

REINHOLD ENVIRONMENTAL Ltd.



# 2016 NO<sub>x</sub>-Combustion-CCR Round Table Presentation

February 1 & 2, 2016, in Orlando, FL / Hosted by OUC

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# Embracing Change During Challenging Times

## 2016 NOx-Combustion – CCR Roundtable

Jan Aspuru

Vice President – Electric & Water Production



# Overview

- About Orlando
- Background on OUC
- How OUC (and the industry) has adapted to change in the past
- How OUC is positioning itself for a very challenging future

# Orlando – You Don't Know the Half of It

- Central Florida is the nation's largest hub for simulation technology
- The University of Central Florida's Institute for Simulation & Training developed the nation's first master's and Ph.D. programs in modeling and simulation
- *Entrepreneur Magazine* and *Biz Journals* rank Orlando as "one of the best places to start or grow a small business"

Orlando.  
You don't  
know the  
half of it.

[OrlandoEDC.com](http://OrlandoEDC.com)

# Orlando – You Don't Know the Half of It

- *Forbes* names Orlando as one of “the next big boom towns in the U.S.”
- Top 10 in U.S. for “Best Cities for College Grads” – *CareerBliss.com*
- *Techie.com* put Orlando on its list of the “most promising tech hubs to watch in 2014”
- Modis named Orlando “the #3 city to find an IT job”



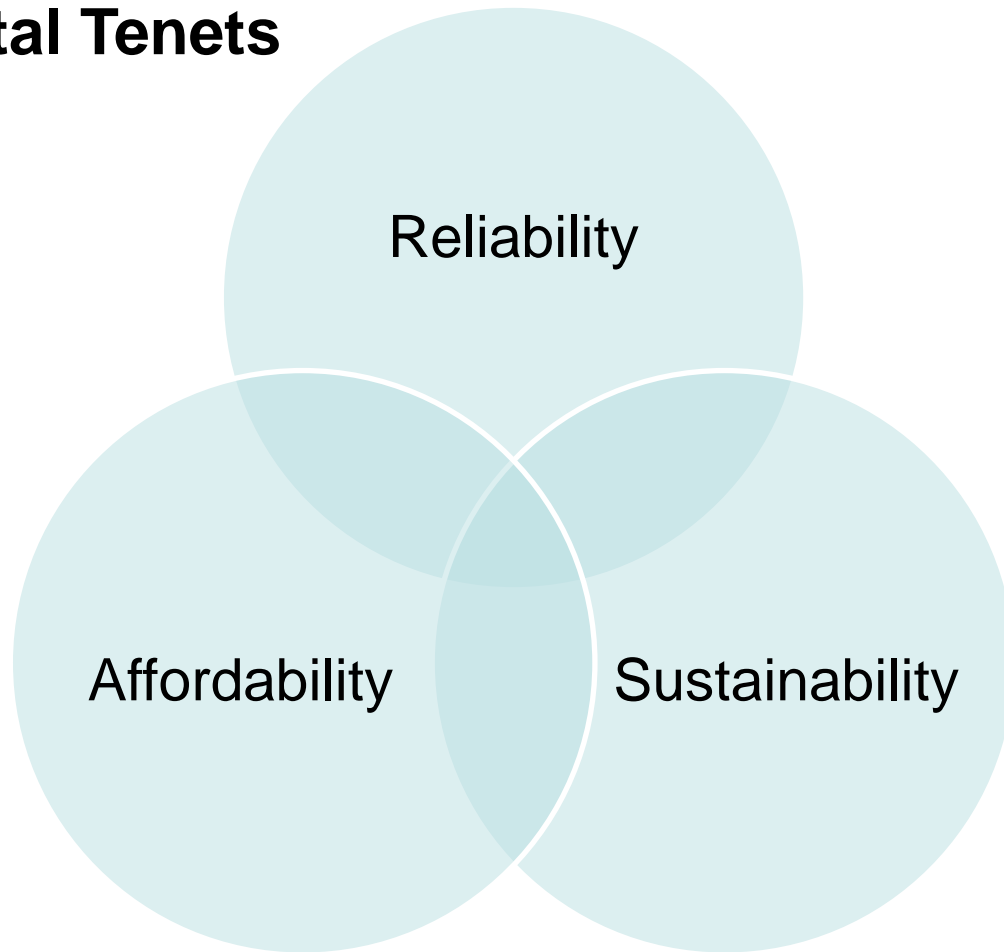
# OUC Background

- Orlando Utilities Commission (OUC)
- Established 1923
- Municipal Electric and Water Utility
  - 2<sup>nd</sup> largest in Florida
  - 14<sup>th</sup> largest in U.S.
- City of Orlando
  - St. Cloud, Vero Beach, Bartow, Lake Worth, Winter Park
- Statutory Commission
  - Governed by five member board
  - Customers are OUC’s “stockholders”



# OUC Background

## Fundamental Tenets



# Stanton Energy Center

# Stanton Energy Center – A Unique Site

- 3,200 acre site
  - 2,200 acres dedicated as wildlife refuge and habitat
- Total 1,897 megawatts
- Four different types of fuel
- Zero Liquid Discharge (ZLD) facility
- List of “Firsts” *(as far as we know)*:
  - 1<sup>st</sup> SCR installation on large pulverized coal unit
  - 1<sup>st</sup> co-firing of landfill gas with coal
  - One of 1<sup>st</sup> ZLD sites in the US
  - Largest installed capacity of Brine Concentrators in US
  - 1<sup>st</sup> solar farm on coal by-product landfill

