The Economics of Demand Flexibility

Business models to deliver customer value in an integrated grid

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ROCKY MOUNTAIN INSTITUTE

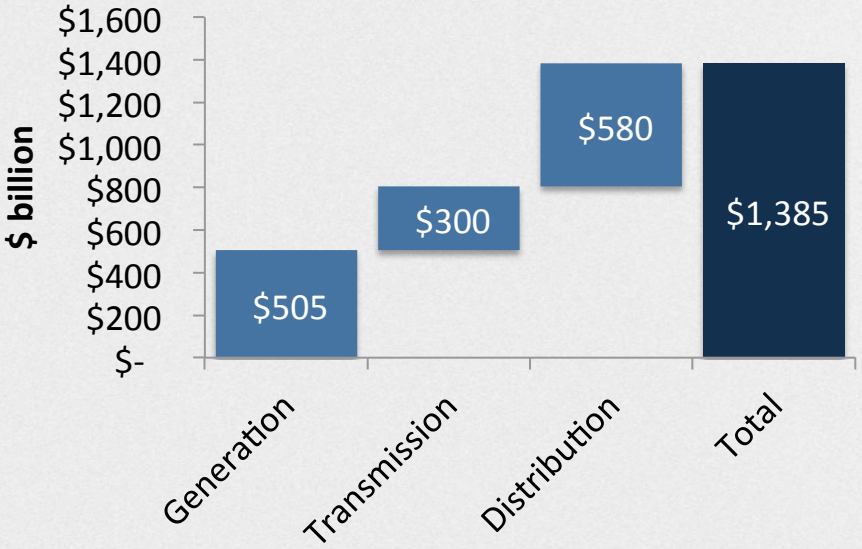
CARBON WAR ROOM

FURTHER, FASTER, TOGETHER

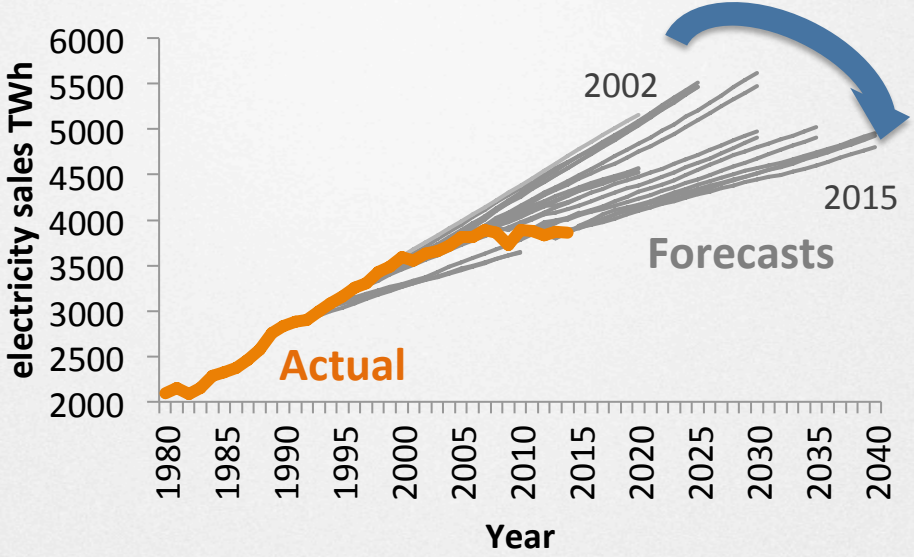
Context: rising costs, flat demand

Utilities plan to invest $1.4 trillion in infrastructure upgrades through 2030, but sales have declined 5 out of the last 7 years, and growth forecasts have been systematically lowered.

Grid investment forecast, 2015-2030



EIA electricity consumption projections



Source: DOE QER 2015; EEI; EIA EPM and AEO

Consumers have expanding options

To meet demand for electricity, utility customers used to buy it, but it is increasingly easy and cost-effective to make it, avoid it, or shift it.

Grid Purchases

Buy kWh from the grid as and when needed.

