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# Storage and Other Disruptions for Networks

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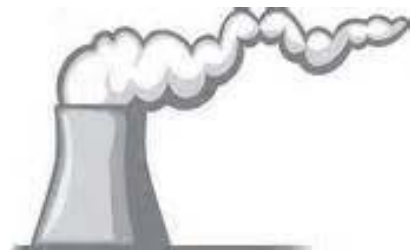


**ACUMEN 2016**

8<sup>th</sup> - 10<sup>th</sup> February 2016

# “Clean” Changes Things

**TODAY**



**2030**



<b>Make</b>	- 15 generation units	- 600,000 generation units
<b>Move</b>	- 10,000 network controls	- 900,000+ network controls
<b>Use</b>	- 0 Smart Cities	- 60 smart cities / communities

Source: Ofgem and IET



# Changes Supported by Technology



## Make Energy:

- More distributed supply
- Accommodate growth



## Move Energy:

- Flexible, intelligent, resilient
- Increase visibility



## Use Energy:

- Integrate end-use activity
- Empower customers and communities

## Technologies:

- Energy storage
- Distributed intelligence
- Adaptive protection
- Layered architecture
- Self-diagnostic, healing
- Power electronics
- Data, cyber, analytics

Source: IEEE GridVision 2050



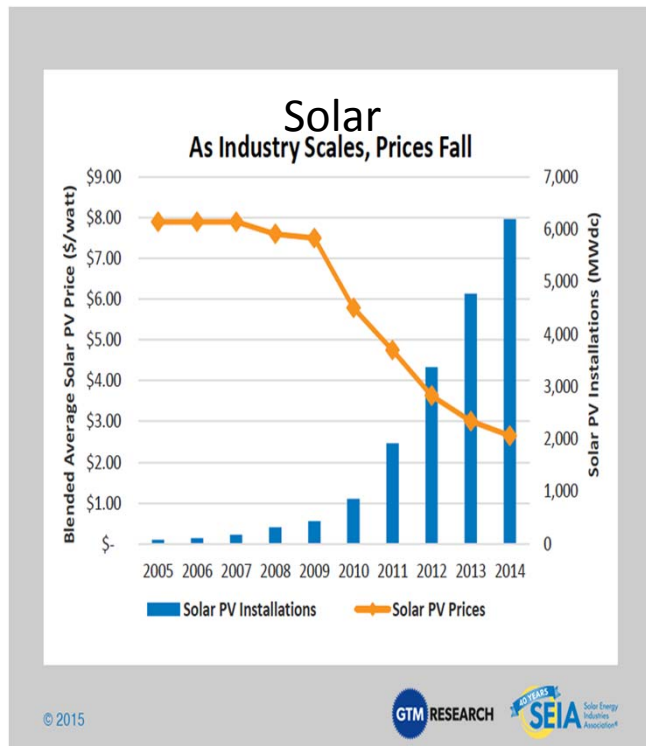
# Technology Disruption!



