

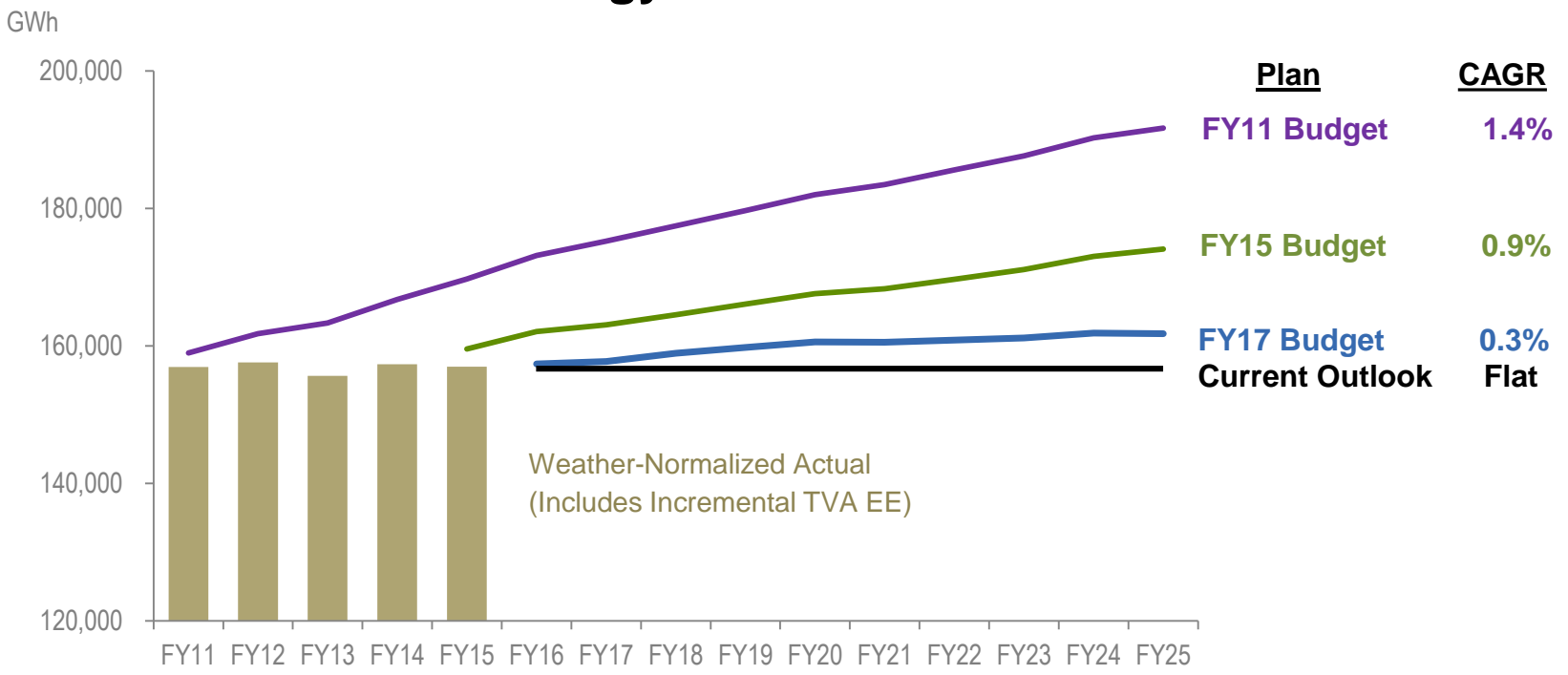
“Envisioning Future Energy Technologies”

Aaron Melda

Tennessee Valley Authority

Where We Are Today

Energy Forecast



Where We Are Going



What Could the Future Look Like?