Distributed Generation

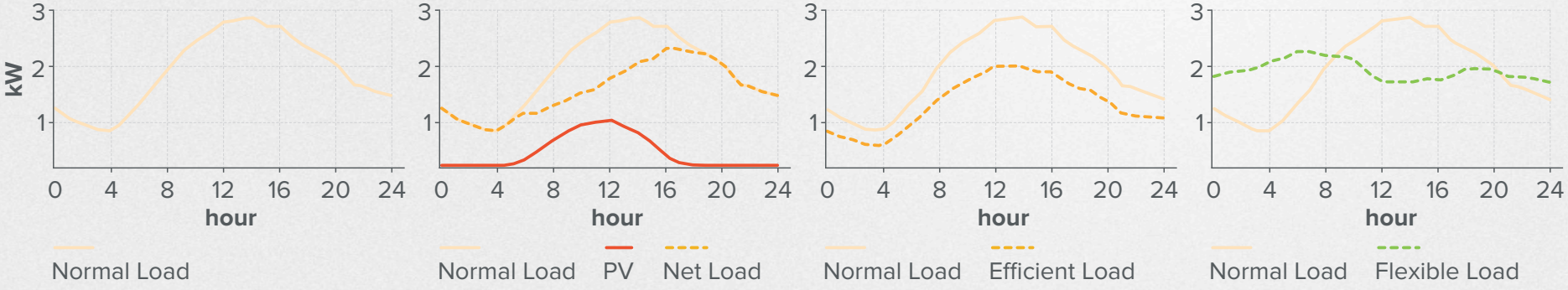
Generate electricity, changing the profile of net grid demand while reducing total grid demand.

Energy Efficiency

Reduce demand whenever load is operated, thus lowering the daily load curve.

Demand Flexibility

Shift eligible loads across the hours of a day to lower-cost times, reshaping the daily load curve.



Source: RMI The Economics of Demand Flexibility

Harnessing DER: demand response vs. demand flexibility

Underlying technology is the same, but demand flexibility business models build on and complement the traditional demand response paradigm.

Demand Response	**Demand Flexibility**
Grid focused	**Customer focused**
Wholesale drivers: price, reliability	**Retail drivers: tariffs, DER integration**
Slow to scale	**Consumer value increases scalability**
Infrequent / emergency	**Frequent / always on**

Trends in rate design value demand flexibility

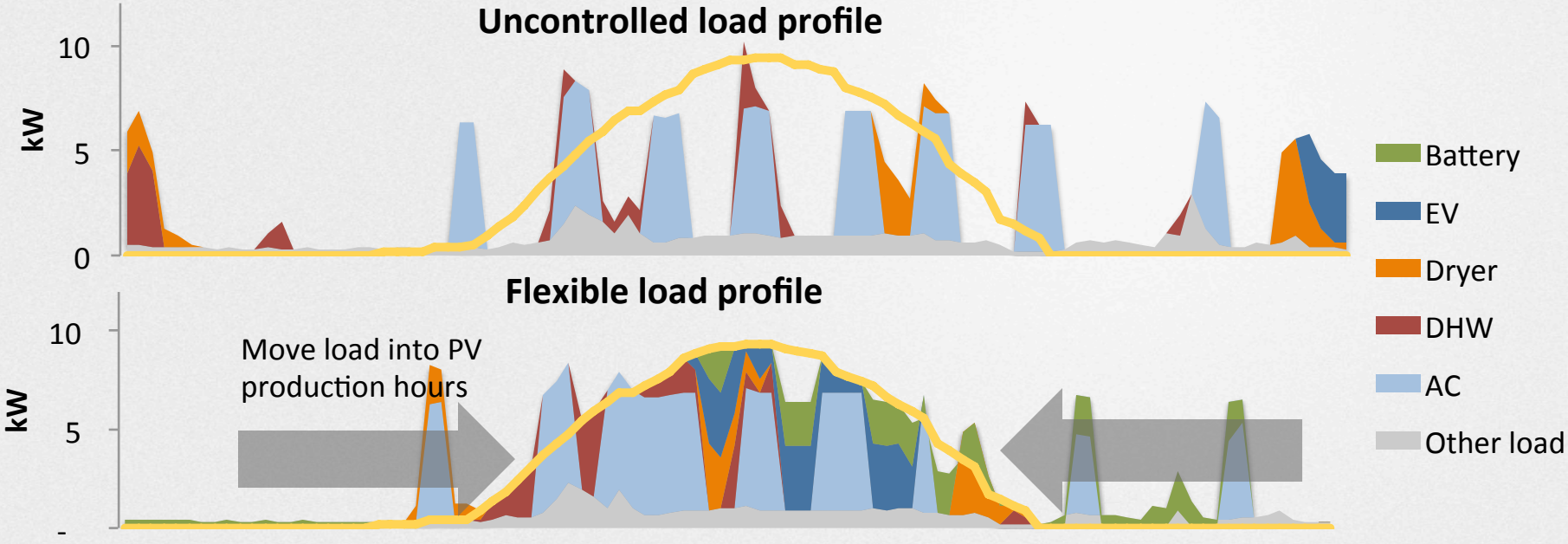
Nationwide, 65 million customers are already eligible to opt in to time-of-use pricing rates, and an increasing number of utilities are proposing non-volumetric default rates.

