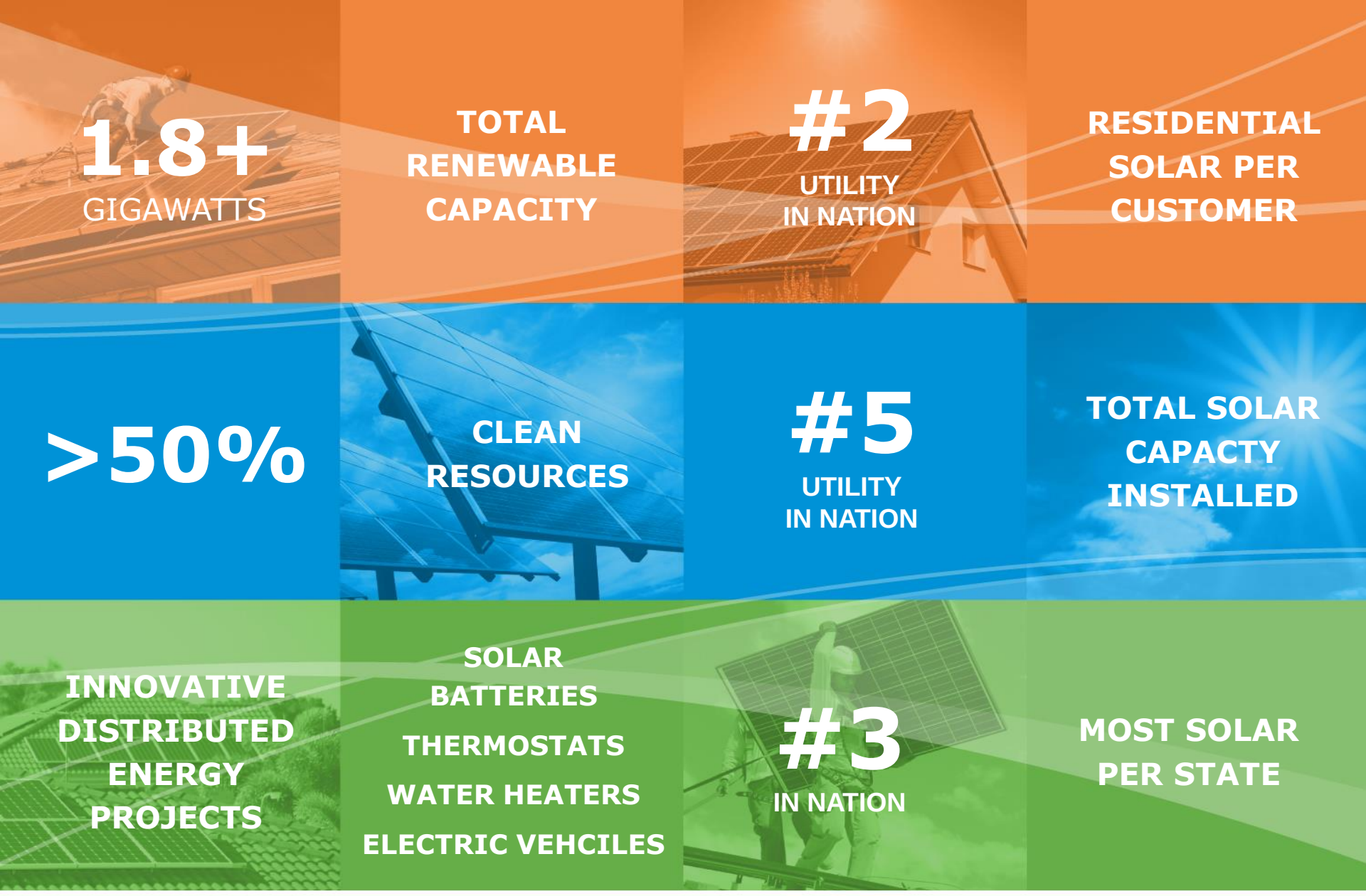
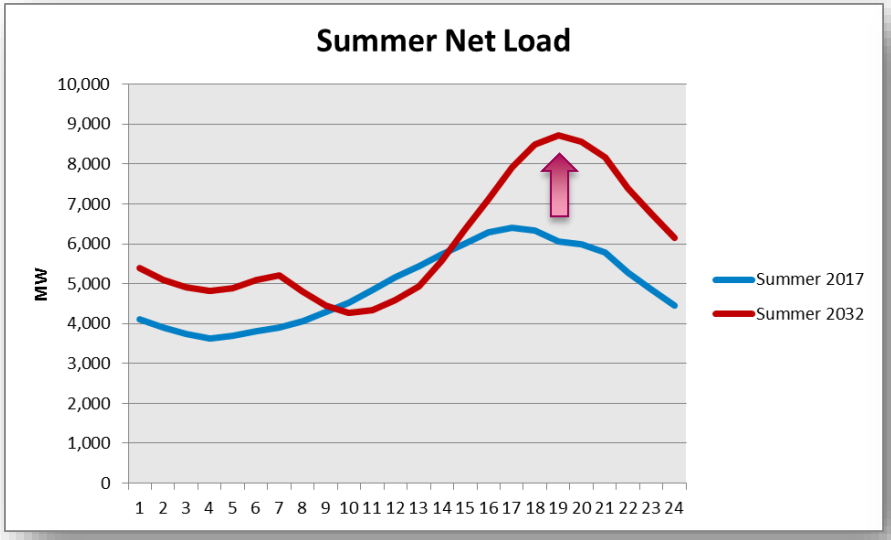
The Future of Arizona Sustainability and Changing Grid Conditions