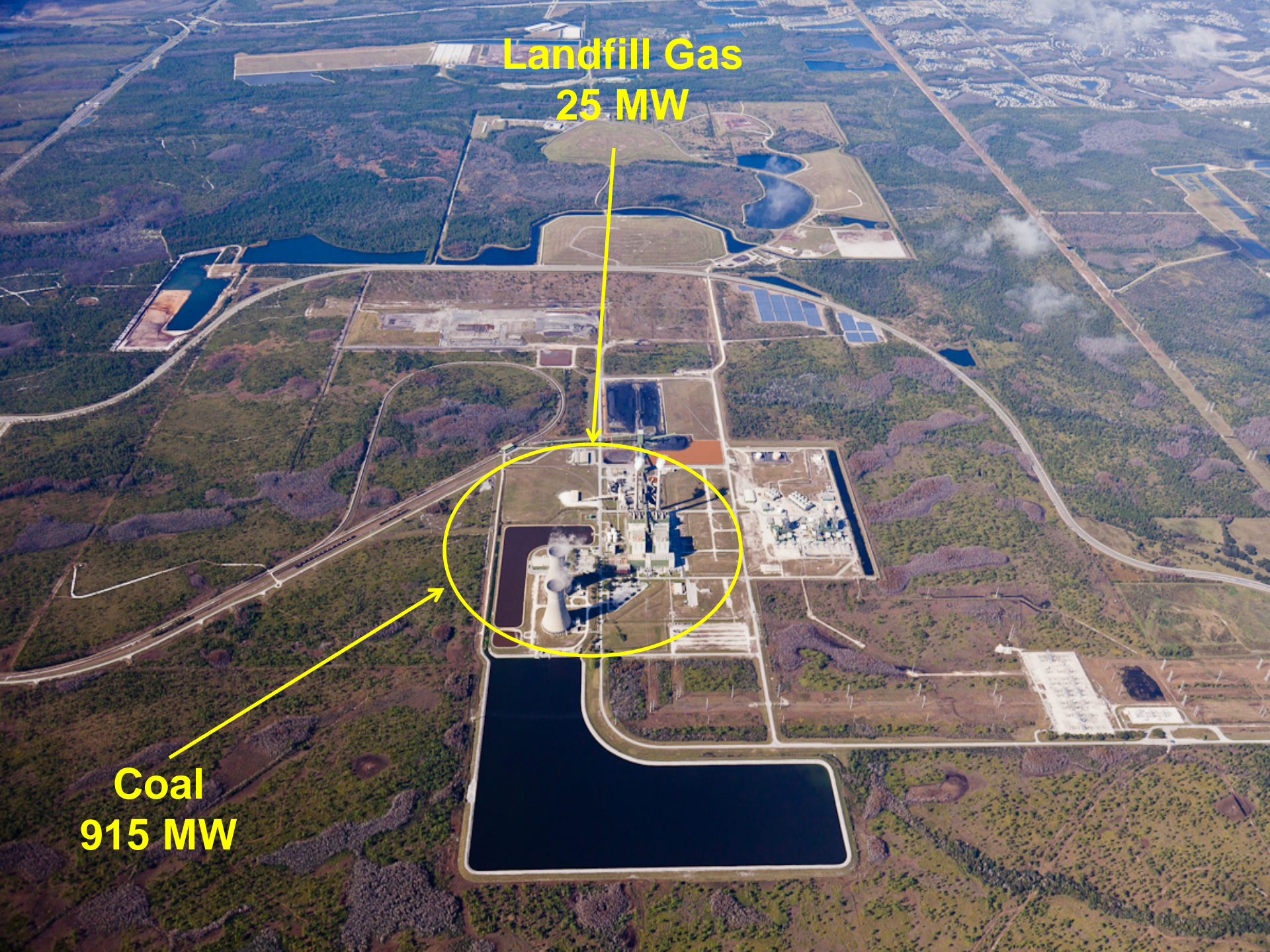




**Coal**  
**915 MW**

**Landfill Gas  
25 MW**

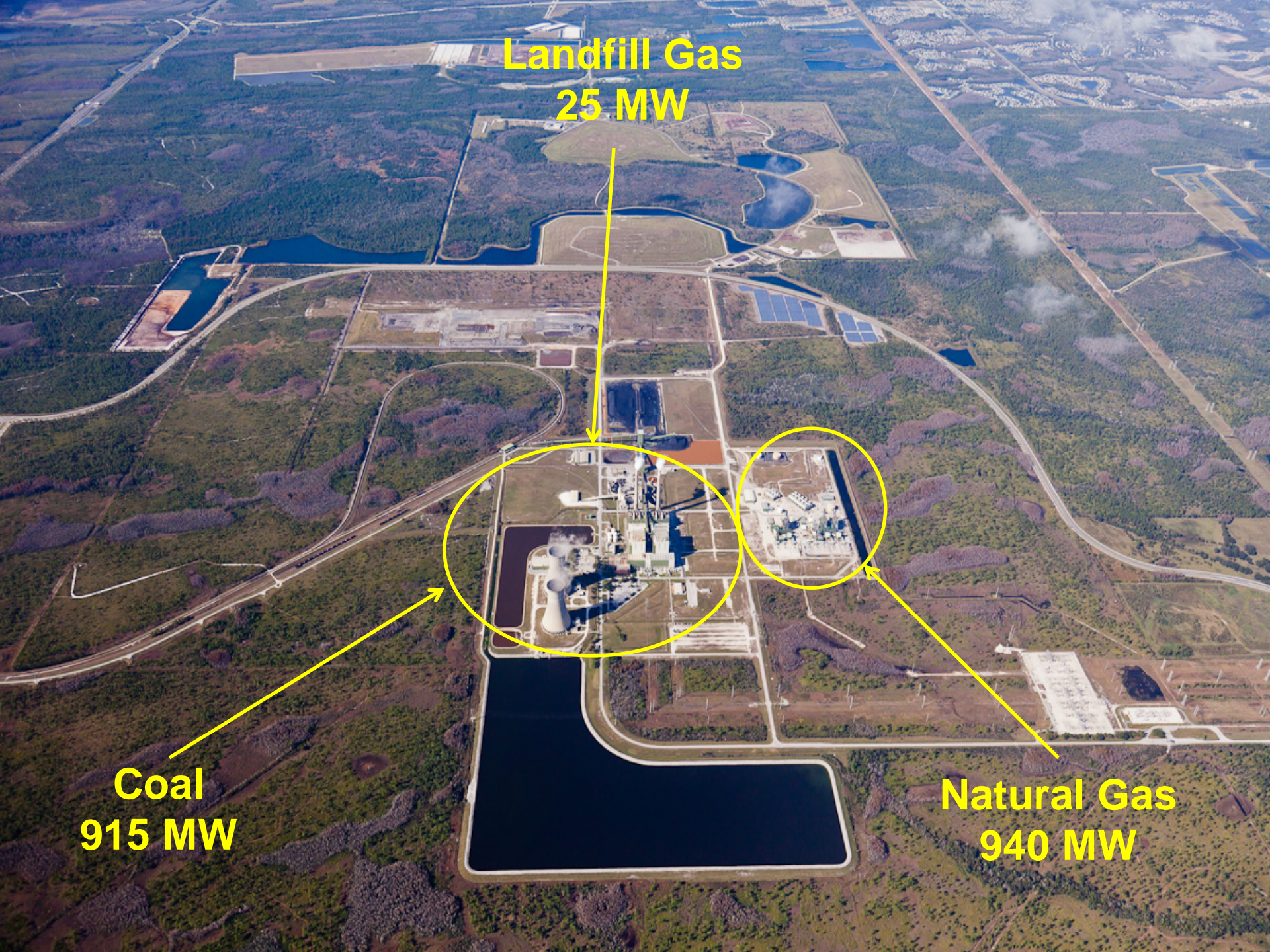
**Coal  
915 MW**

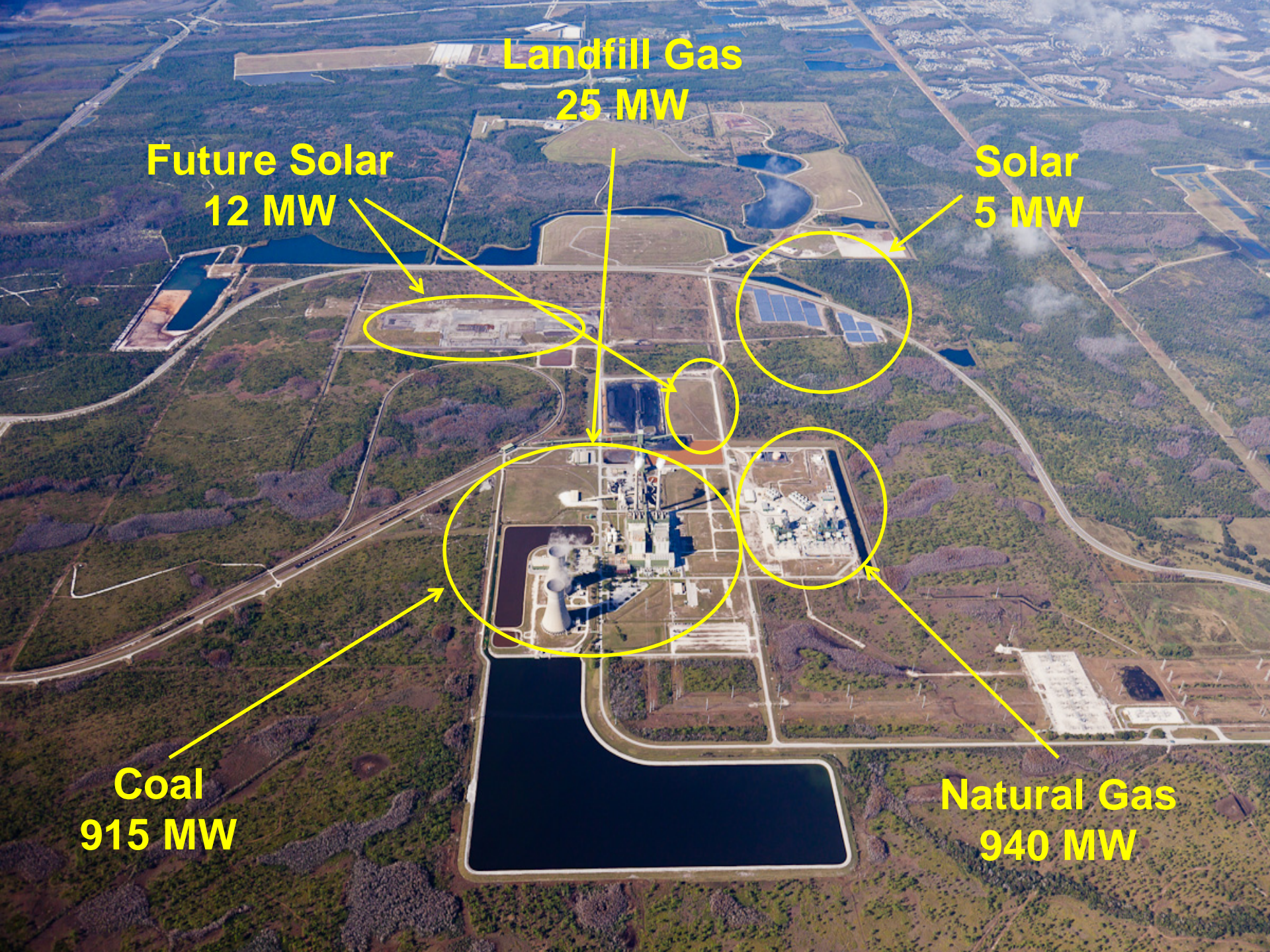


**Landfill Gas  
25 MW**

**Coal  
915 MW**

**Natural Gas  
940 MW**





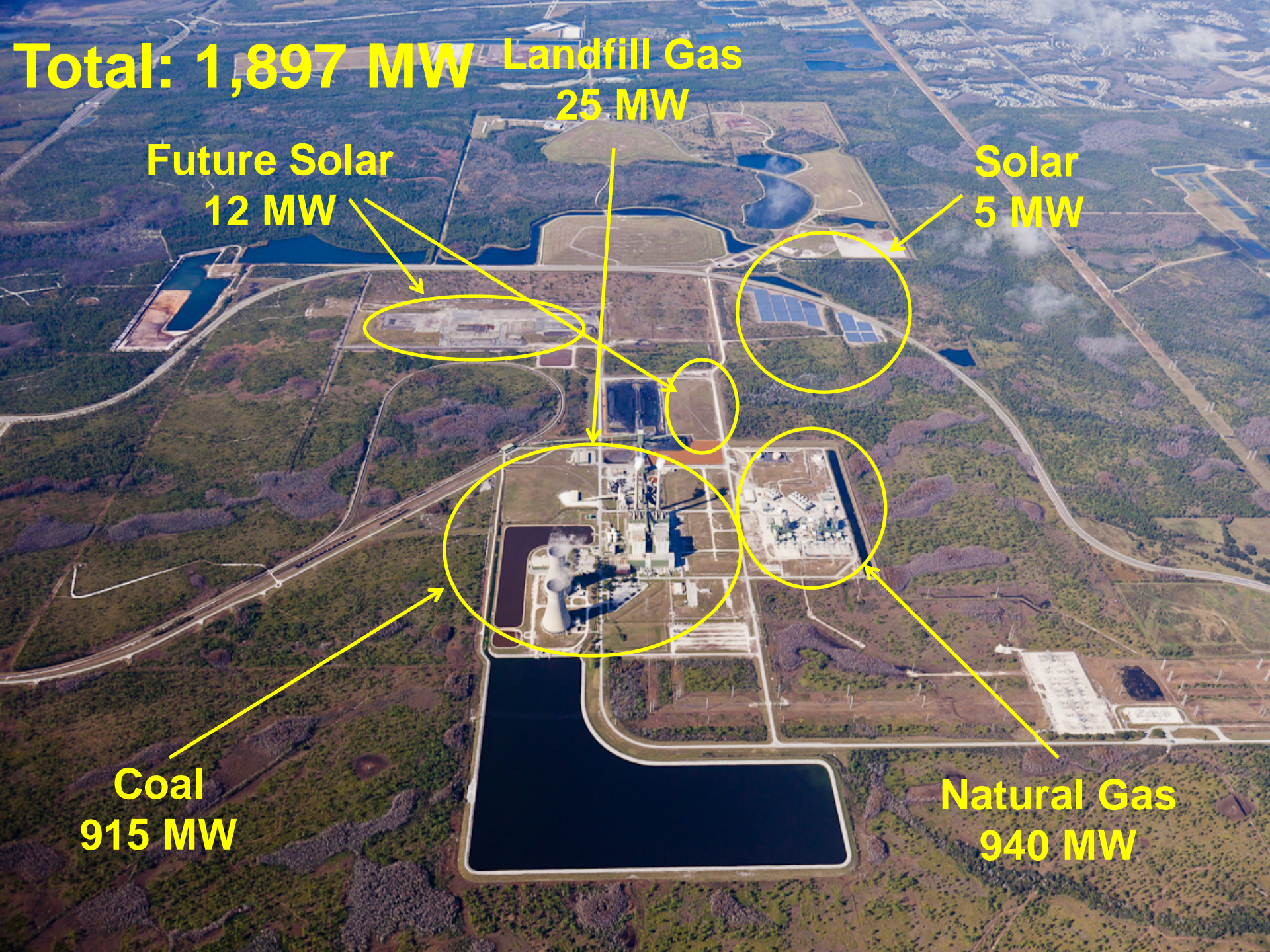