Flat Base Case



Economic growth offset by efficiencies drives flat load outlook

CAGR ~0.0%

Growth Case



Economic growth drives additional industry and customer count growth

CAGR +0.6%

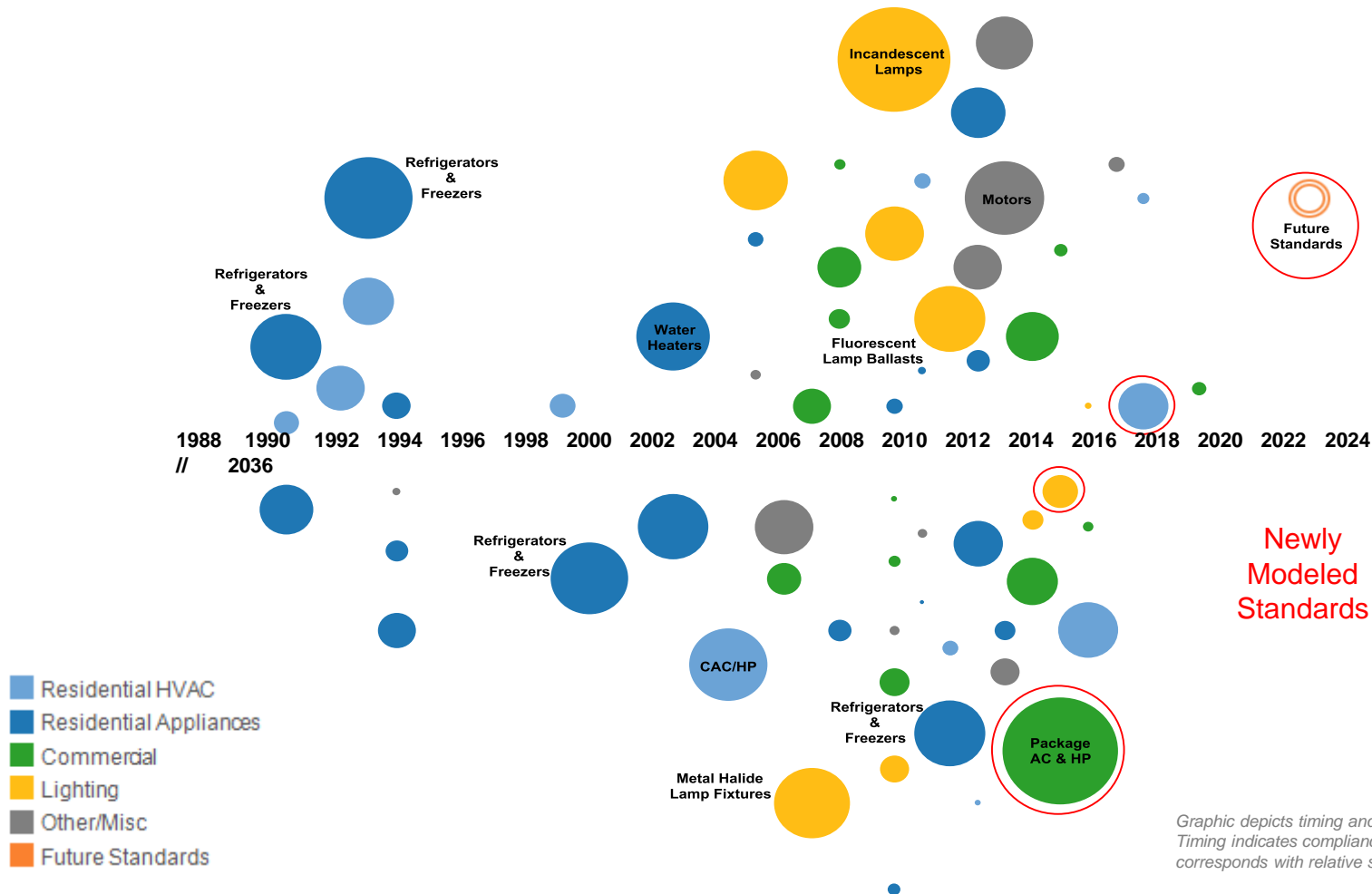
Steady Decline Case



Technology enables incremental efficiencies and distributed solutions

CAGR -1.0%

Impact of DOE Standards Continues to Grow



Graphic depicts timing and magnitude of DOE standards. Timing indicates compliance year and size of bubble corresponds with relative savings.

Residential Use Impacted by Lighting Efficiencies

Lighting percent of average use
is forecasted to be
more than cut in half,
from

13% in 2005

to

6% in 2025,

driven by codes and standards
and economics

What if every household
replaced one light bulb
with an LED bulb?