Source: "Utility Marketplace with a Texas Twist" Tim Hein, Oncor, April 2015

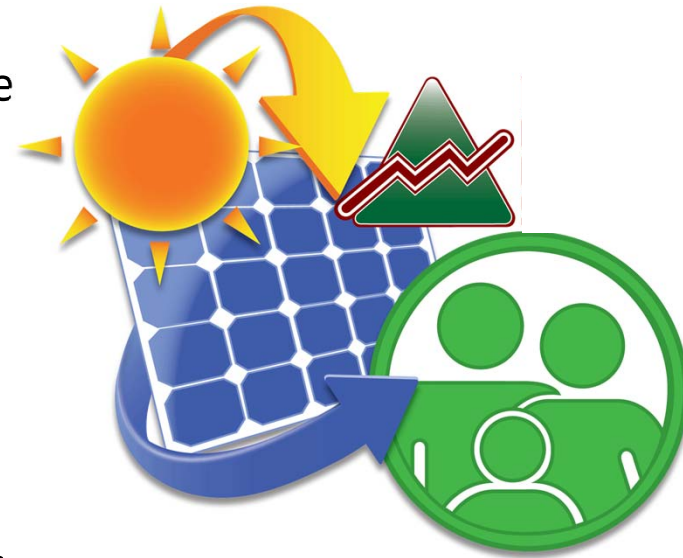


# Storage Costs are Following Solar



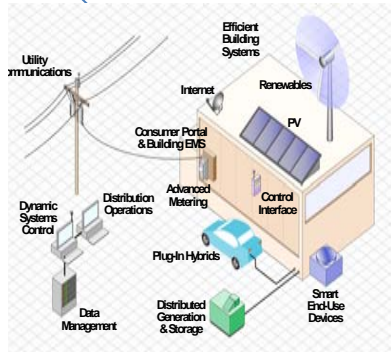
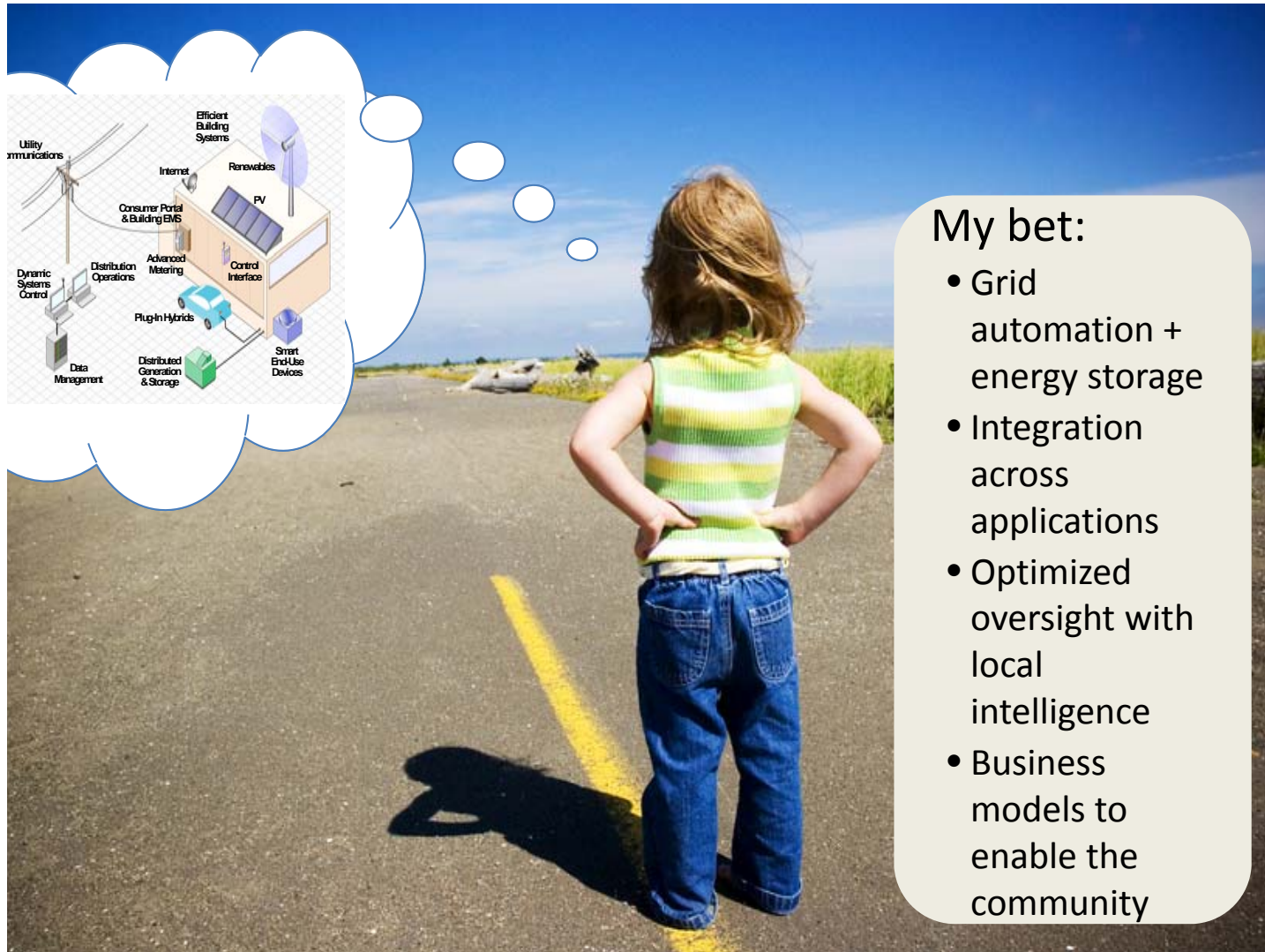
## So What?

- Energy storage paves the way for consumers to choose their own energy future
- The traditional utility model is challenged and changing
- Many pursuing energy services and new business models to enable consumers and the community