**Landfill Gas  
25 MW**

**Future Solar  
12 MW**

**Solar  
5 MW**

**Coal  
915 MW**

**Natural Gas  
940 MW**



**Total: 1,897 MW** Landfill Gas  
25 MW

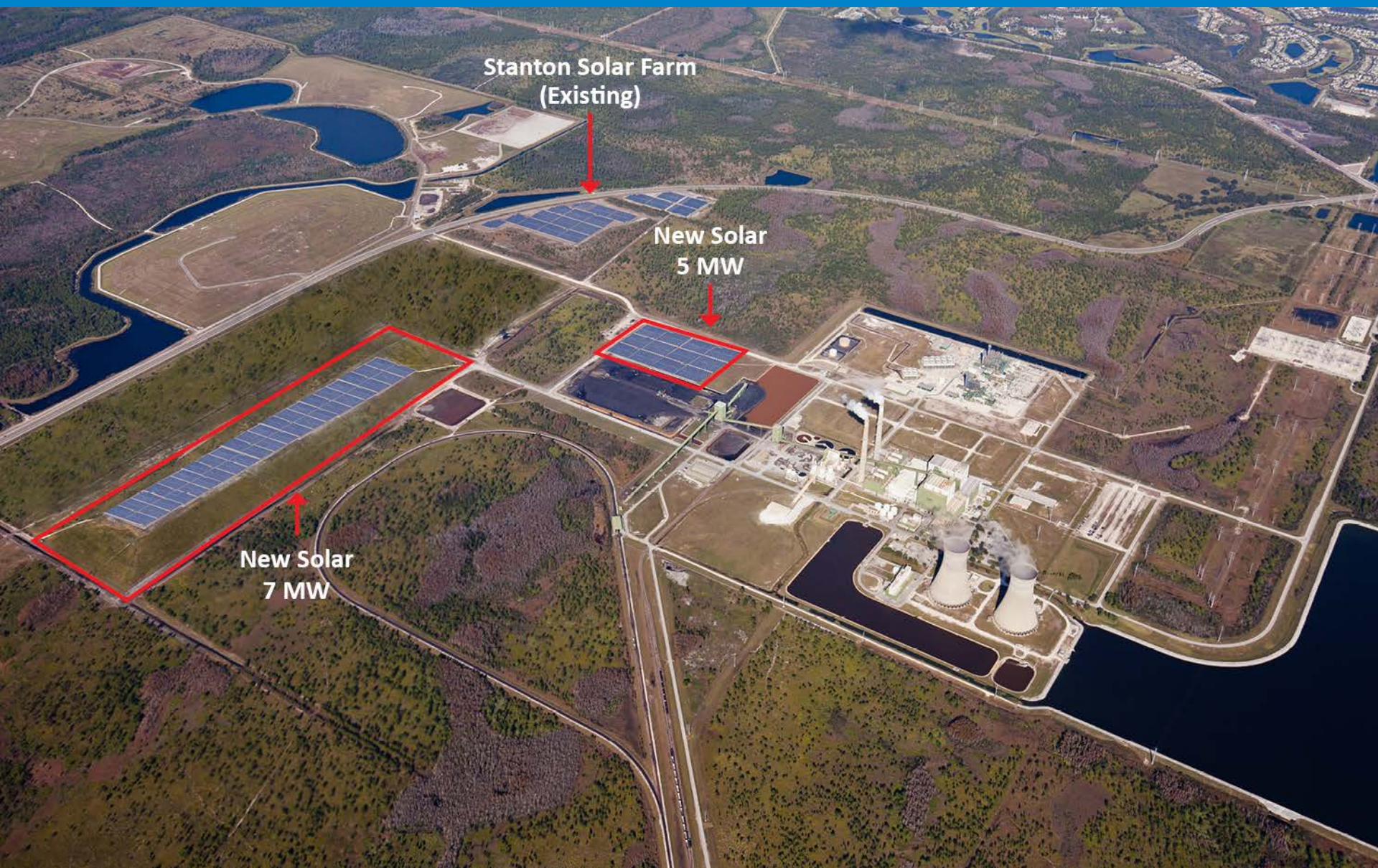
Future Solar  
12 MW

Solar  
5 MW

Coal  
915 MW

Natural Gas  
940 MW

# New Stanton Solar Layout



Stanton Solar Farm  
(Existing)