60 Watts –



9 Watts = 51 Watts

4 Hours a Day = 204 Watt hours

365 Days a Year = 75 kWh

4,000,000 Residential Customers = 298 GWh

Equates to **0.5%** reduction in residential load

Equates to **0.2%** reduction in TVA's total load

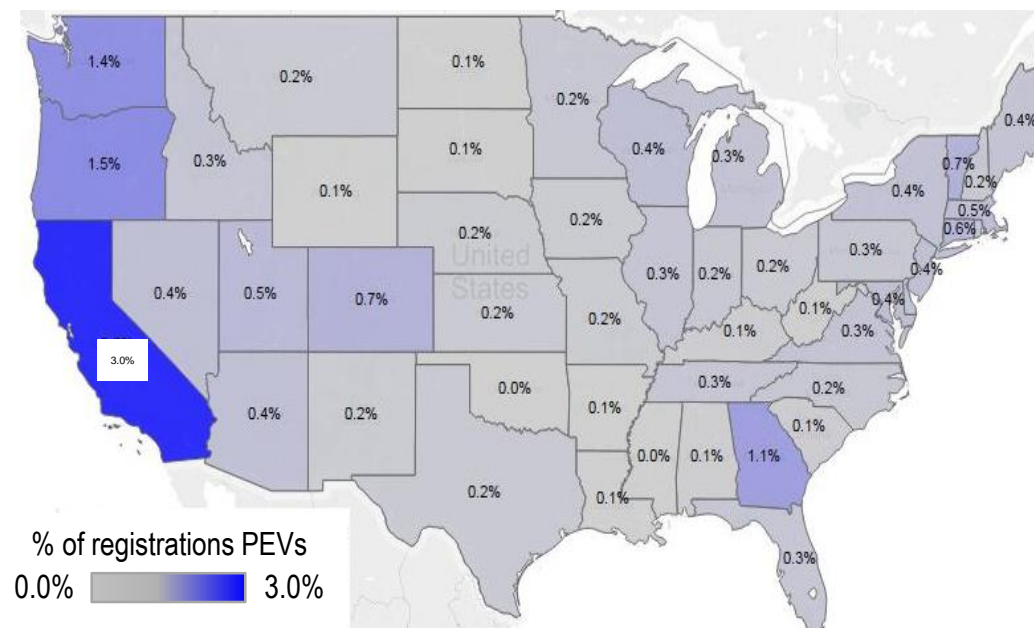
Equates to **\$30 million** in annual revenue

Plug-In Electric Vehicles (PEV) – TVA Snapshot

PEV's were introduced in 2010/2011 and 7 PEV models are available from various OEMs in the Valley (Nissan, Chevy, Ford, Tesla, BMW)

As of May 2016:

- About 5,400 PEVs have been registered in the TVA Service Territory
- PEVs = 0.2% of registrations and < 2% of market share
- About 3MW “diversified load at transformer” representing about 16 GWh annually



About 550,000 PEVs needed for 1% of TVA sales (25% market share over 5 years)

Renewable Product Demand

OTHER PPAs



REGIONAL



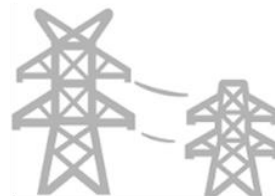
IN COMMUNITY



ONSITE



TRANSMISSION



DISTRIBUTION



I need to reduce my carbon footprint

I want to own it

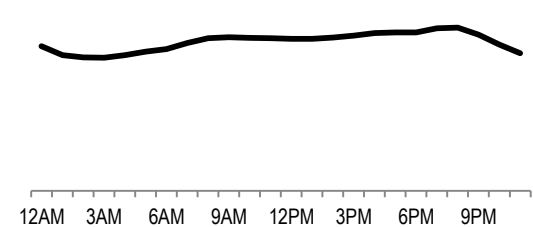
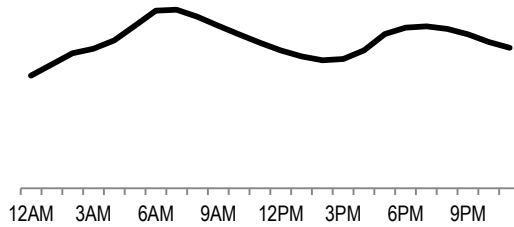
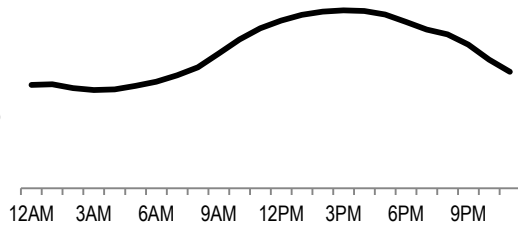
Seasonal Wind and Solar Shapes

SUMMER

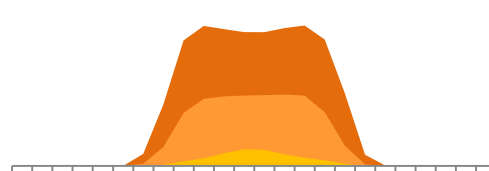
WINTER

FALL / SPRING

LOAD SHAPES

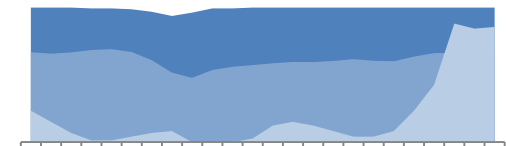
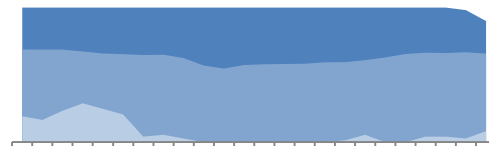
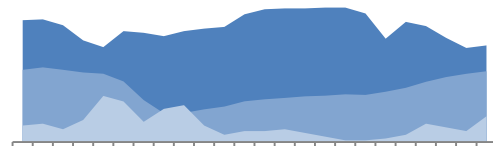


