

# PHOTOVOLTAICS

past, present & future

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# Past

**1970**

New silicon design brings cost down \$100/w to \$20/w

**1980**

ARCO Solar becomes first company to produce more than 1MW PV per year

**1983**

Worldwide PV production exceeds 21.3 MW

**1999**

Global installed PV capacity reaches 1000 MW

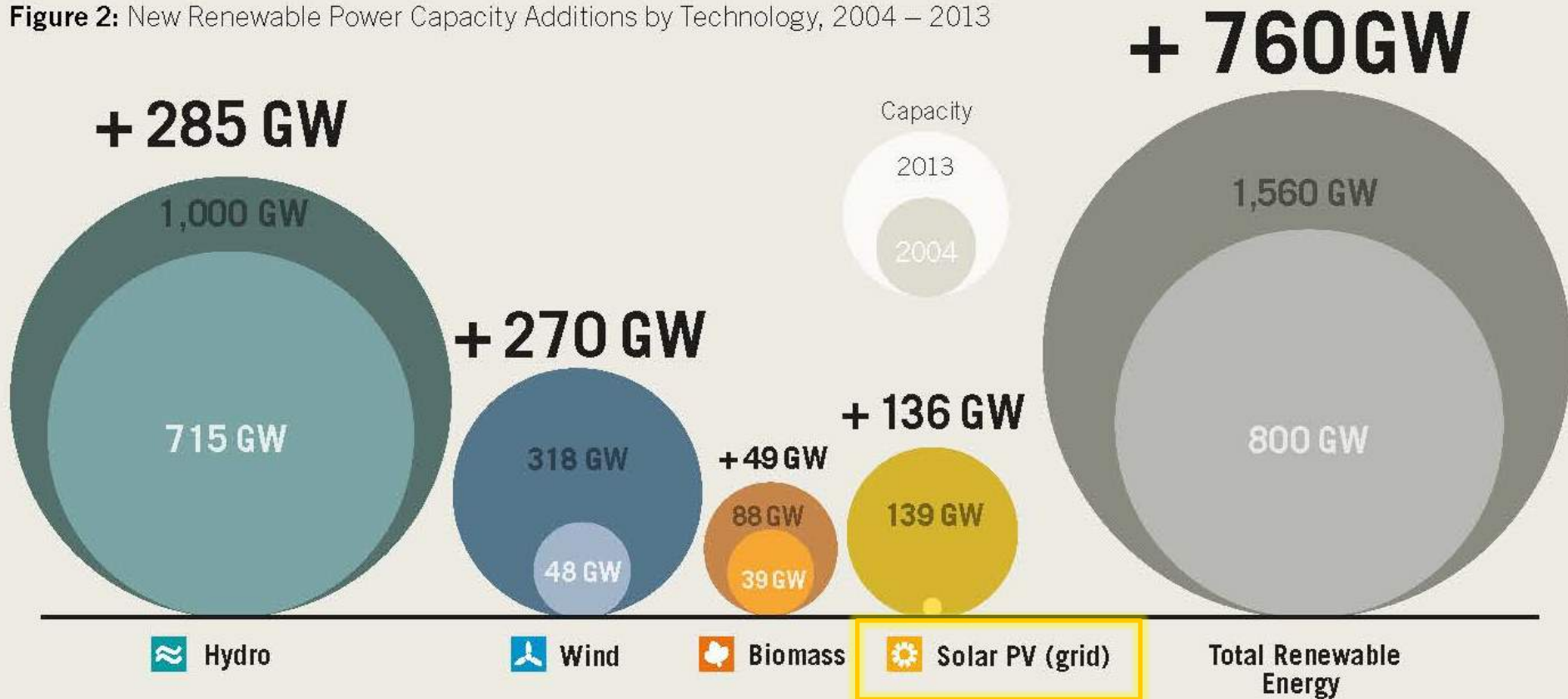
**2002**

First 38.7-kilowatt station opens in Washington State



# Growth in Solar Capacity

Figure 2: New Renewable Power Capacity Additions by Technology, 2004 – 2013



Note: Geothermal figures for 2004 and 2013 were 9 and 12 GW respectively. For CSP, capacity was 0.4 in 2004 and 3.4 GW in 2013. These amounts have been included in the Total Renewable Energy calculation.