New Solar  
5 MW

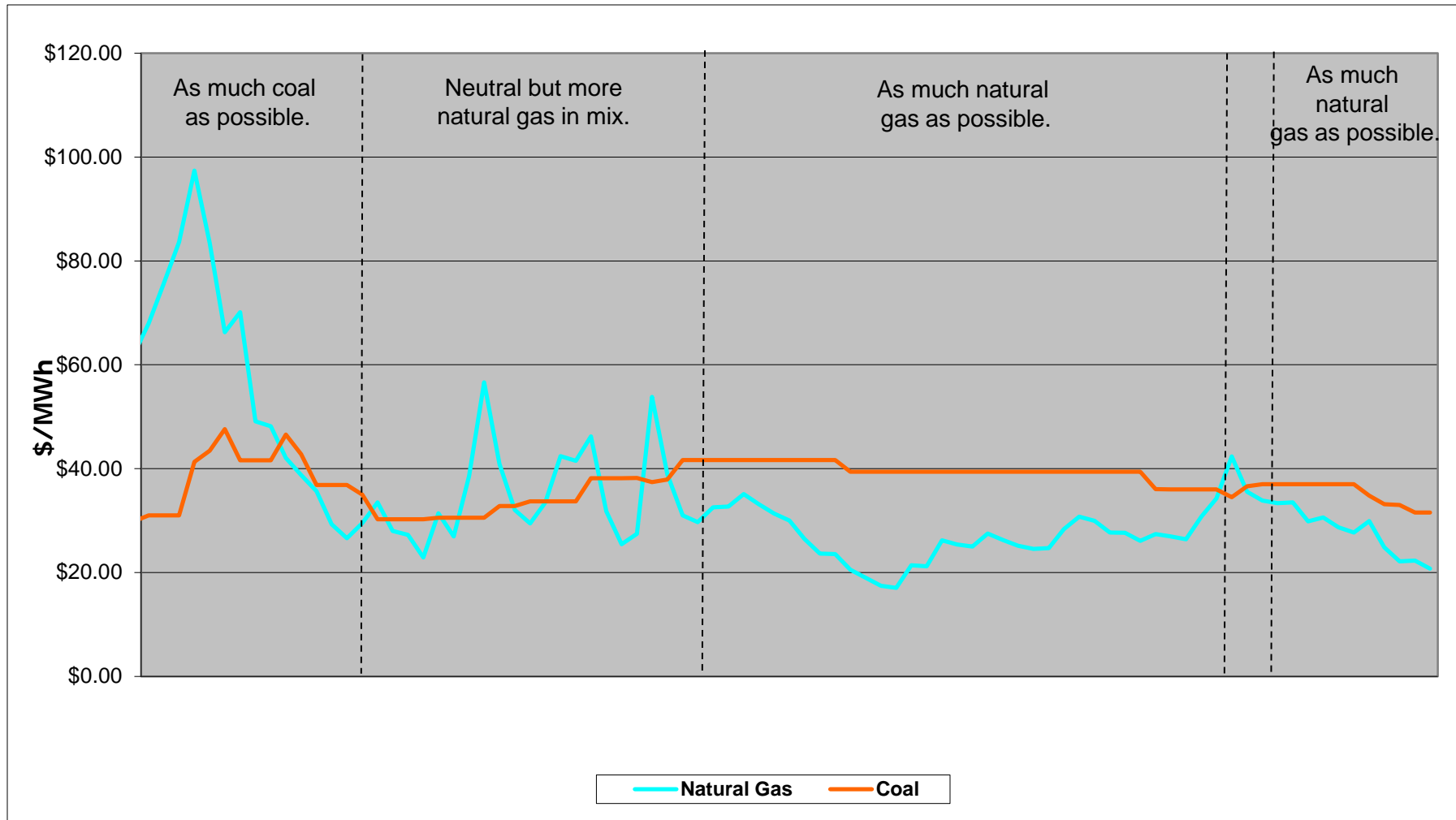
New Solar  
7 MW

# Value of Operating Flexibility

# Value of Operating Flexibility

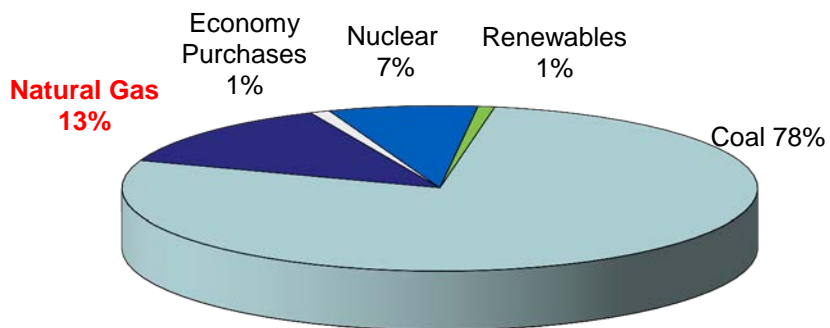
- Diversity of generation assets allow resource flexibility
- Adapt to natural gas price fluctuations
  - 2012: \$2.50/MMBTU
  - 2014: \$8.00/MMBTU
  - 2015: \$2.75/MMBTU
- Stanton natural gas igniters
  - Operating range: 90 MW to 460 MW
    - 80% turndown capabilities compared to 40-50% industry
    - Reduce need for repeated shut down/start up
    - Significant cost savings during off-peak periods
      - \$3 million per year

# Economic Dispatch

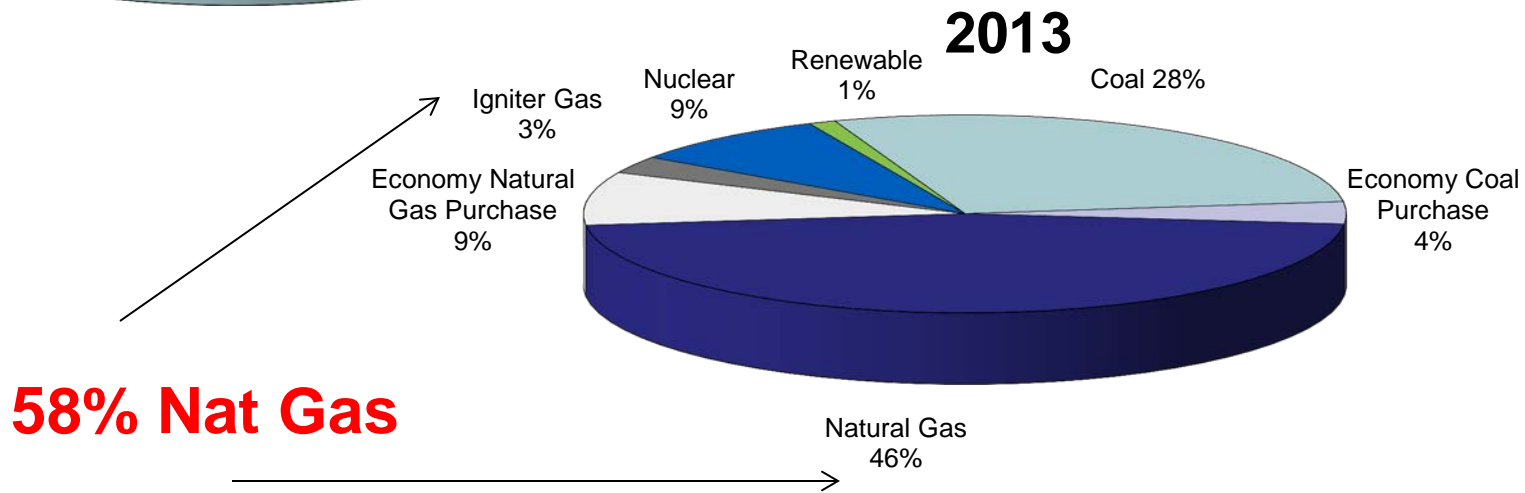


# Fuel Mix for Retail Energy

**2008**



**2013**

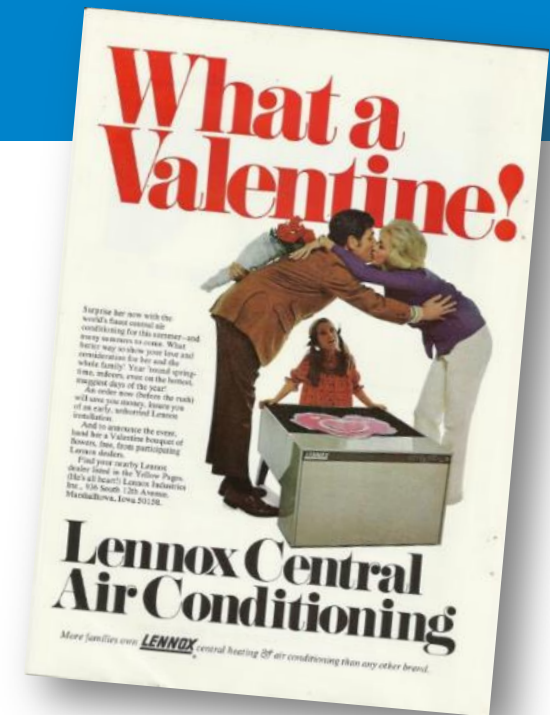


**58% Nat Gas**

# How OUC (and the Industry) Adapted To Change

# The 1970s

- Rising use per customer
  - Technology advancements including central A/C
- Oil embargo highlighted the nation's oil dependency
  - Electric utilities primary fuel source was oil
  - Caused rates to increase dramatically
  - Prompted state and federal legislation

