Transformational Times

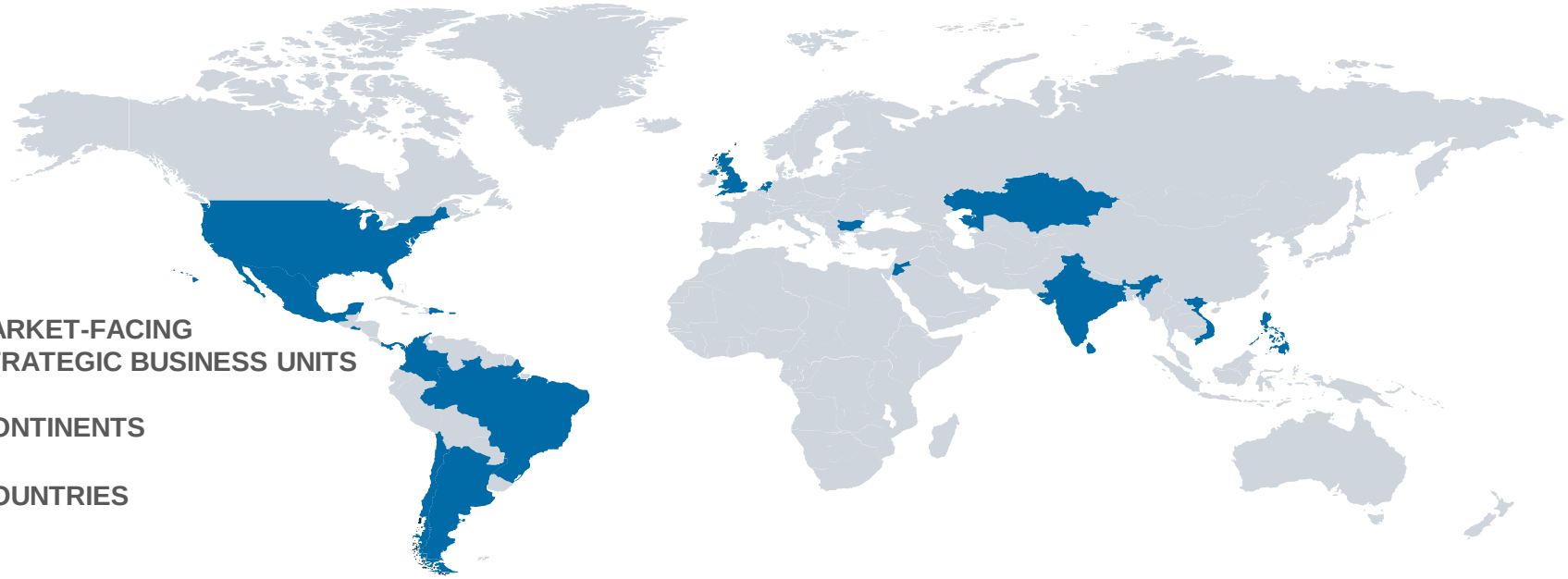
CSULB Regional Economic Forum

Jennifer Didlo
President, AES Southland

April 14, 2017

The AES Corporation

Improving lives by delivering safe, reliable and sustainable energy in every market we serve.



