickr

UNPRECEDENTED OPTIONS

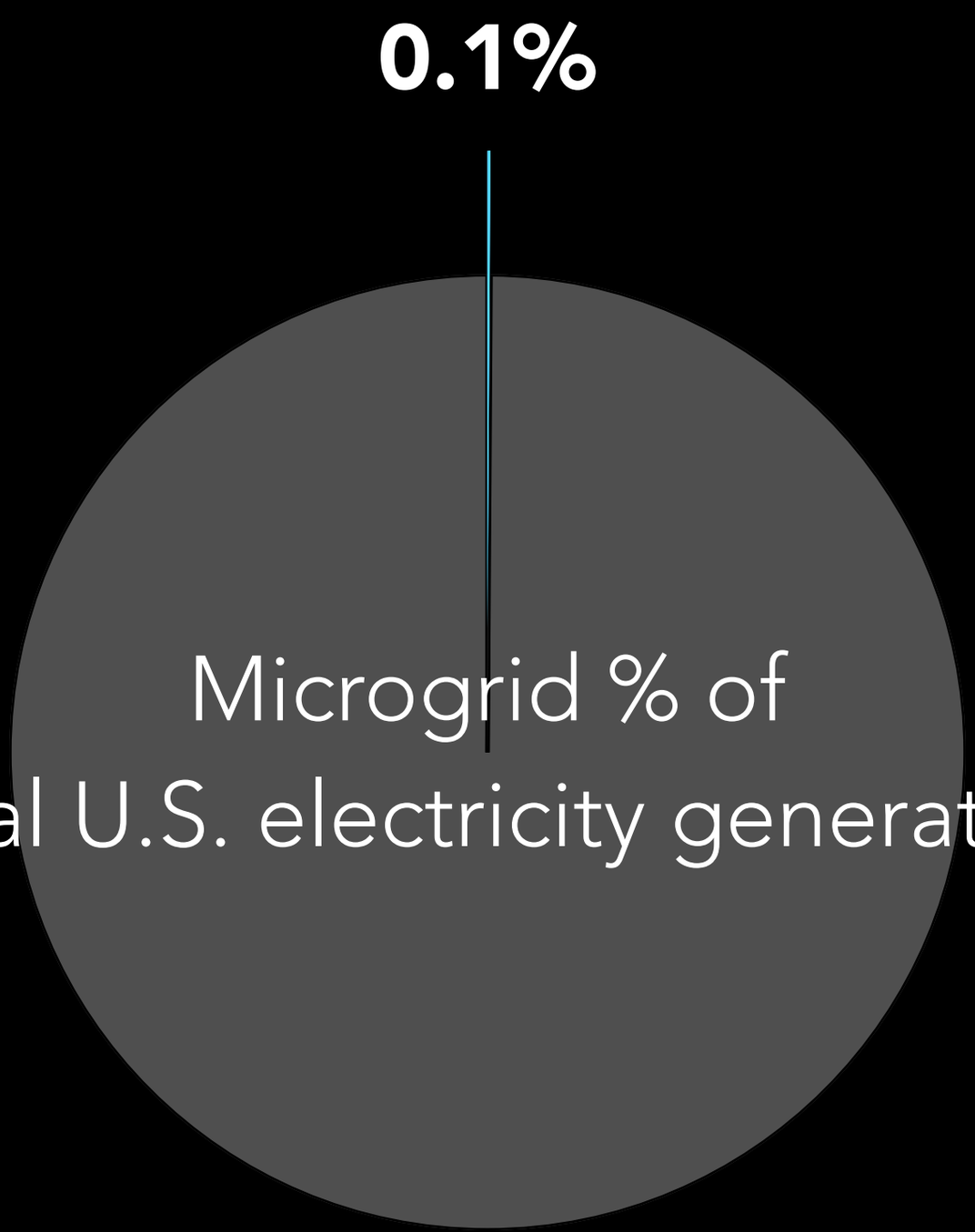
1 INSTALL EVERY 60 SECONDS

PERSONALIZED CONTROL



Software allows
many iterations

A SMALL START



UP AGAINST A MONOPOLY PROBLEM

DISTRIBUTION GRID INVESTMENT LAGGING

*"America will see an **investment gap** in distribution infrastructure **of $57 billion** by 2020"*

