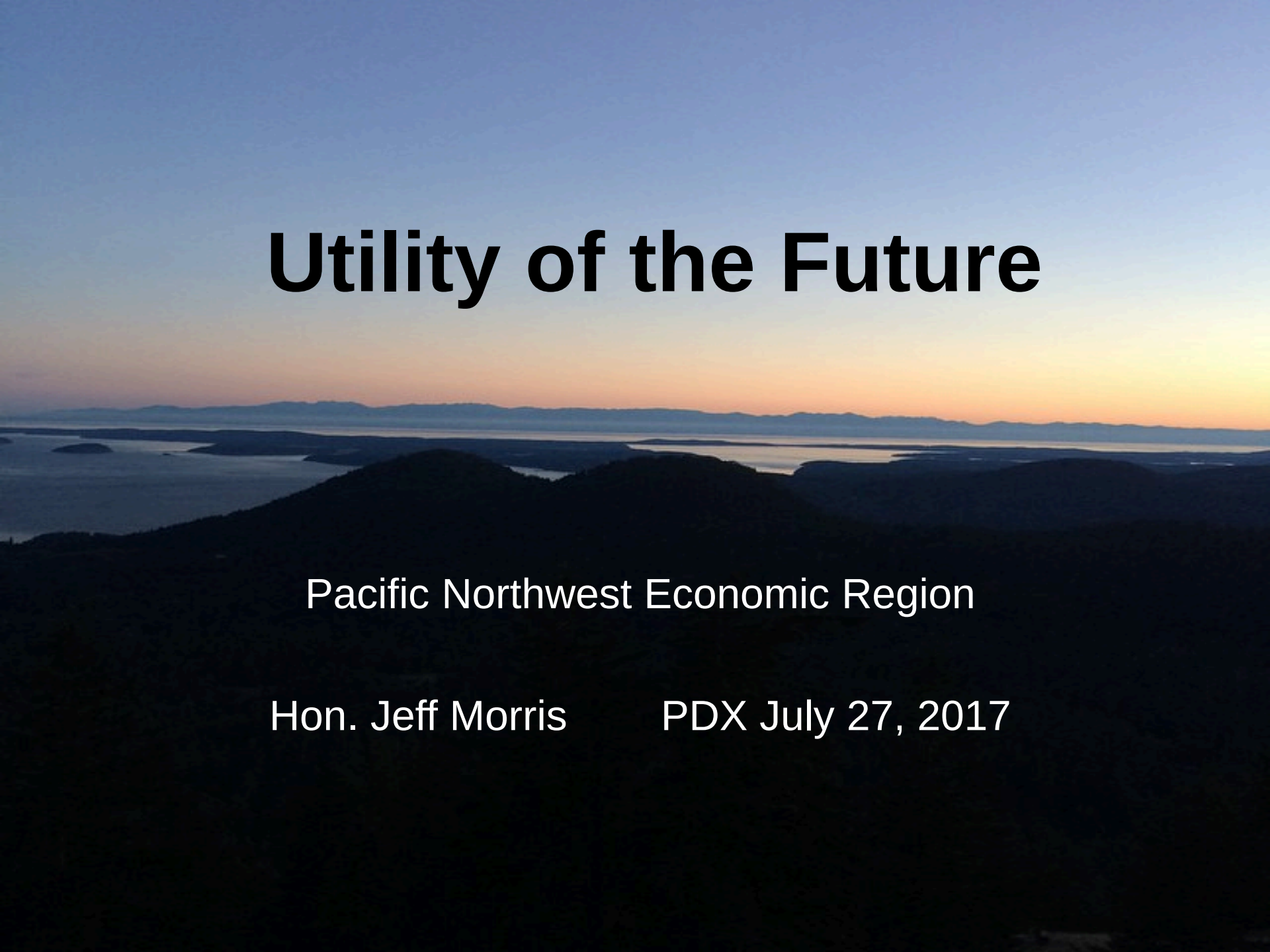


Utility of the Future

Pacific Northwest Economic Region

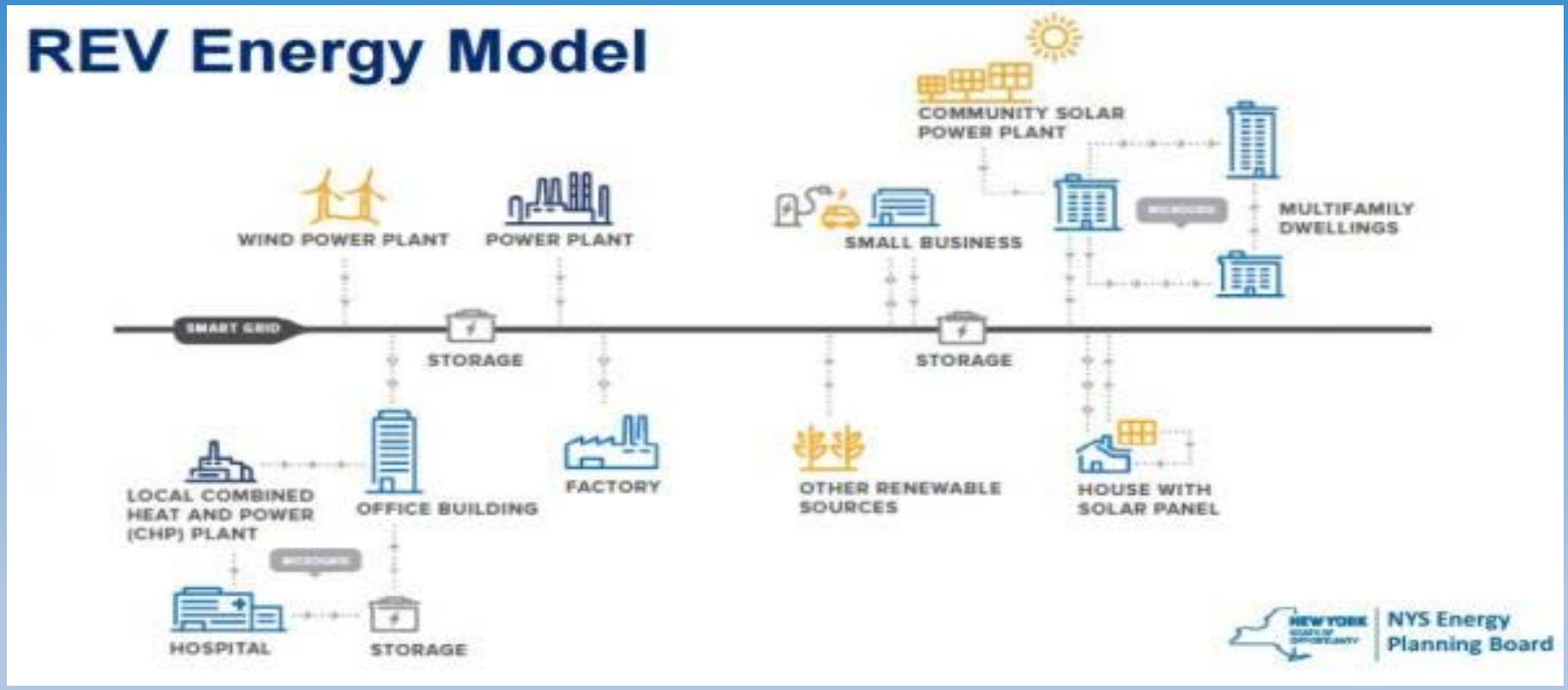
Hon. Jeff Morris PDX July 27, 2017

- ✓ Wincharger was born in 1927 on a farm in Cherokee, Iowa. Before the Wincharger, when the a radio's battery was drained, it had to be hauled to town and left for a few days at an auto repair shop to be recharged by a gas-powered generator. The fledgling Iowa company partnered in 1935 with the Zenith Corp. In 1937, Zenith Radio Corp. purchased the remaining shares of Wincharger stock. To provide additional lighting capacity, 12-, 32- and 110-volt generators were developed. Zenith continued with the Wincharger line until 1968. In Wincharger's first 10 years, which included the Great Depression, the company sold 750,000 units worldwide

- ✓ With implementation of the Rural Electrification Act in 1936, however, the wind-powered battery charger's days were numbered. Many utility companies refused to provide power to farms with working wind generators

- ✓ Many modern devices operate internally on direct current (DC), alternating current (AC) electricity is then converted back to DC electricity by the adapter of each device. This double energy conversion, which generates up to 30% of energy losses, can be eliminated.