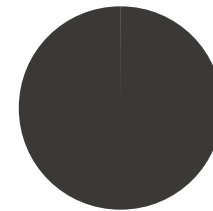


# Changes Impacting the Industry

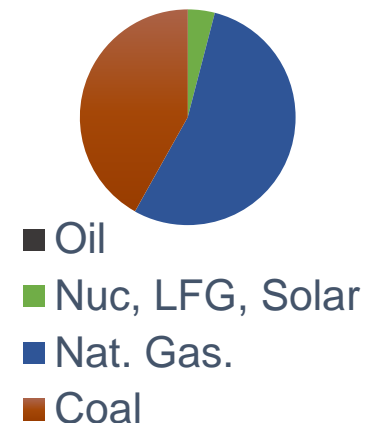
## *Supply-Side Improvements*

- Diversification of generation
- Advancement in environmental control technology
- Advancement in power plant efficiency
  - Combined cycle facilities 35-50% more efficient and emit 2/3 less CO<sub>2</sub> than coal
- Introduction of utility-scale renewable energy options
- Advancements in equipment automation and distributed control systems

OUC Early 70's



OUC Today



# Unregulated Services

- Chilled Water Services

- Five chilled water districts
  - Similar to thermal (steam) districts
- 50,000 tons
- Largest thermal storage tank in U.S. – 17 million gallons



- Convenient Lighting

- Complete outdoor lighting service for commercial and residential applications
- Customer enters into a 20 year Lighting Contract at a fixed monthly rate

# Drivers Shaping the Industry Today

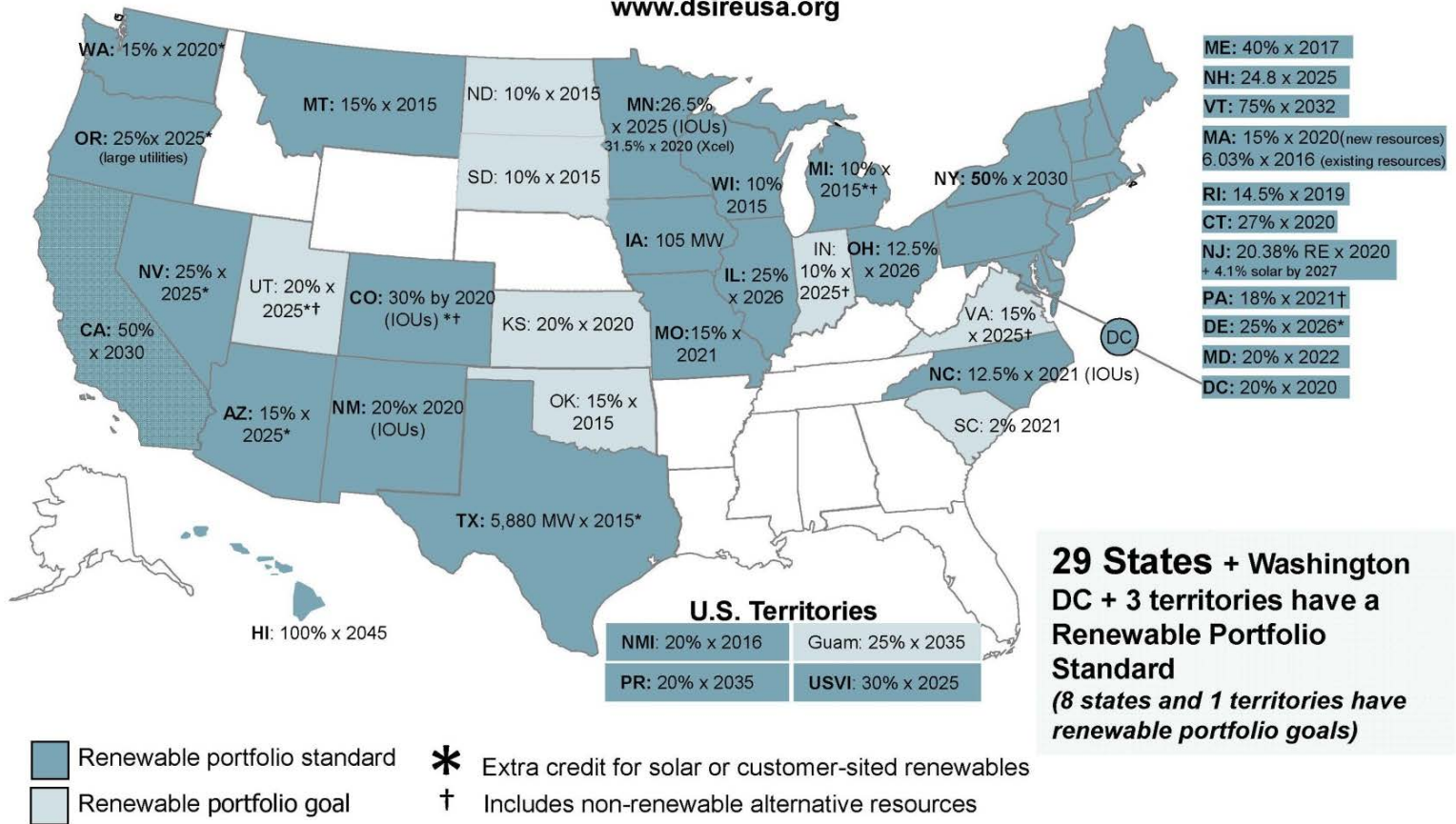


# Regulatory Drivers

## State Level

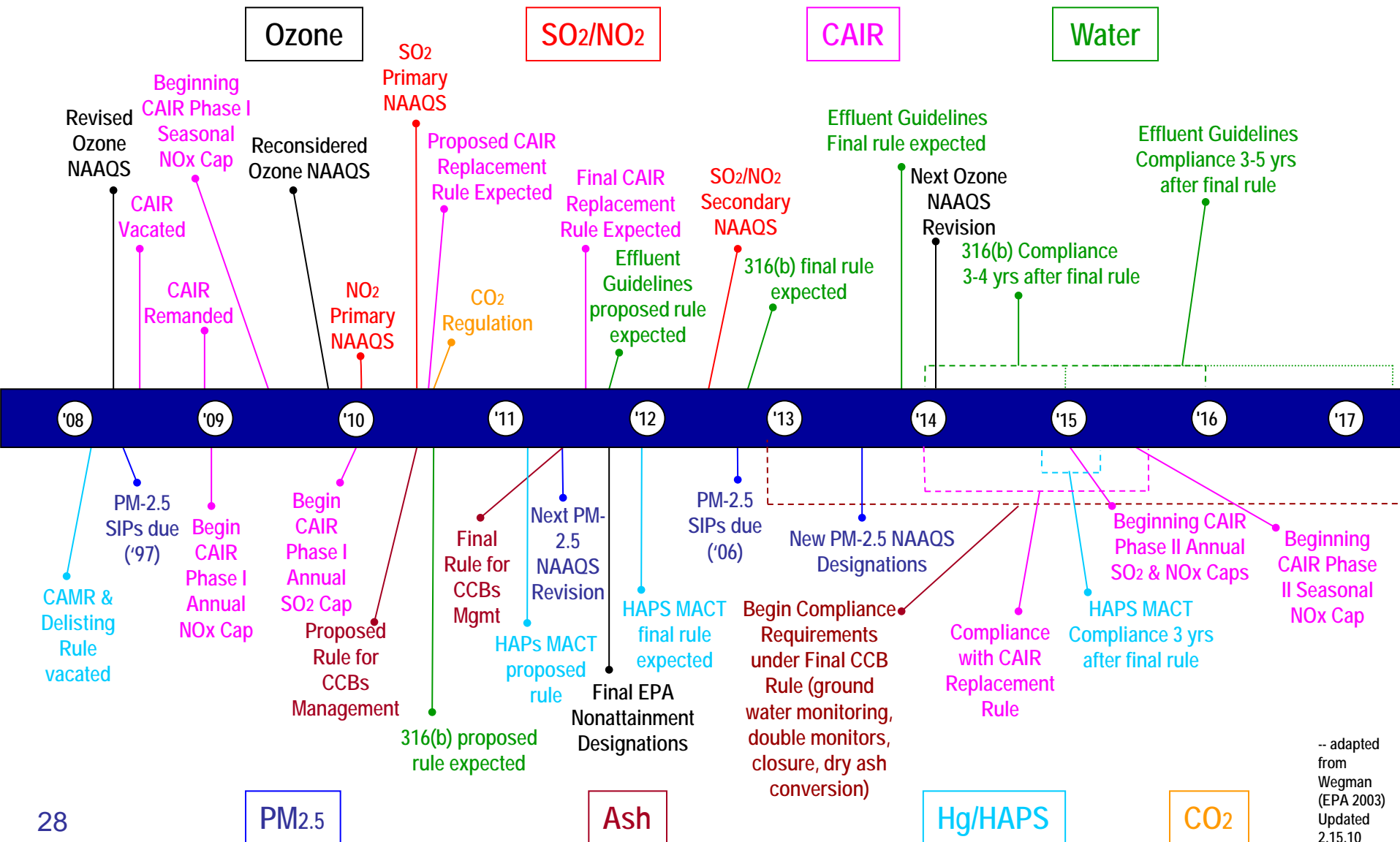
### Renewable Portfolio Standard Policies

www.dsireusa.org



# Regulatory Drivers

## Federal Level



# Regulatory Drivers

- Clean Power Plan
  - Proposed rule is very controversial and is expected to change prior to final issue.
  - If implemented as proposed
    - Electric rate impacts
    - Reliability impact
      - Florida is an island?