American Society of Civil Engineers

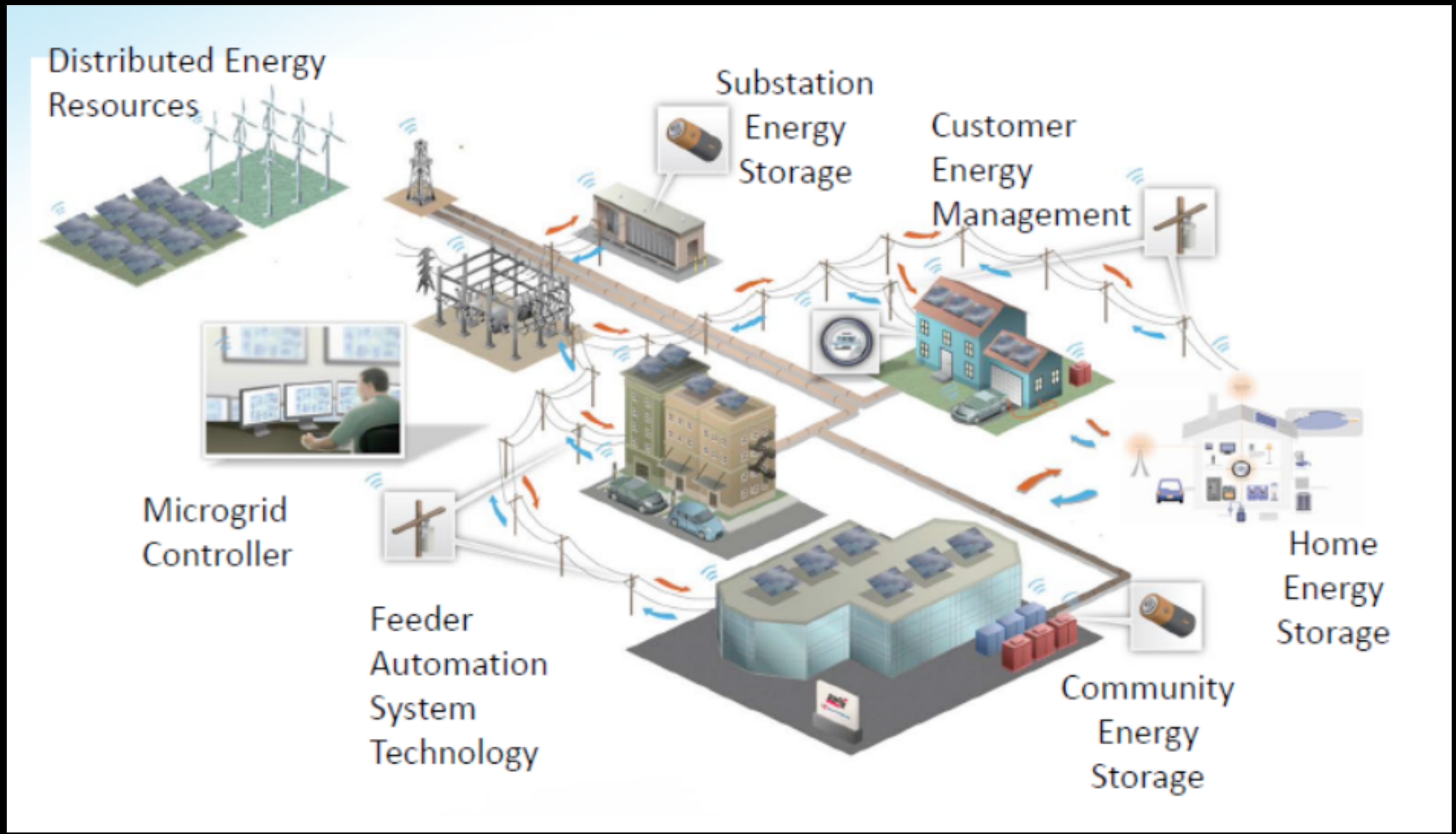
SLOW TO ITERATE

"MIGHTY" MICROGRIDS

MICROGRID

A group of interconnected loads and distributed energy resources within clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid and that connects and disconnects from such grid to enable it to operate in both grid-connected or island mode.