The new “Utility of the Future” models are starting to appear today.

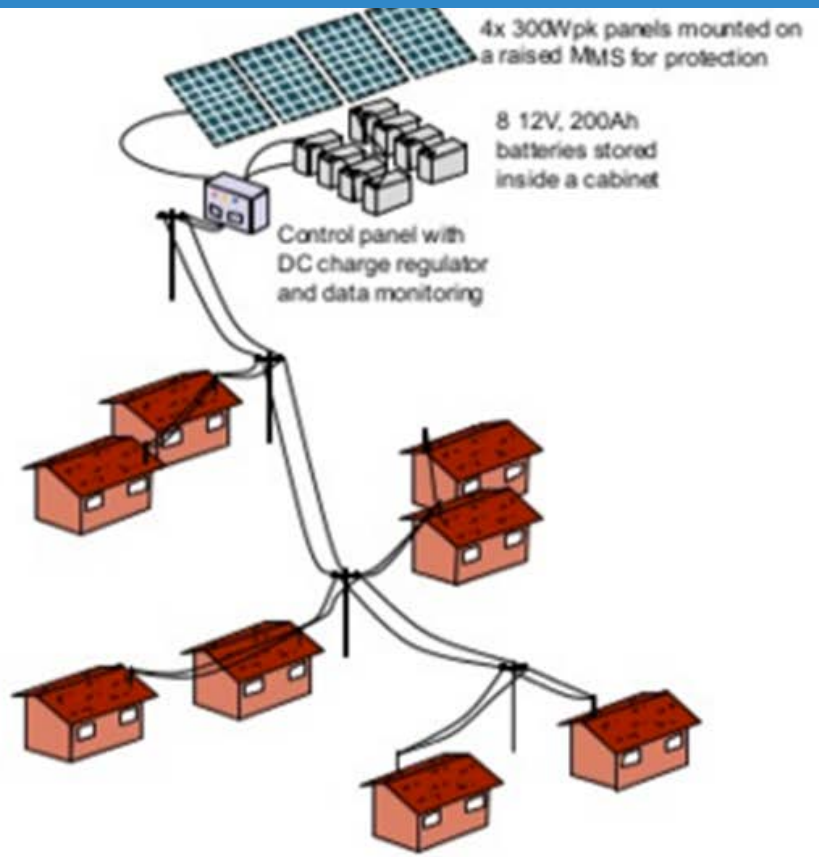


At Home

And Abroad

The System

System voltage: 48VDC
PV panels: 4x 300W, 24V, series connection, EmmVee
Batteries: 8x 200Ah, 12V, series connection, Primetech
Charge controller: 48V Phocos CR
Transmission: 48VDC overhead wiring
Household connection: Service lines taken to house, junction box inside house
Household wiring: Copper with standard consumables
Load control: Fuses for each house limit power consumption. Timing is centrally & manually controlled by Entrepreneur
Loads used: 48VDC LED lights, 3W. 48VDC mobile charger
Monitoring: Centralised data logger with remote monitoring. Timing of the system can be controlled remotely and data collected and analysed remotely.