5 MARKET-FACING STRATEGIC BUSINESS UNITS

4 CONTINENTS

17 COUNTRIES

AES Serves **9M** CUSTOMERS

7 **UTILITY** COMPANIES

19,000 **GLOBAL** WORKFORCE

$36B
TOTAL ASSETS
OWNED & MANAGED

$14B
TOTAL 2016
REVENUES

36,693 MW
GENERATION CAPACITY

Contains Forward Looking Statements

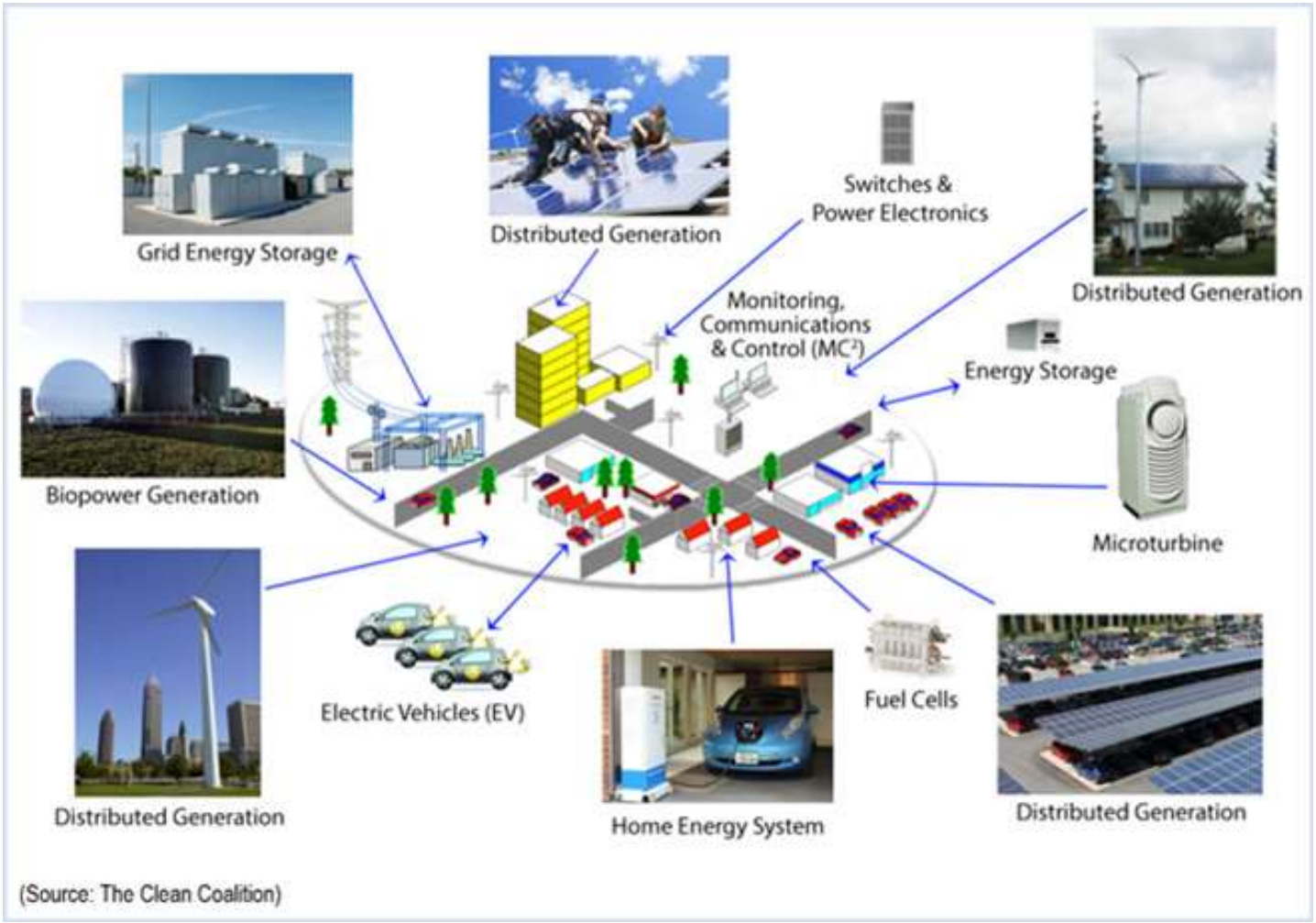
AES in California - helping to meet green energy & clean air goals

- Approximately 15% of SCE's peak demand is served by an AES facility
- AES generation in California:
  - Coastal natural gas-fired
  - Wind in Palm Springs
  - Solar across the state
- Innovative leader in Energy Storage
  - 160 MWhr sold to SDGE
  - 400 MWhr contract with SCE