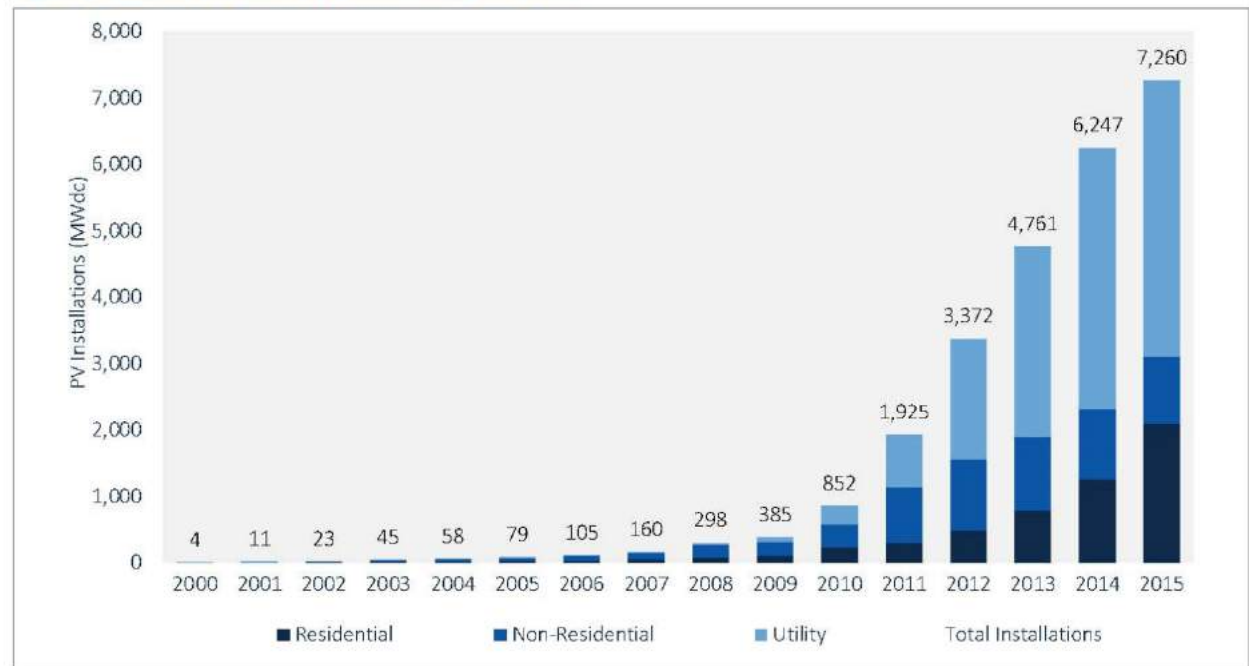
# Present

Nearly 1 MW of solar PV – enough to power more than 160 homes – was installed almost every hour in the US in 2015.