MICROGRID


Distributed Energy Resources
Substation Energy Storage
Customer Energy Management
Microgrid Controller
Feeder Automation System Technology
Home Energy Storage
Community Energy Storage

MICROGRID

- Likes to act alone
- Capable of making its own decisions
- May benefit from remaining grid connected
- Lots of possibility

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Photo: tifotter via Flickr

A QUESTION

Where is one of the first 100% renewable microgrids larger than 1 megawatt?

A FEW SAMPLES

STAFFORD HILL

Photo: Green Mountain Power

Stafford Hill

in Rutland, Vermont

100%

Renewable

2.5 Megawatt (MW) Solar

2 MW/ 1 MWh Lithium-ion Storage

2 MW/ 2.4 MWh Lead-acid Storage

97%

Utility Funded

Costs $10.77 Million

Economic Benefit

Cost 17.1 ¢/kWh

Value of 18.7 ¢/kWh

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Democratic Energy Initiative

AUSTIN

Photo: clickykbd via Flickr

UT: Austin

in Austin, Texas

0%

Renewable

135 megawatt

Combined Heat & Power

provides power, heat, and cooling for a 20 million square foot campus

Economic Benefit

Annual savings of $4.8M (compared to buying energy from the market).

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LONG ISLAND

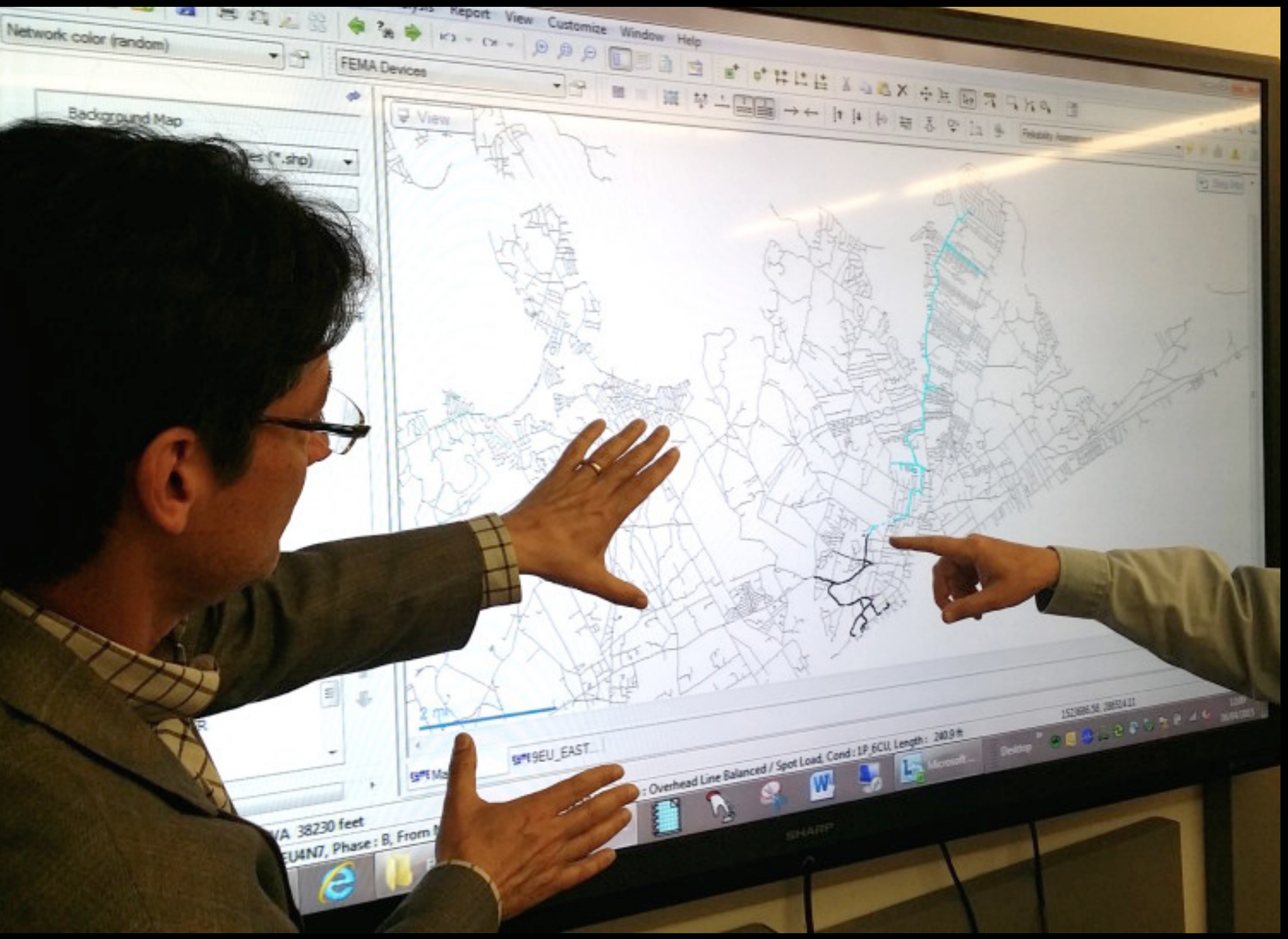

Photo: Clean Coalition

Long Island

in New York City, New York

Fossil Fuel vs Renewable