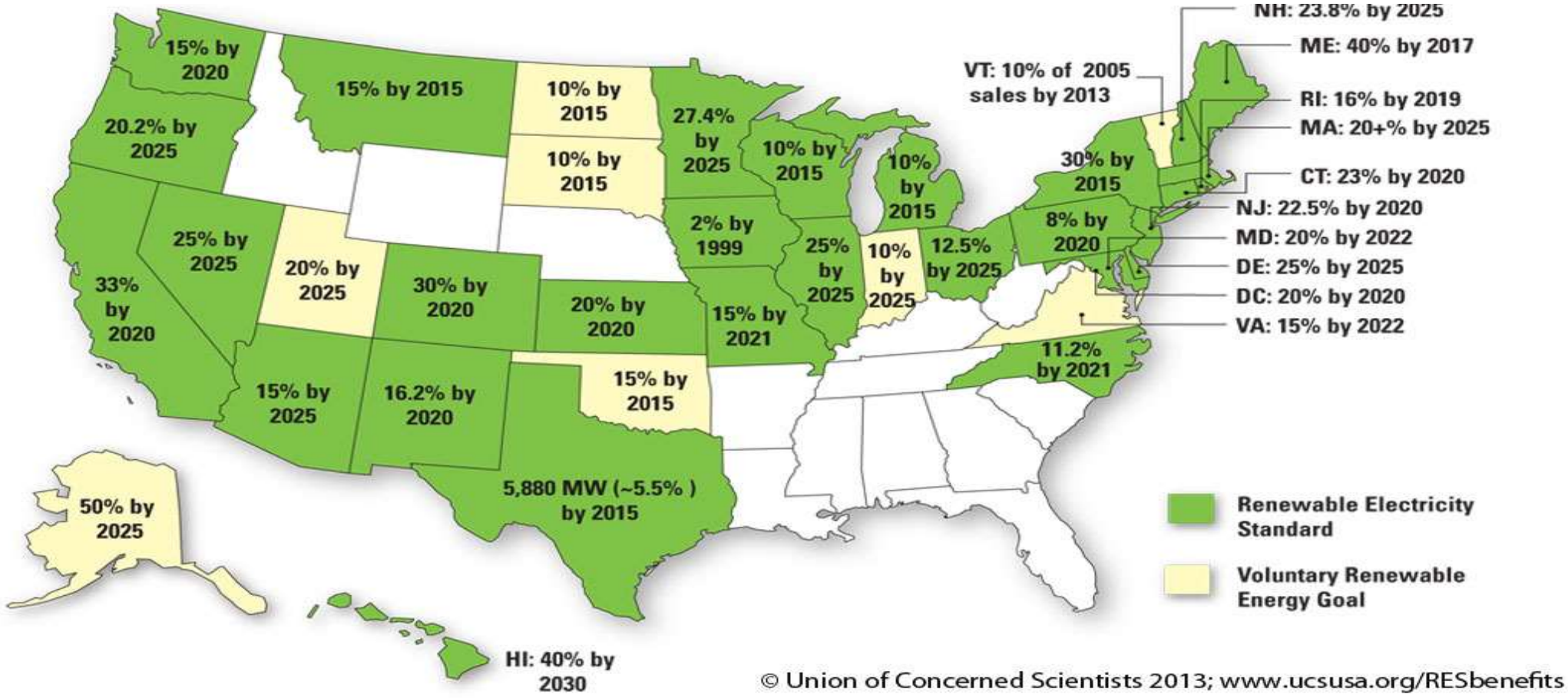
The transformation of our electricity infrastructure is unprecedented

The way we make electricity, the way we use electricity and what we use it for is forever changing.

Customer choice and access to cost competitive renewable energy is a *Game Changer*