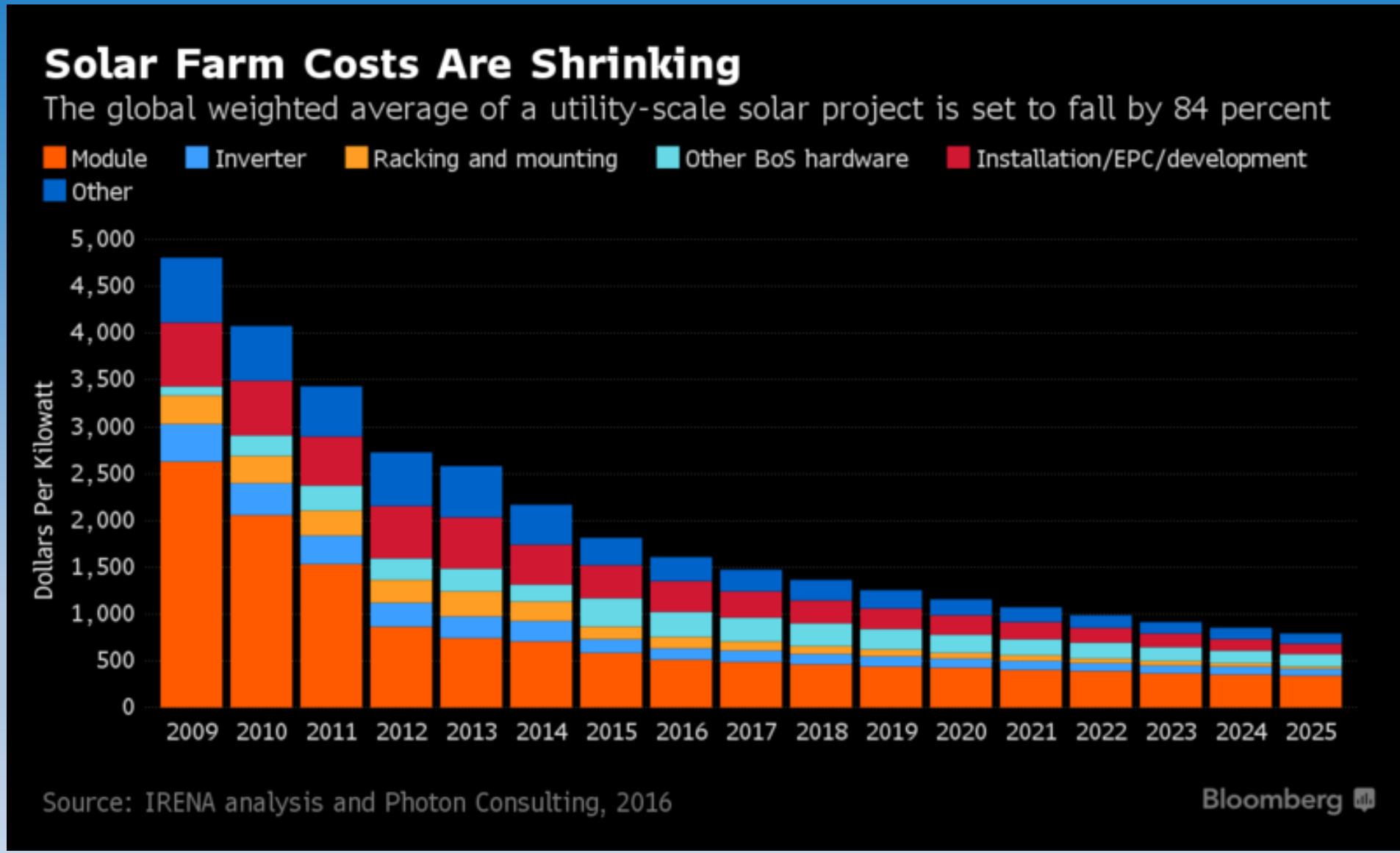


Kenya Proposed System

Mileposts to Watch

- ✓ The Energy Storage Association predicts that “a highly networked ecosystem of two-way power flows and digitally enabled intelligent grid architecture will replace the current one-way power system” and that energy storage will play a main roll in this process by 2025.
- ✓ The big guys are coming--Siemens and AES are joining forces to form to a new joint venture called Fluence, a move likely to spur greater uptake of energy storage and other distributed energy resources.
- ✓ The price of electricity vs. the fixed cost of infrastructure to deliver electricity.

Continued Falling Installed Costs



What Are The Emerging Models

- ✓ REV New York --- State's provide a platform with incumbent utility for competing technology/services to your home
- ✓ Incumbent Utility acts as Distribution System Operator DSO—A Local erosion of and ISO. Allows competing technologies/vendors to retail their services to you
- ✓ Performance Based Regulation—utilities earn income based on meeting agreed to performance metrics with customers or regulators. RIIO
- ✓ Transactive Energy – Intra-distribution balancing achieved by thousands of instant transactions of values on DS
- ✓ Electricity as Service – Utility provides you electrical products as a set price