> \$3  
a watt

Figure 1.1 Annual U.S. Solar PV Installations, 2000-2015

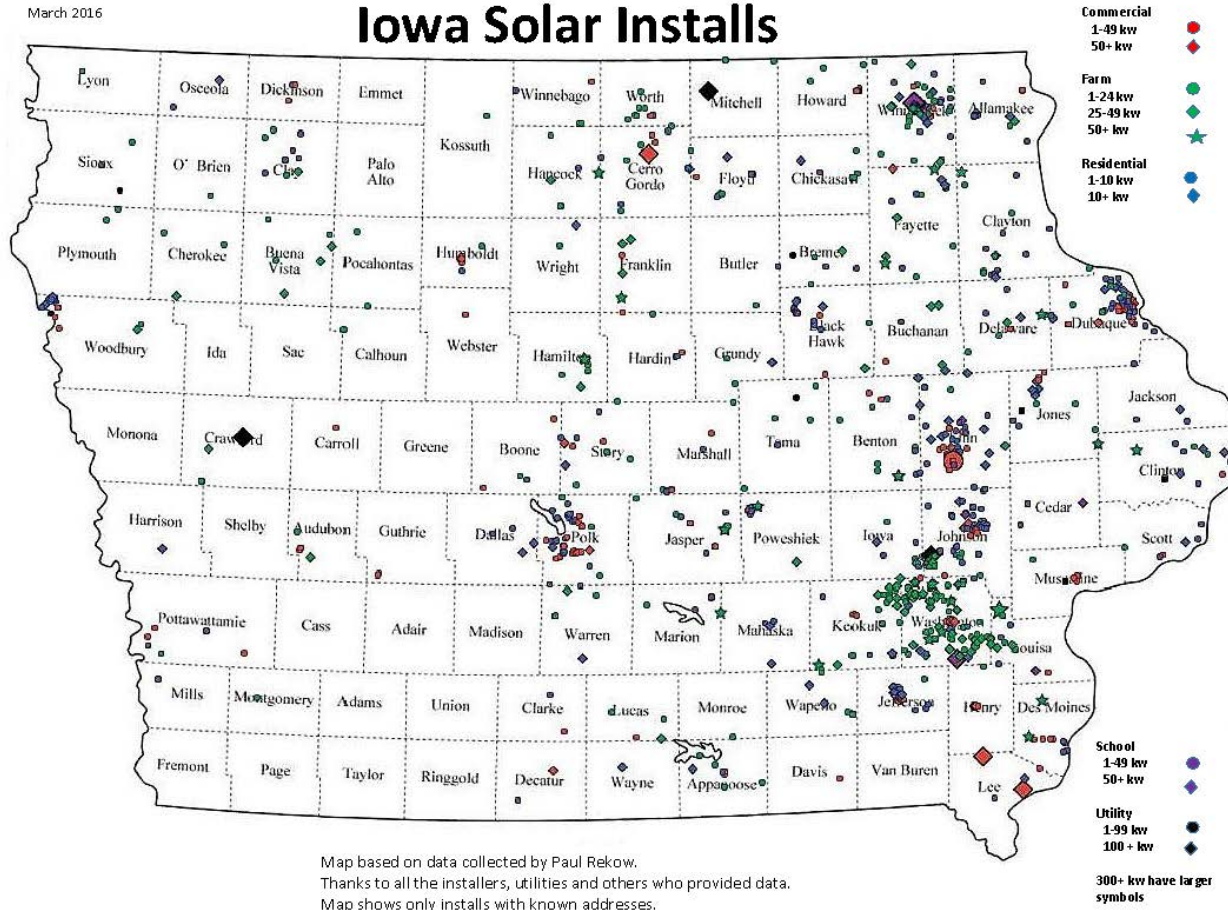


Source: Green Tech Media

# Present - Iowa

March 2016

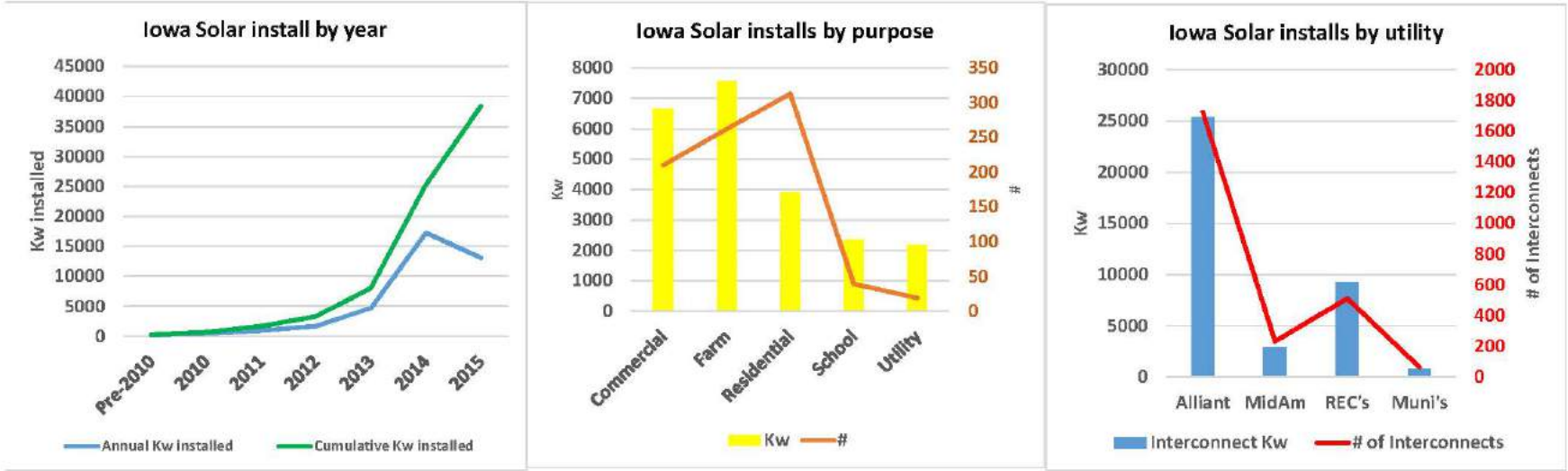
## Iowa Solar Installs



Source: Paul Rekow



# Present - Iowa



Install breakdown by year

	#	Kw	Cum Kw
Pre-2010	78	260	260
2010	53	448	707
2011	60	957	1664
2012	193	1671	3336
2013	355	4694	8030
2014	1170	17248	25278
2015	637	13095	38373
<b>Total</b>	<b>2,546</b>	<b>38,373</b>	

Install breakdown by purpose

	#	Kw	Average	Largest Install
Commercial	210	6661	31.7	500
Farm	262	7552	28.8	374
Residential	313	3905	12.5	63.8
School	39	2343	60.1	725.8
Utility	19	2181	114.8	797.5

School includes colleges and universities

The numbers in this chart and table are based on my verified data

Install breakdown by Utility

	#	Kw
Alliant	1725	25376
MidAm	232	2900
REC's	511	9276
Muni's	65	800
Off-Grid	13	21
<b>Total</b>	<b>2,546</b>	<b>38,373</b>

A few of these interconnects may be in 2016

Source: Paul Rekow

# Breaking News

## **New Jersey Senate passes 80% renewable energy mandate**

80% of electrical power from renewables by 2050. - PV Magazine  
3/21/16

## **Oregon Governor signs bill into law phasing out Coal-fired Power**

making Oregon the first state to eliminate coal from its energy supply by legislation, phased in through 2030.

-Renewable Energy World 3/11/16

## **Nevada's Perplexing war on solar**

drastic rate changes lead Solar City to lay off 550 workers - CNN 2/6/16

# Present- New Rate Structure

MARKETS & POLICY

## A Rising Tension: 'Value-of-Solar' Tariff Versus Net Metering



TASC members SolarCity, Sungevity, Sunrun and Verengo are battling to keep net energy metering intact.