Most states have either a mandatory or voluntary renewable portfolio standard

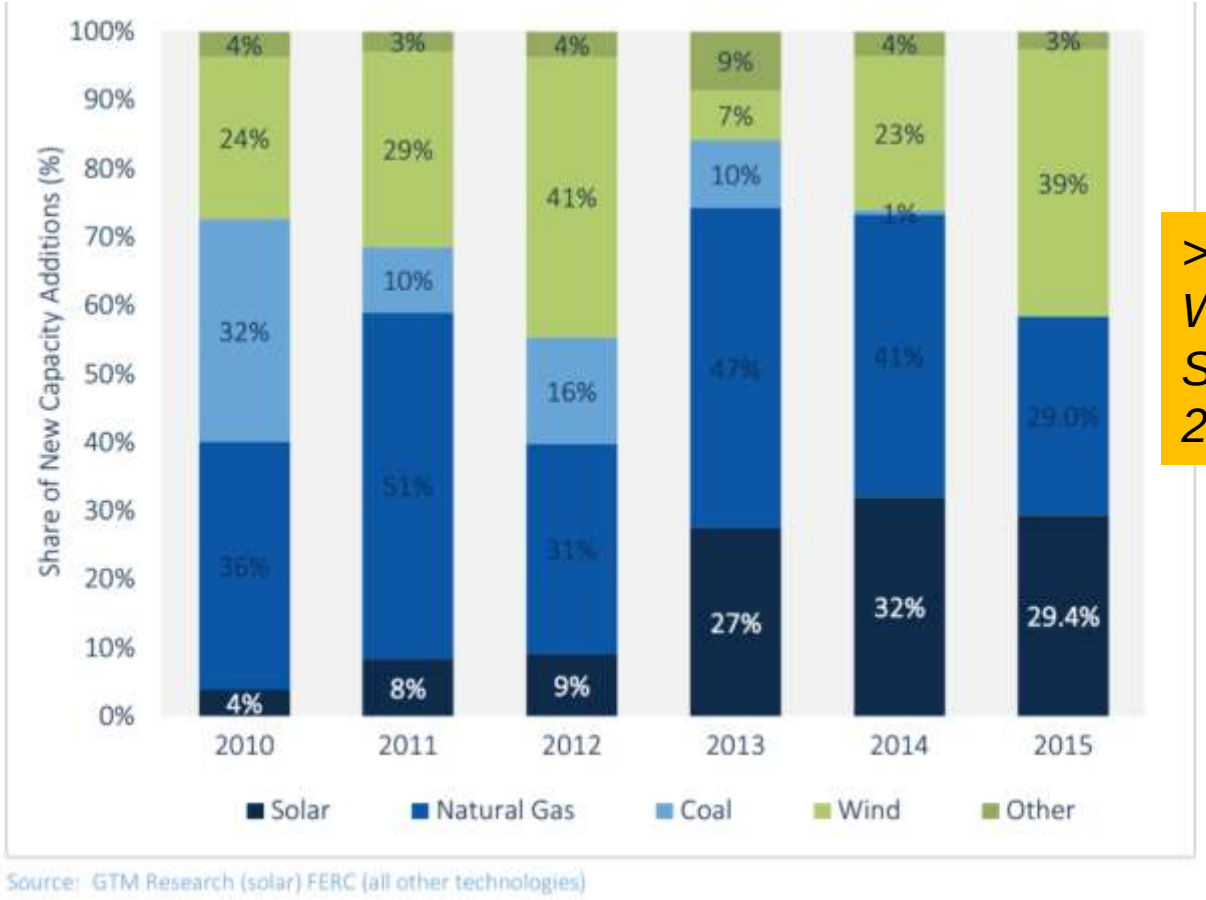


State-level renewable electricity standards are a leading driver of wind, solar, and other renewable development in the United States. Twenty-nine states and the District of Columbia have renewable electricity standards in place, 17 of which have set targets at 20 percent or greater. Another eight states have voluntary targets for renewable electricity.

In combination with Federal & State programs, renewable energy cost is rapidly declining making it the largest growing new capacity

Power Plant Type	Cost $/kW-hr
Coal	$0.095-0.15
Natural Gas	$0.07-0.14
Nuclear	$0.095
Wind	$0.07-0.20
Solar PV	$0.125
Solar Thermal	$0.24
Geothermal	$0.05
Biomass	$0.10
Hydro	$0.08

Adapted from US DOE[2]