# Customer Drivers

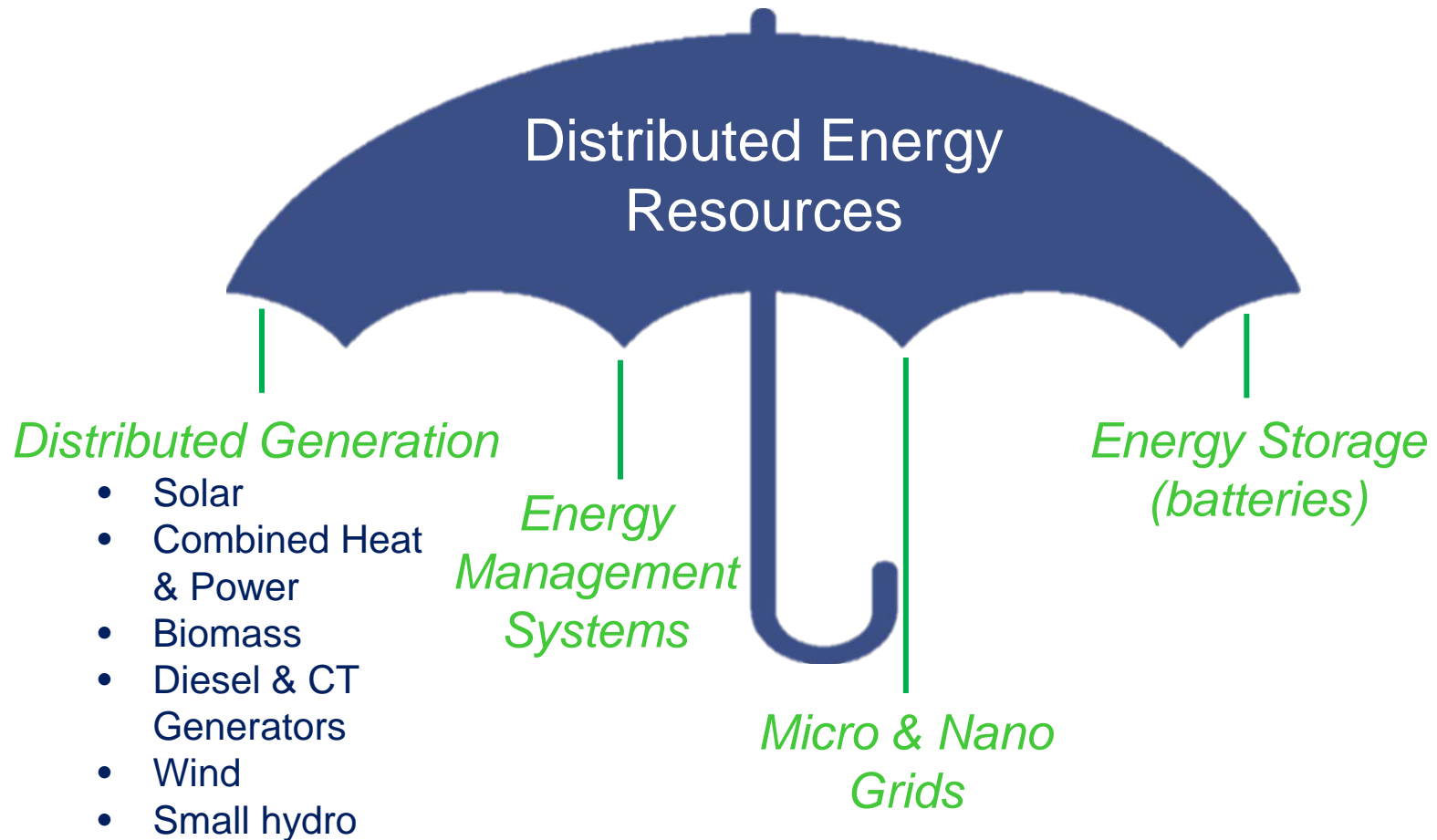
## *Smart Technology*

- Customer's increasing expectations to monitor and reduce their utility bills
- Increased accessibility of lower cost digital metering solutions including prepaid
- Development of in-home smart technologies



# Customer Drivers

## *Distributed Energy Resources*

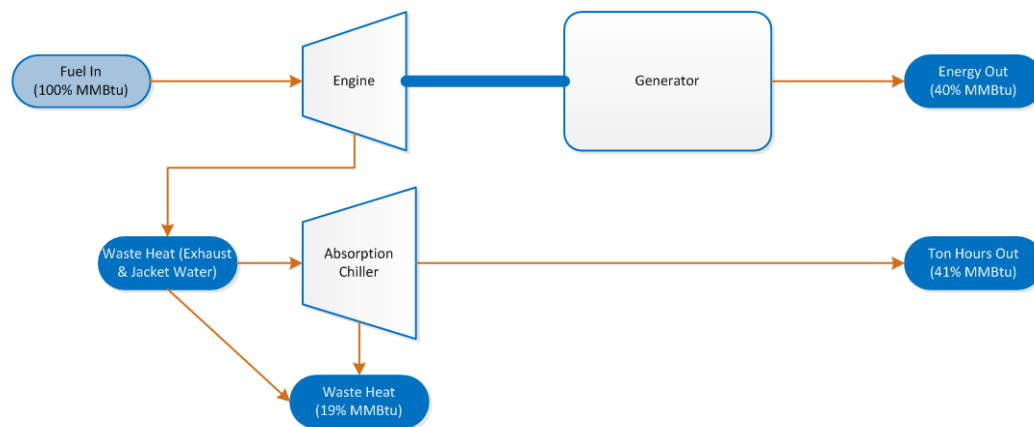


# Customer Drivers

## *Distributed Generation/CHP*

- Waste heat is utilized for a secondary use
- Main reasons for customers considering
  - Lower utility costs
  - Better reliability and power quality
  - Redundancy/backup
  - Corporate sustainability goals
  - Equipment vendor influence

CHP Cycle with Reciprocating Engine and Absorption Chiller



# Customer Drivers

## *Battery Storage Advancements*

- To gain widespread adoption, price must fall 75%
- Currently receiving extensive research and development funding
- Offers potential demand reduction
- Future EVs may become the battery itself



# Market Drivers



**Fortune** magazine cover: "Every aspect of your business is about to change." "21st Anniversary" "By Geoff Colvin p. 102".

**CRYSTAL BALL** graphic: A futuristic cityscape with a crystal ball in the foreground.

## Apple Will Buy Tesla...

Apple has announced plans to build an electronic car, targeting 2019. Apple could dramatically accelerate this timetable by buying Tesla ( **TSLA** ▼ -1.00% ). With over \$200 billion cash on hand, the iPhone-maker has more-than ample resources to absorb the purchase, especially now that some of the bloom has come off Tesla's once-rosy stock. In addition to its automobile know-how, Apple gets access to Tesla's battery technology, which CEO Elon Musk claims can help change "the entire energy infrastructure of the world." Of course, Apple would also get Musk—a worthy heir to Steve Jobs' "think different" legacy and ideally suited to be Apple's futurist, chief technologist and CEO-in-waiting. —*Aaron Turk*

...While Becoming the First \$800 Billion Company



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## Bill Gates Launches Energy-Innovation Fund at Paris Climate Conference

One focus will be on driving solar, wind energy costs down



Bill Gates is launching a multi-billion-dollar initiative to accelerate clean-energy research and development. Without incentives to go green, he says "India will generally err on the side of development." WSJ's Bill Spindle reports.