by Herman K. Trabish

April 10, 2014

Green Tech Media



# Legislative Goals

→ Increase Investment Tax Credit fund to \$7.5 million

→ Add 40 MW solar under Iowa Renewable Energy Tax Credit

→ Increase Renewable Portfolio Standard from 105 MW to 1 GW for solar

→ Expansion of “community” solar gardens



Community Solar Garden, Kalona IA

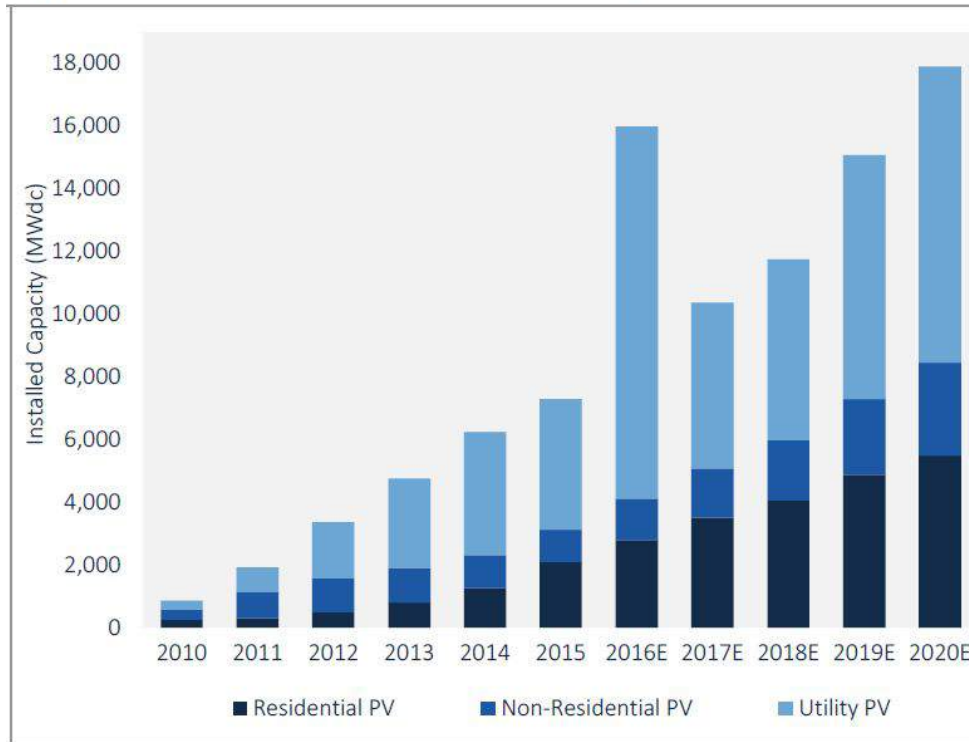
# Future

## US Solar Market Set to Grow 119% in 2016



**\$2**  
|

Figure 1.5 U.S. PV Installation Forecast, Current