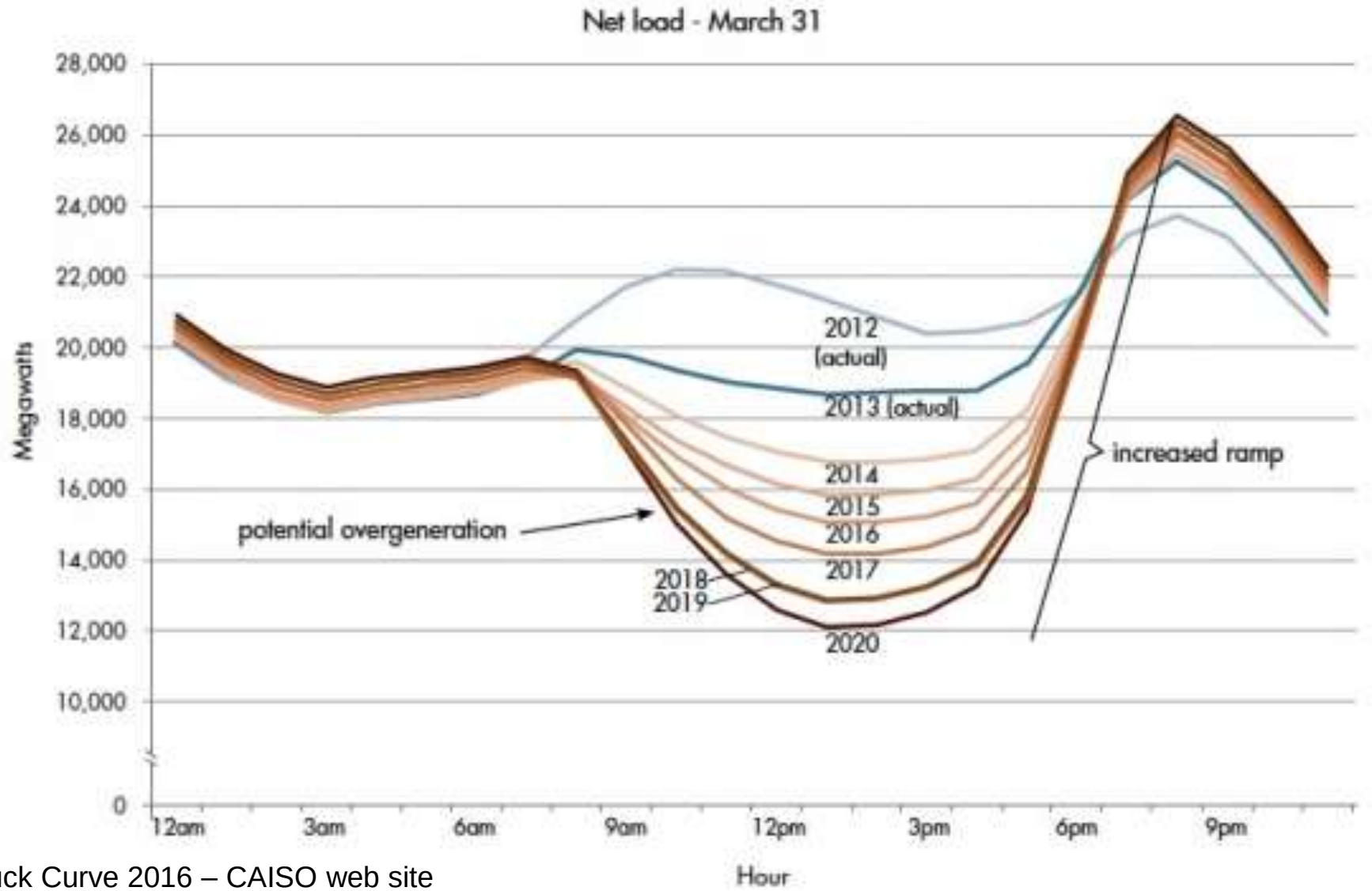


> 68% Wind + Solar in 2015

Source: US Department of Energy Annual Energy Outlook 2015

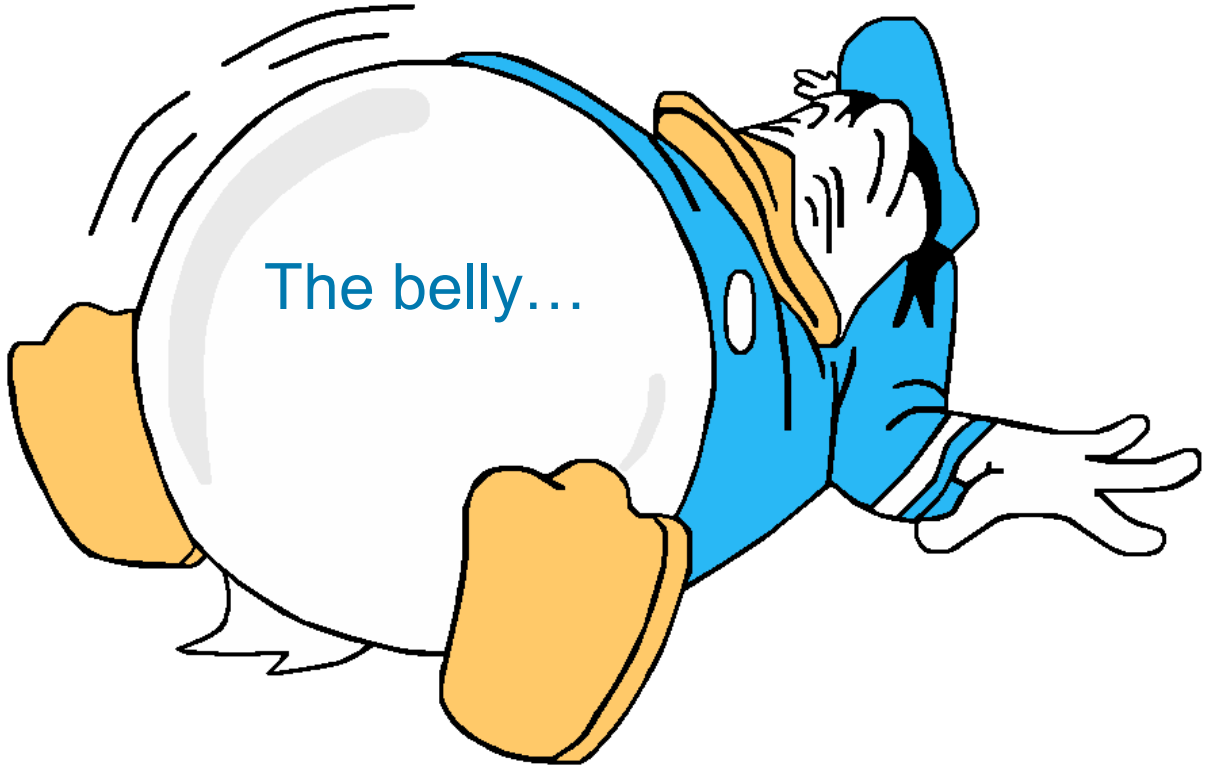
Source: GTM Solar Market Insights, Q1 2016

Daily Net Load is no longer stable and predictable – but what's so complicated about that?