Trend	Overview	Examples
Time-varying energy pricing	Prices for energy change, as often as hourly, depending on time of day.	ComEd, Ameren (IL), California, Massachusetts, >600 others
Demand charges	Customers pay a fee corresponding to maximum demand during a given period (e.g. monthly)	Salt River Project, Arizona Public Service, PG&E*, SDG&E*, Westar Energy, OG&E*, 10+ others
Reduced export compensation for PV	Exported PV is compensated at less than the retail rate	HECO, Alabama Power, Xcel*, Tucson Electric*, SCE*, SDG&E*

*proposal

Demand flexibility supports on-site PV use

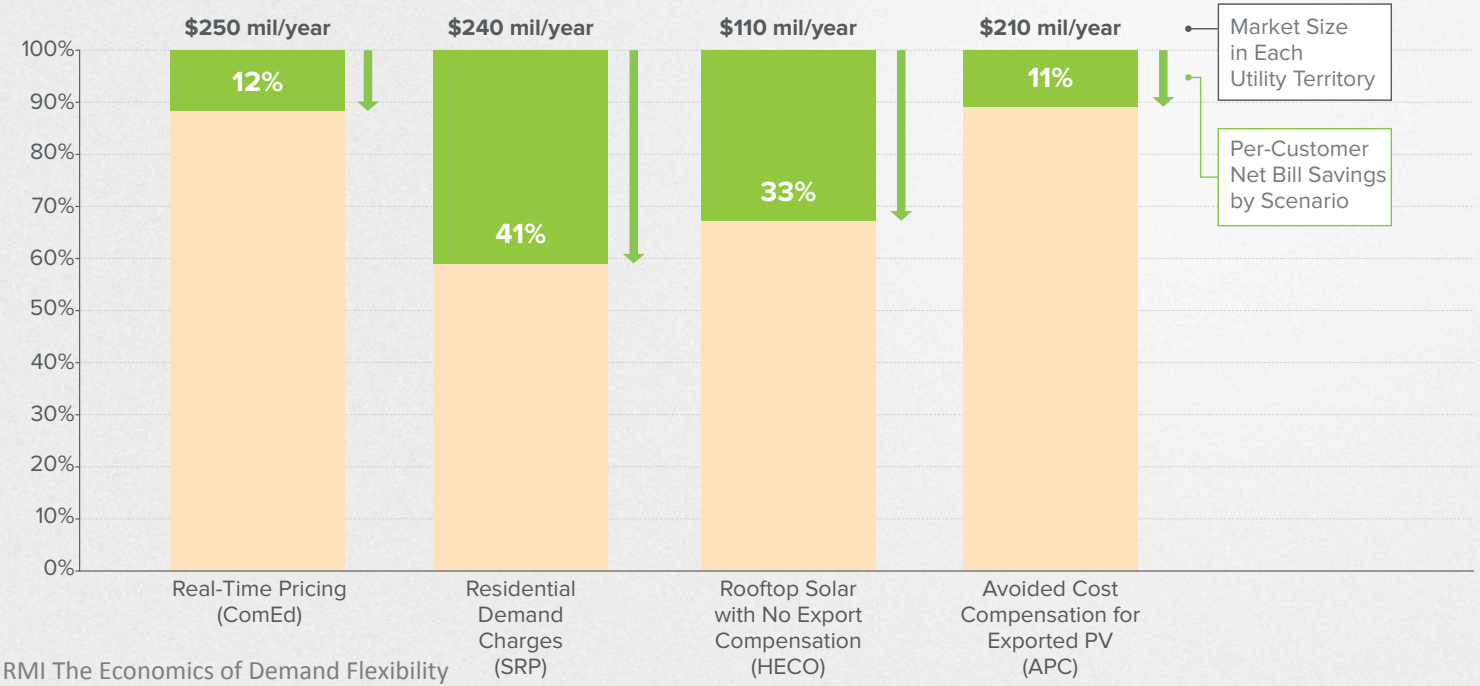
Load can be scheduled to coincide with PV generation in the absence of net energy metering.