Source: Graphic modified from Missoula Electric Community Solar





### My bet:

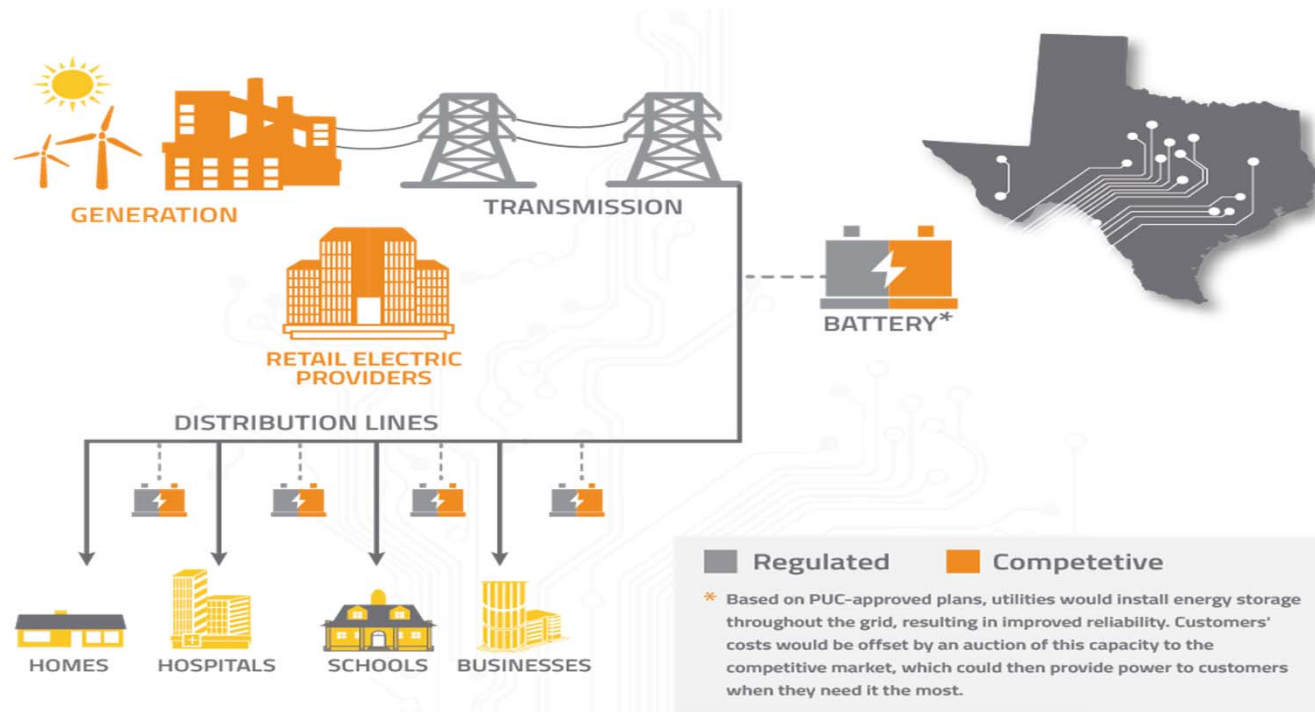
- Grid automation + energy storage
- Integration across applications
- Optimized oversight with local intelligence
- Business models to enable the community

# Why Enable Communities

- Address the de-carbonisation requirement
- Improve security and resiliency
- Offer services and community investment to expand business opportunity
- Ability to interconnect distributed resources
- Utilize distributed resources for security of supply
- Address difficulties associated with ageing assets
- Optimize community assets across all value streams



# Oncor Market Development



Source: David Treichler, ONCOR "ONCOR Energy Storage and Microgrid" for DOE in June, 2015

# Storage Report for ONCOR

Brattle report for ONCOR, Nov. 2014 - "The Value of Distributed Electricity Storage in Texas"

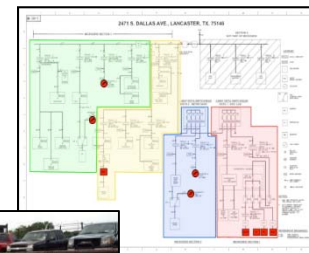
- 5,000 MW of distributed storage is cost-effective at \$350/kWh in ERCOT
- Payback requires regulated investment deferral and merchant market
- Deploy storage on distribution system and "auction" rights to 3rd parties to participate in wholesale market

*Telling the story with  
ONCOR Microgrid*



# ONCOR Microgrid

- Engineered to maximize energy storage, renewable generation and improve reliability
- Utilizes distributed generation
  - two solar photovoltaic arrays
  - a microturbine
  - two energy storage units
  - four generators
- Energy storage is the backbone



# Examples of Microgrid Experience

Application	Solar or Wind	On-Site Gen	Self Healing	Storage	Island	Coms
Military		x	x		x	x
Military		x	x			x
University	x	x	x	x	x	x
Utility		x		x	x	
Utility			x	x	x	
Utility			x	x	x	x
Jail	x	x		x	x	
Utility - Oncor	x	x	x	x	x	x
Data Center			x	x		
University			x			
Utility	x		x	x		x
Utility	x			x		
Hospital		x	x			



## Storage Enables Community Integration

- Benefits are many - include constraint relief
- Many considerations for business models
  - Location
  - Funding sources
  - Economic growth
  - Social and health benefits
  - Multi-vector aspirations (gas/electricity/heat)

## Opportunities Remain

- Address storage regulatory, ownership, price issues
- Create win-win community business models
- Embrace distributed intelligence
- Facilitate the interoperability of everything
- Develop workforce competencies
- Create tools for planning and dynamic operations
- Utilize large amounts of data
- Overcome cyber-security obscurities

# Conclusion

- Many trends and drivers
- Transitions how we make, move, use
- Storage is a disrupter
- Business models are evolving to enable communities
- More to be done



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Read More: S&C Grid Blog from @WandaReder <http://bit.ly/1PJMPzN>