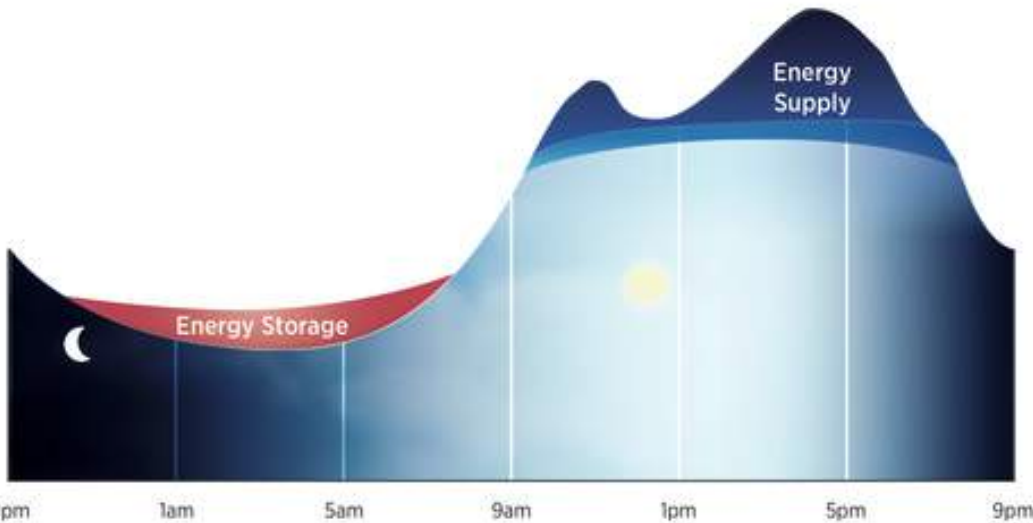


Source: Green Tech Media

a watt

# Future

## Energy Storage



Solar as  
Baseload

# Future - VOST

How the Value of Solar Tariff (VOST) works in Austin, TX



You pay the utility company your regular residential rate for each kWh you use

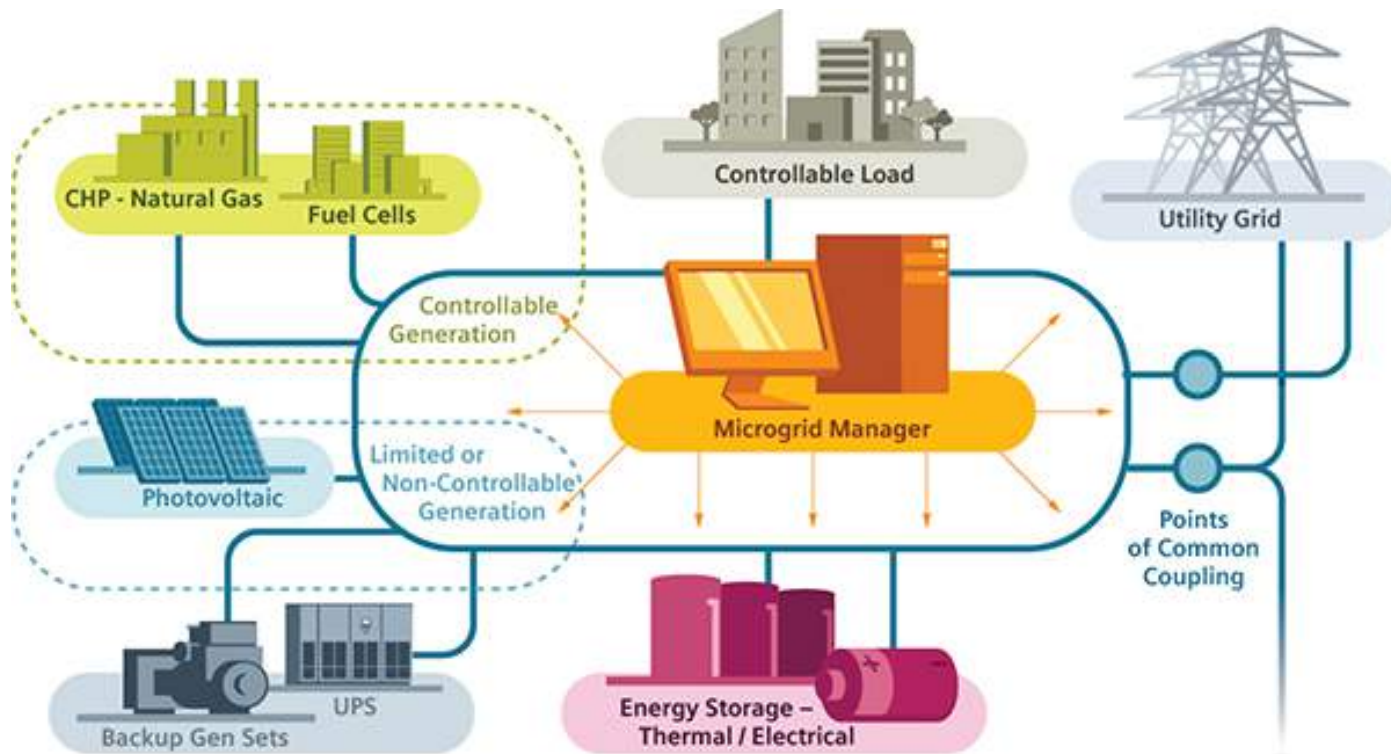


Utility pays you 11.3¢ for every kWh you produce!

# Future:

## New Energy Paradigm Modernization and Planning

### Microgrid





# Thank you Questions

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