50% of power will come from 15 MW of local solar and 25 MWh of energy storage

Economic Benefit

Will defer $300 million in transmission and distribution costs from the utility

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MACRO BARRIERS

5 Reasons Why Microgrids Face Macro-Problems

1. A microgrid is undefined in most state laws

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5. Who pays for it? Who benefits?

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SMALL RULES FOR BIG RESULTS

STATE FUNDING?

	
NY Prize provides funding for municipal feasibility studies	*No microgrid financing*

Credit: Microgrid Resources Coalition

EXEMPT FROM REGULATION?

New York	Minnesota
	
Exempt if: 1. *solely on private property OR* 2. *uses cogeneration, small hydro, or alternative energy*	*Exempt if:* 1. *muni or co-op OR* 2. *only serves tenants of single building OR* 3. *serves < 25 persons*

Credit: Microgrid Resources Coalition

ARE MICROGRIDS PUBLIC UTILITIES?

	
New York does not designate monopoly service territories	*Only if they serve fewer than 25 persons*

Credit: Microgrid Resources Coalition

EASY INTERCONNECTION?

Credit: Microgrid Resources Coalition

RETAIL OR WHOLESALE MARKET COMPENSATION?

	
Wholesale, yes. Retail may be coming with Reforming the Energy Vision *process.*	*Wholesale, no. Retail limited to net metering for 1 MW or smaller.*