By **BILL SPINDLE**  
Nov. 30, 2015 4:55 a.m. ET

24 COMMENTS

**PARIS**— **Bill Gates** announced an energy research initiative drawing on billions of dollars from 28 private investors, ranging from billionaire individuals to the University of California, to try to grow businesses from ideas generated by stepped-up government basic research.

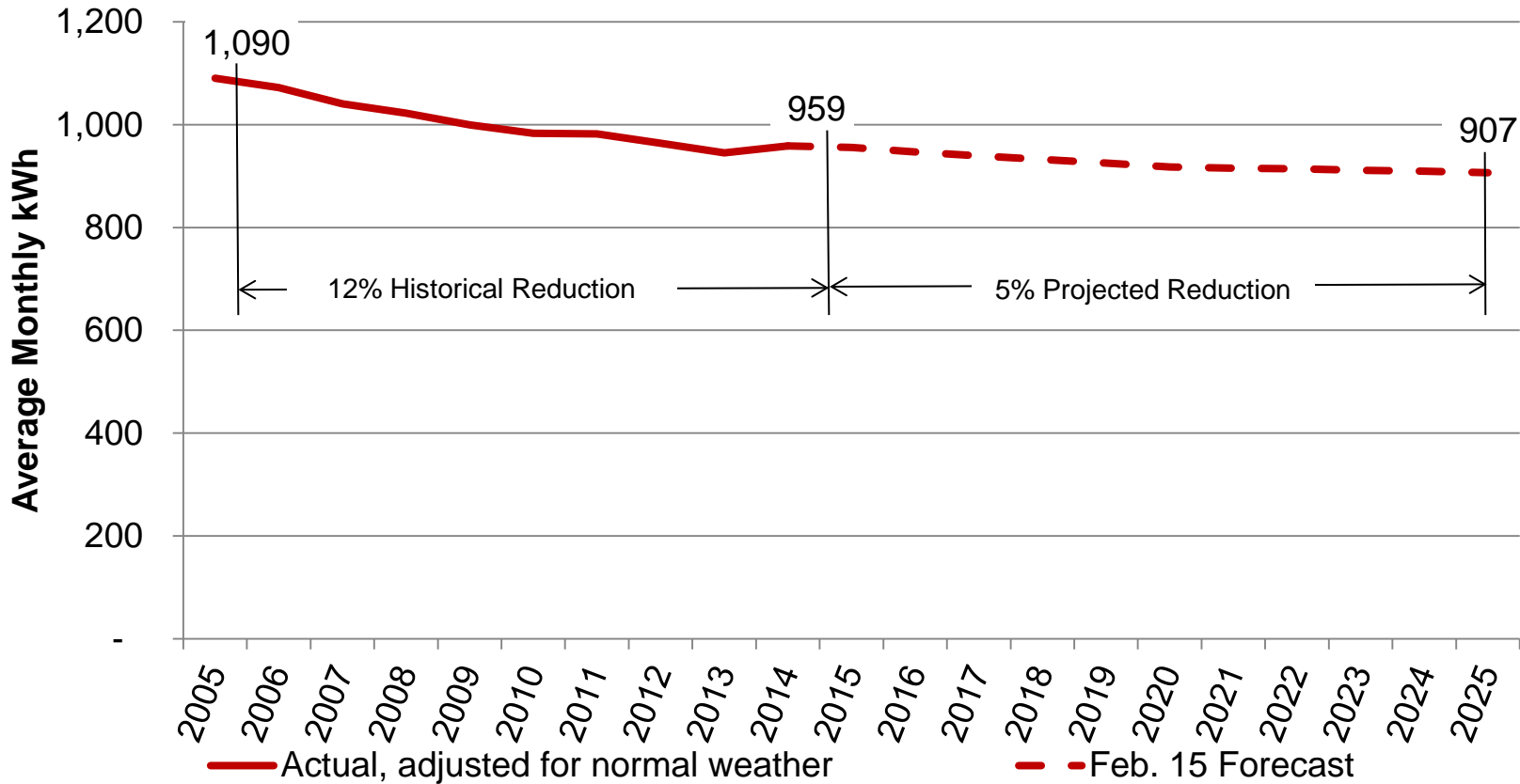
In an interview with The Wall Street Journal at a global climate conference in Paris, the founder of Microsoft Corp. and leading philanthropist said 20 governments—including the U.S., China and India—have committed to double their energy research budgets as part of the initiative.



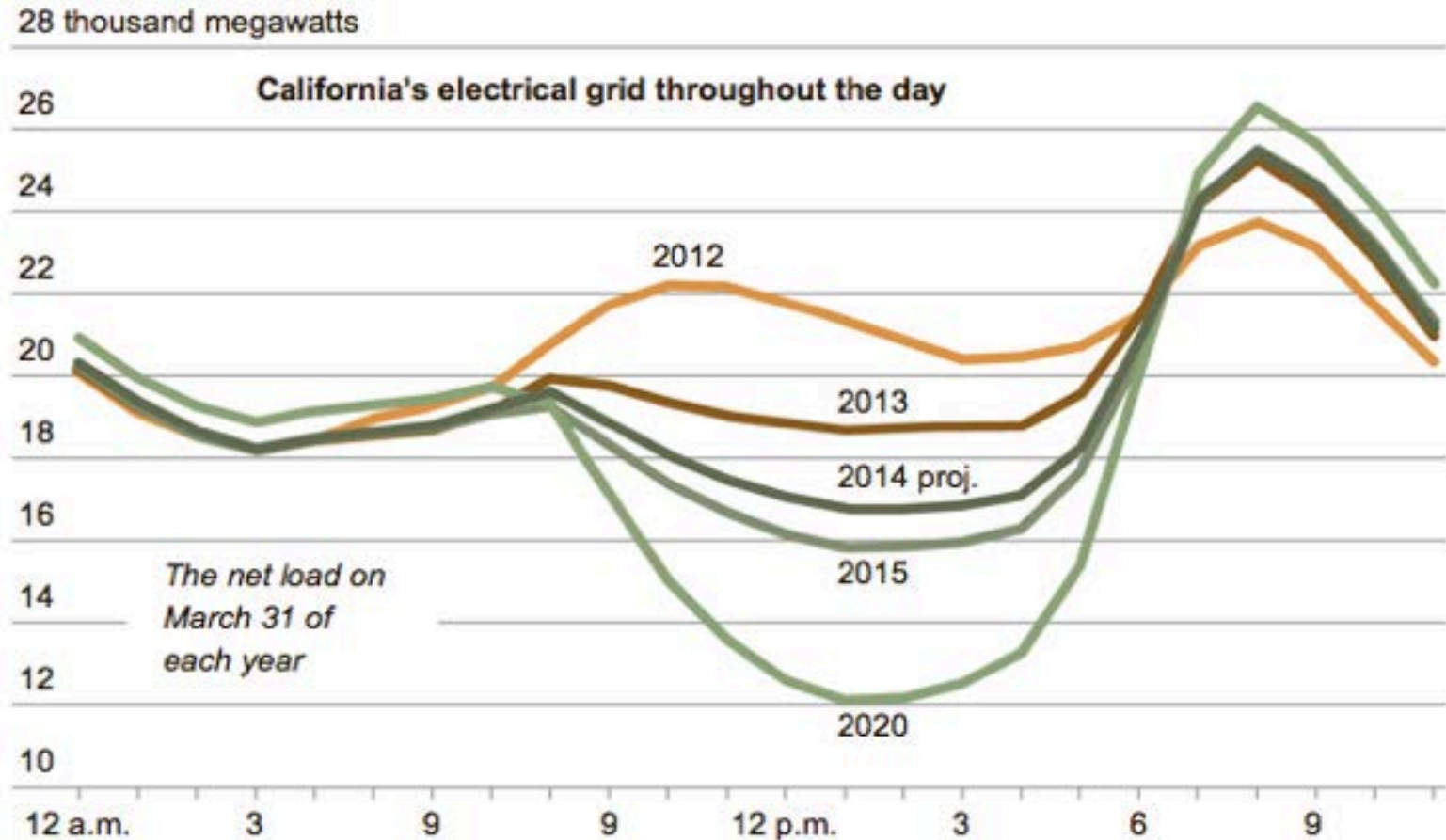
What can rising rates in 1956 tell us about rising rates in 2016?  
60 years of Fed influence. An interactive timeline.