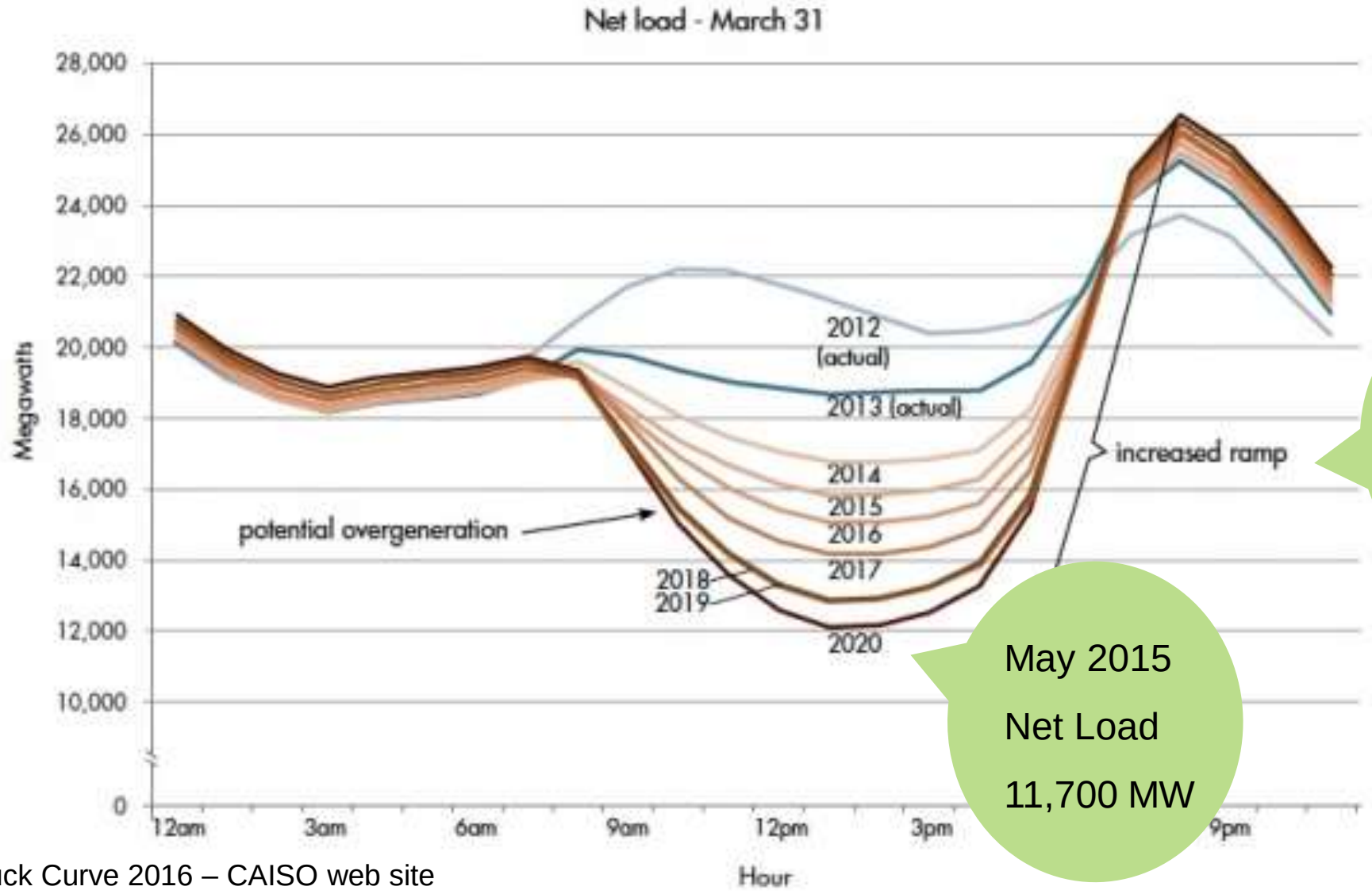


Source: CAISO Duck Curve 2016 – CAISO web site

The problem is two fold...



Renewable Integration is NOW, not 2020



March 2015

3 hour ramp

13,800 MW

May 2015

Net Load

11,700 MW

Source: CAISO Duck Curve 2016 – CAISO web site

California's goals for a cleaner, more environmentally sensitive energy future are fundamentally changing the electrical system

- Renewable Energy: 33% by 2020 – 50% by 2030
- Greenhouse Gases: 80% reduction by 2050
- Coal: Limits on out-of-state coal contracts
- Loss of generation: Nuke plant retirement, net-net less installed capacity
- Water: Limits on once-through-cooling (OTC) for power plants
- Electricity: Transportation and goods movement

The need to Modernize our existing Electricity Generating Plants

- Ability to add more renewable resources to our energy supply
- AES' modernized plant will be:
  - Cleaner, use much less potable water and no ocean water
  - Shorter & Sleeker with way more "curb-appeal"
- Meaningful state and community benefits:
  - **$1.3 billion** private investment in California's electric infrastructure
  - over **$130 million in local purchases** over a period of 6 years
  - 4.7 million hours in construction-related work and a **payroll of over $400 million** – much of which will be spent in the local community.
  - contribute over **$8 million annually to the local economy**, over the lifespan of the plant, while also generating tax revenue to help pay for local services such as police and fire

Clean, Reliable, Low Profile

Clean, Reliable, Low Profile

Battery Energy Storage System (BESS)

- **Replace natural gas generation with up to 300 MW of BESS**
- local capacity, 4 hour energy and fast acting grid stabilizing services

AES has more than 8 years of operational experience with Battery based Energy Storage around the world

Battery systems are providing tremendous benefits to our electricity systems

Uses:

- Capacity Release
- Firming wind generation
- Energy time shifting
- Grid stabilizing
- Optimizing existing infrastructure

In our utilities and competitive markets

Both as projects and product sales

Thank you