SOLAR



■ Maximum Daily Solar Energy
 ■ Average Daily Solar Energy
 ■ Minimum Daily Solar Energy

WIND



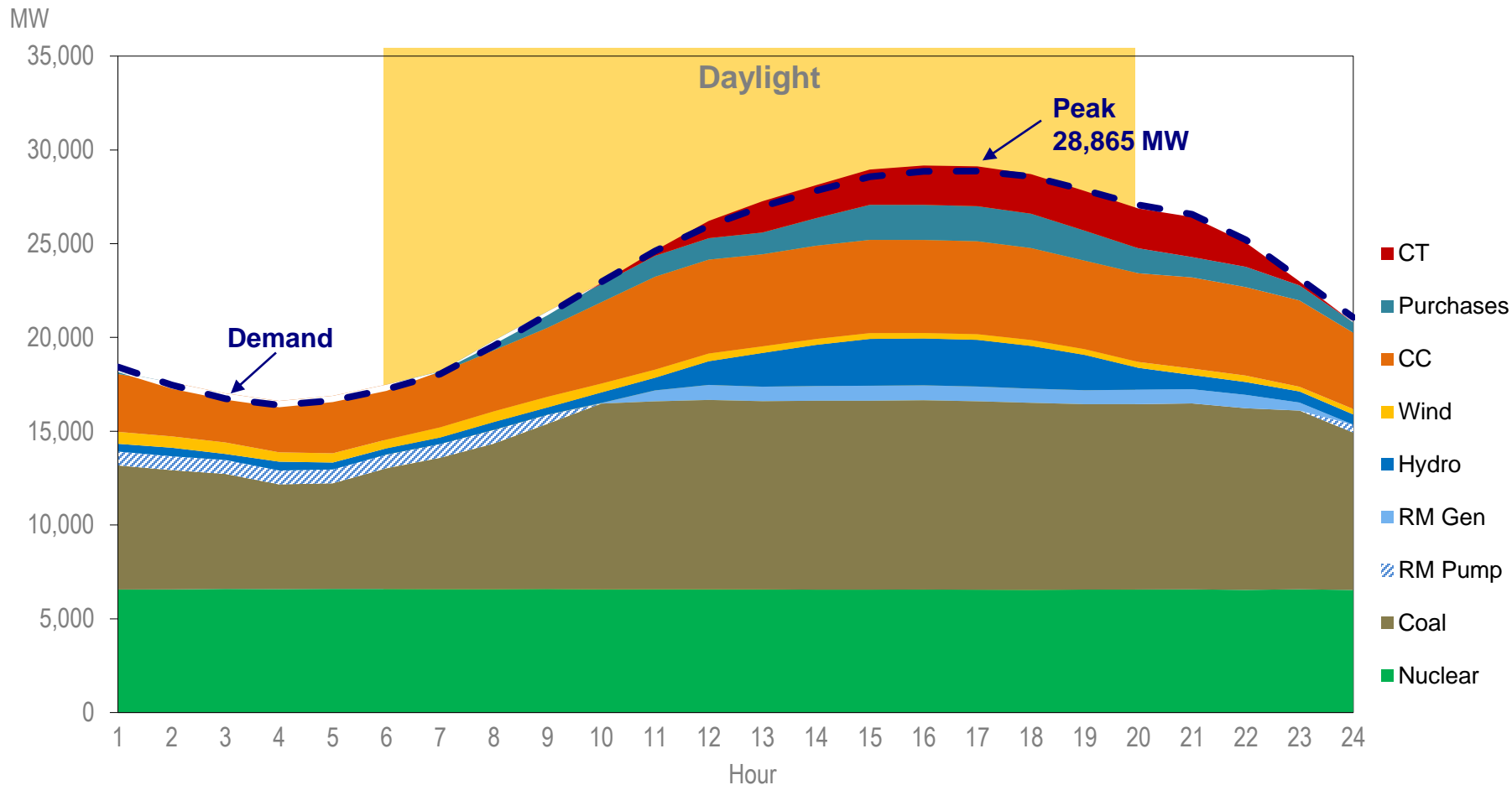
■ Maximum Daily Wind Energy
 ■ Average Wind Energy
 ■ Minimum Daily Wind Energy

Key Takeaways

- **Current load outlook is flat to slightly declining**
- **Energy efficiency standards and technologies continue to evolve**
- **Substantial PEV adoption in the Valley is needed to impact load**
- **Meeting customer demand for renewables and attractive combination of low rates and carbon is a focus**
- **Future energy technologies needed to flatten loads and increase flexibility to optimize the future value proposition**

Appendix (Other Slide Options)

Load Dispatch on Typical Summer Day



Load Dispatch on Typical Winter Day