WSJ | PIMCO

# Residential Electric Average Use



# Duck Curve Problem

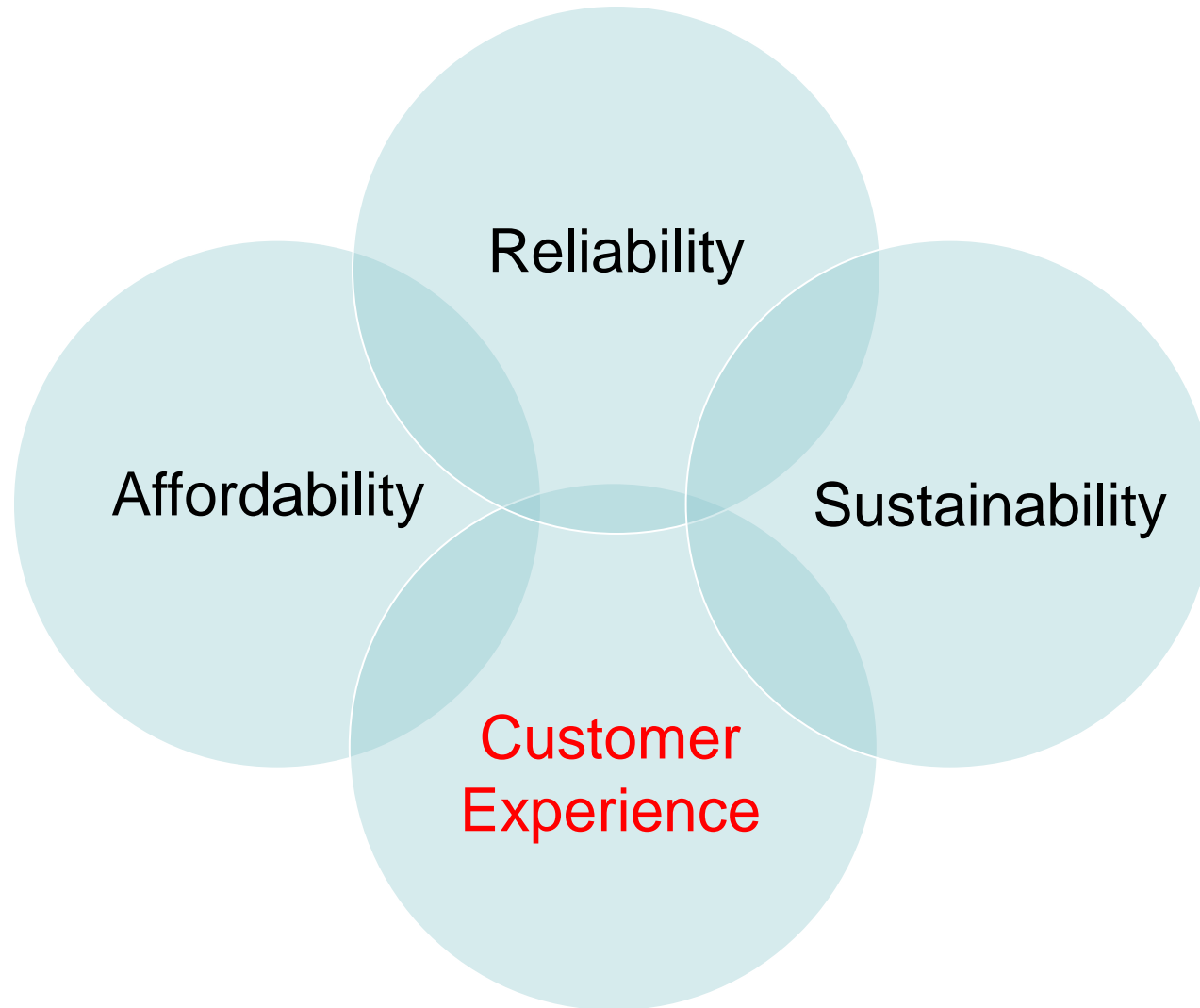


Source: CalISO

# Positioning for the Future

***Industry will need to leverage technology to improve the customer experience, reduce costs and find new sources of revenues***

# One New Fundamental Tenet



# Customer Experience

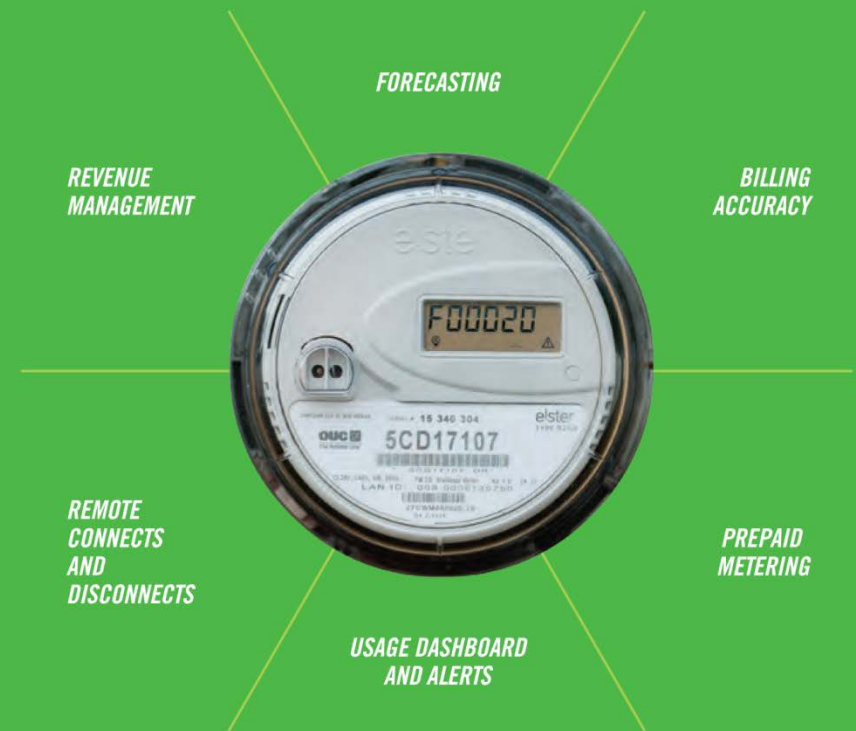
- Leverage technology to meet customer expectations
  - Smart Grid
  - Meter Data Management
  - Home automation
  - Real-time communications
- Leverage existing unregulated business models to create new ones
  - Solar offerings
  - Distributed Generation/CHP
    - New installations
    - Existing installations
  - EV's and EV Charging



# Optimize Quality Customer Experience

## Smart Grid Strategy

- Smart Grid
  - Electric and Water AMI
  - Meter Data Management (MDM)
    - MDM is the “big thing” for utilities – a “must have” for Smart Grid
    - Enables prepaid meters
    - Automates connects and disconnects
    - Completed infrastructure and interfaces in 12 months



# Optimize Quality Customer Experience

## *A Portfolio of Customer Innovation Projects*



Self-Service Web  
(HTML 5)

Real-Time  
Payment

Advanced IVR

Data Analytics  
& Dashboards

OUC Power Pass  
(Prepaid Metering)

Capitalize on our previous investments, revolutionize customer interactions, and reduce administrative labor costs, uncollectible expenses and field expenses

# Optimize Quality Customer Experience

## *Transforming the Way We Do Business*

- OUC made award winning investments in technology based on low cost, high benefit and fast implementation
  - Smart Grid
    - 2014 Best Smart Grid Infrastructure in North America\*
  - Customer Innovation
    - 2015 Best Customer Innovation in North America\*
  - Reliability
    - Best Electric Reliability in Florida for 17 years based on the Florida Public Service Commission
    - Among the top in North America over past 10 years



\* Awarded by Electric Light & Power Magazine and CS Week in the Large Utility Category (utilities with more than \$500 million in revenues)

# Distributed Generation Business Opportunities

- **Rooftop Solar**
  - Commercial & Residential
  - Solar Cities model
    - OUC makes initial investment
    - 20-year agreement
- **Commercial Distributed Generation**
  - Straight DG or Combined Heat & Power (CHP)
    - Natural gas-fired
    - Absorption chillers
    - Fuel cells
  - Similar to OUC Chilled Water & Convenient Lighting business models
- **Aggregation of Existing Distributed Generation**
  - Existing Commercial/Industrial customers with installed emergency generation
  - Credit in exchange for OUC control



# Commercial EV Charging Station Program

- Revenue opportunity
- Encourages adoption of Electric Vehicles (EV)
- Customer options
  - Charge It
  - Own It
- Started marketing charging stations in September 2015



# Electric Vehicle Infrastructure



- 140 charging stations installed
  - Level 2 = 135 units
  - DC FC = 5 units (fast chargers)
- Accessible to public and employees
- Over 20,000 charging sessions to date

# Partnerships with the Community



## Customer Products & Services

- Chilled Water
- Solar Programs
- Indoor Lighting
- Outdoor Lighting
- EV Charging Stations
- Hydration Stations
- Solar Sculptures
- Mobile Recharge Stations
- Education Outreach