Source: RMI The Economics of Demand Flexibility

Customers save 10-40% net with DF

Under rates that exist today, residential customers can achieve 10-40% annual bill savings. Across just four markets, there is an $800 million/y savings potential for eligible customers.

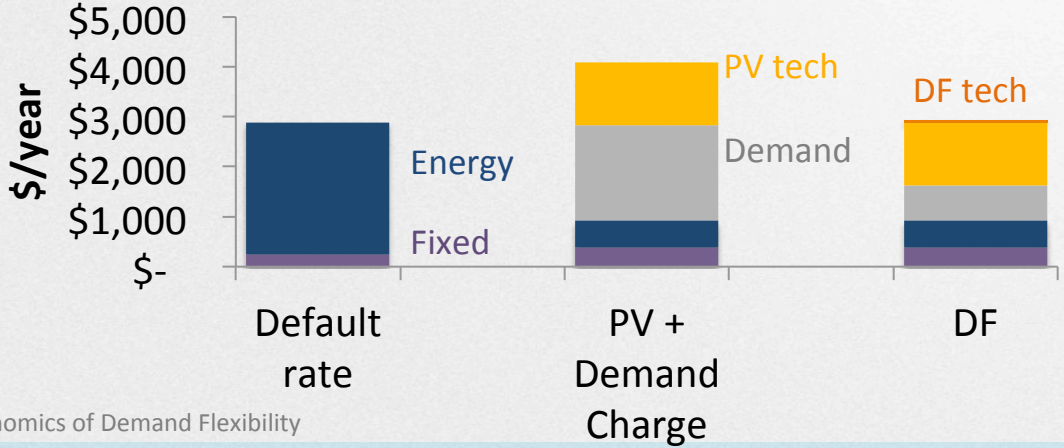


Source: RMI The Economics of Demand Flexibility

Case details: Salt River Project

- DF reduces peak demand by 48%
- PV customer saves 41% net on bills
- A new customer breaks even, including cost of PV at today's prices
- >350,000 eligible customers
- $240 m/y savings for eligible customers
- Unlocks $6 billion rooftop PV market

Annual supply costs: SRP customer



Source: RMI The Economics of Demand Flexibility

New business models can scale this resource

Utility tariffs and programs can line up incentives for new business models to deliver what the customer values, while also lowering bills and reducing grid costs with demand flexibility.

Customers want many things…

- *Lower bills*
- *Increased comfort*
- *More control*
- *Self-generation*
- *Green attributes*
- *Shiny objects*
- *Social engagement*
- *Security*
- *…*

… and companies are innovating to deliver it

eCURV

Coefficient

eMotorWerks SMART [GRID] EV CHARGING + WattTime

greentechgrid: SunPower Invests $20M in Tendril to Link Solar With Home Energy Management

ALARM.COM

ohmconnect

Utility DIVE TOPICS FEATURES
SolarCity partners with Google's Nest to integrate smart thermostats with rooftop solar

enbala POWER NETWORKS

TEMPUS energy

SIMPLE ENERGY MARKETPLACE

WASHINGTON BUSINESS JOURNAL
New Opower product platform guides shoppers on energy efficiency

aquanta

[e] enphase

Developers and utilities have a role to play

Good retail pricing and new business models can unlock massive value from demand flexibility, and reduce customer bills while lowering grid costs.

DER developers

- Take advantage of **business opportunities that exist today** across the US and abroad
- Focus on **delivering what the customer wants**, but seek to monetize additional grid values of demand flexibility

Utilities & regulators

- Capture the grid value of flexibility + PV with **rate design that aligns incentives** by lining up customer prices with utility costs
- Seek **partnerships to unlock innovation** and drive the scale of the flexibility resource