Credit: Microgrid Resources Coalition

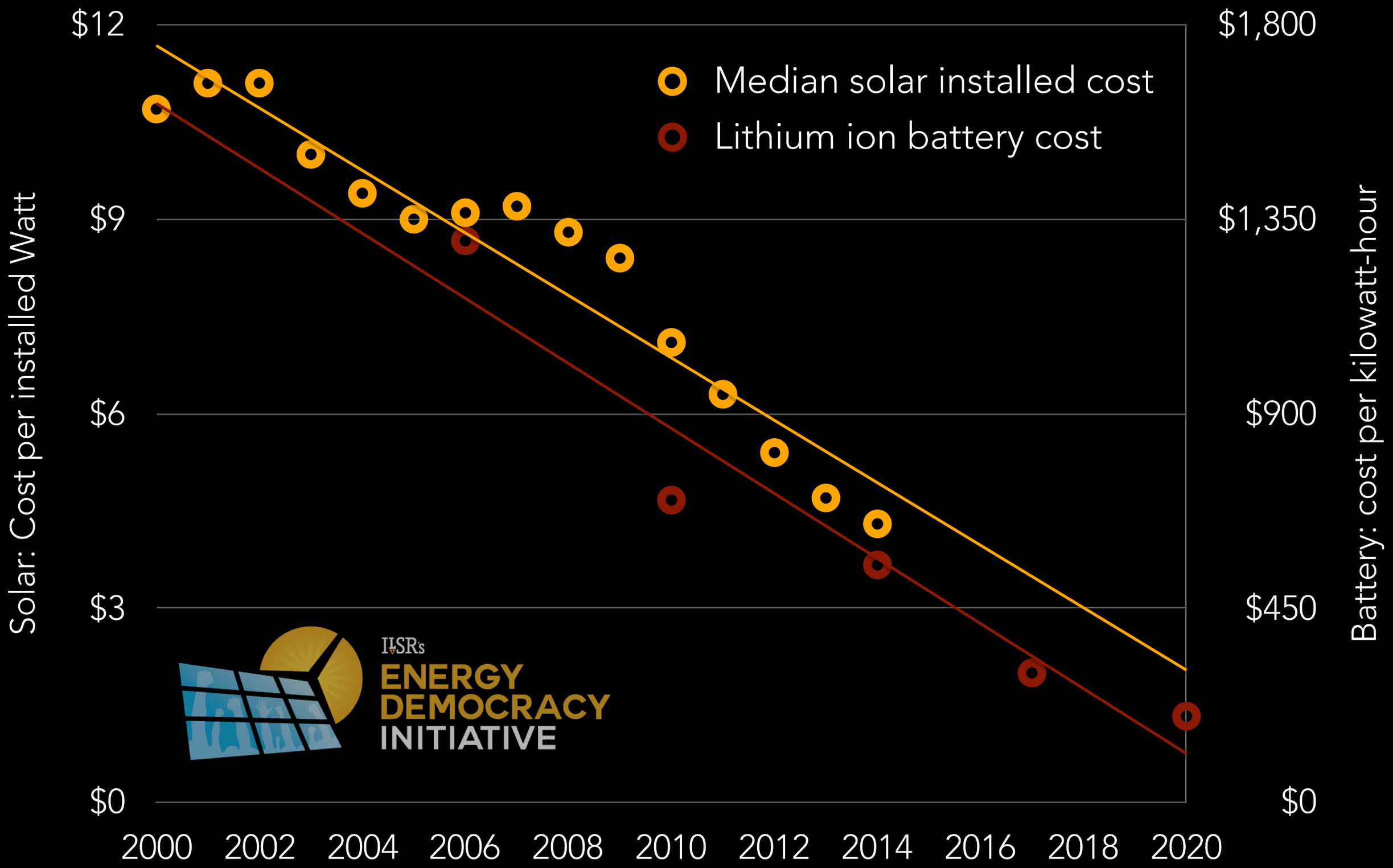
OTHER BARRIERS

	
Distribution utilities may be limited in ownership of microgrids.	*Vertically integrated utilities will likely fight any laws enabling microgrids.*

Credit: Microgrid Resources Coalition

BIG OPPORTUNITY

ROOFTOP SOLAR AND BATTERY STORAGE PRICES KEEP FALLING



ENERGY, ENERGY SELF-RELIANT STATES

ARTICLE, RESOURCE

Matt Grimley | No Comments | Mar 3, 2016

PODCAST: Microgrids and Regulation with Chris Villarreal – Episode 30 of Local Energy Rules

With the release of ILSR's new report, "Mighty Microgrids," ILSR is releasing two podcasts with the developers and regulators of microgrids in the United States. This is the second podcast. In 2014, Chris Villarreal helped write the white paper, Microgrids: A Regulatory Perspective. As a regulatory analyst with the California Public Utilities Commission, he outlined... CONTINUE READING →

TAGS: distributed generation / interview / local energy rules / microgrid / minnesota / renewable energy / solar

ENERGY, ENERGY SELF-RELIANT STATES

ARTICLE, RESOURCE

Matt Grimley | No Comments | Mar 3, 2016

PODCAST: Clean Coalition's Community Microgrids – Episode 29 of Local Energy Rules

Most microgrids today are single buildings that rely on diesel generators to run when the grid is out. They're simple backup, redundant power. But some more advanced microgrids, such as the Clean Coalition's planned community microgrids, are looking into the future, when multiple sources of generation can support a community of homes and businesses. In... CONTINUE READING →

TAGS: initiative homepage / local energy rules / microgrid / report

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ILSR's ENERGY DEMOCRACY INITIATIVE

Mighty Microgrids

Communities all over the country are finding ways to break the macro barriers to microgrids. As we flip from a top-down to bottom-up grid management structure, major policy barriers must be lifted in order to expand energy democracy to customers and producers.

Matt Grimley and John Farrell
March 2016

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