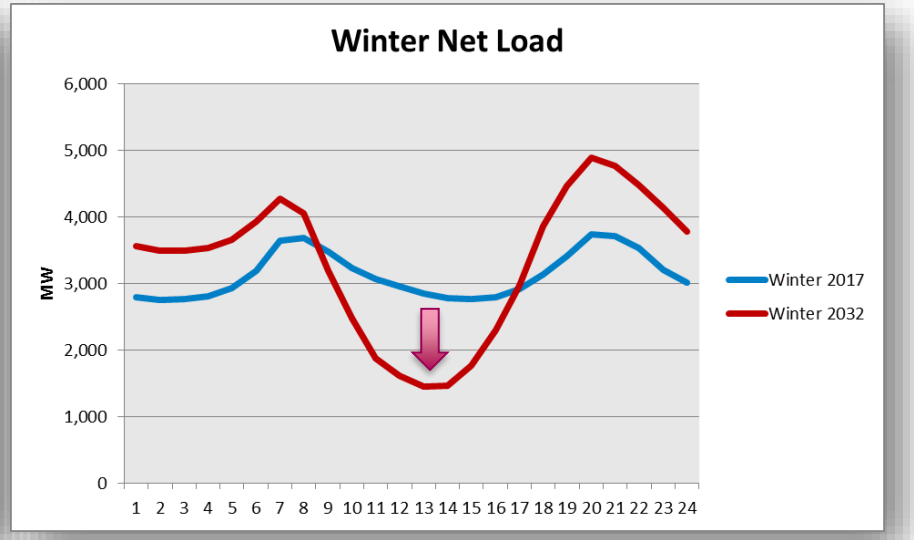

1.8+
GIGAWATTS
TOTAL RENEWABLE CAPACITY
#2
UTILITY IN NATION
RESIDENTIAL SOLAR PER CUSTOMER
>50%
CLEAN RESOURCES
#5
UTILITY IN NATION
TOTAL SOLAR CAPACTY INSTALLED
INNOVATIVE DISTRIBUTED ENERGY PROJECTS
SOLAR BATTERIES
THERMOSTATS
WATER HEATERS
ELECTRIC VEHCILES
#3
IN NATION
MOST SOLAR PER STATE

aps

Arizona Resource Needs are Changing

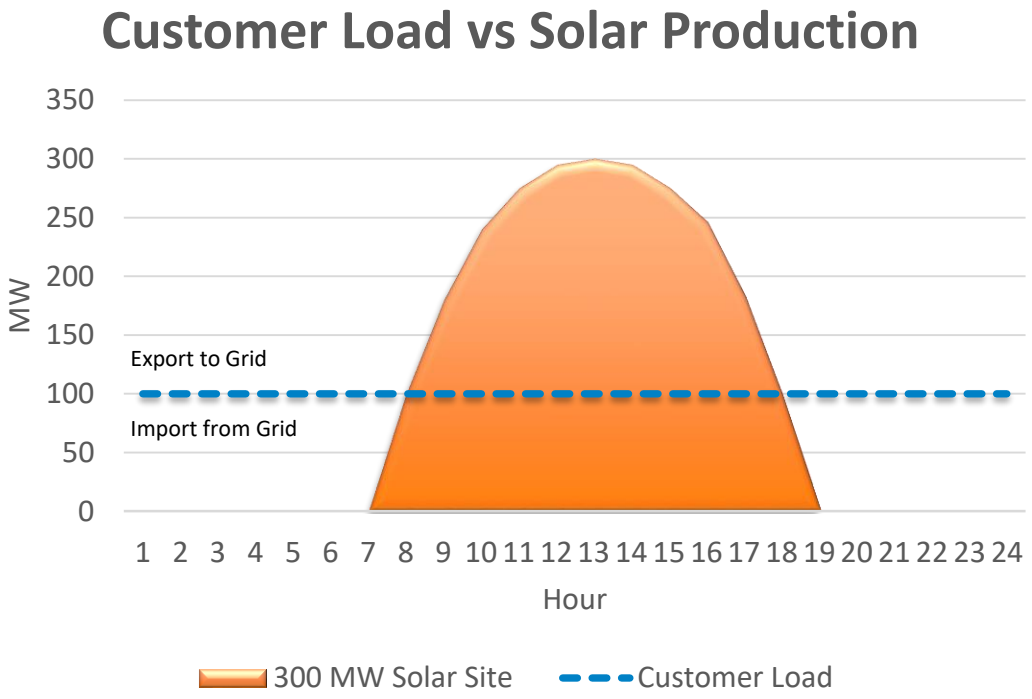
- Seasonal variation of resource needs
  - Continued evening growth during high load, summer periods
  - Continued reduction in net load during the daytime, non-summer periods





What does it take to reach 100% Solar Renewable Goals?

- **Grid** used to manage import & export energy flow
- Utility must **balance** the grid to maintain reliability
- High solar **penetration** causes operational difficulties



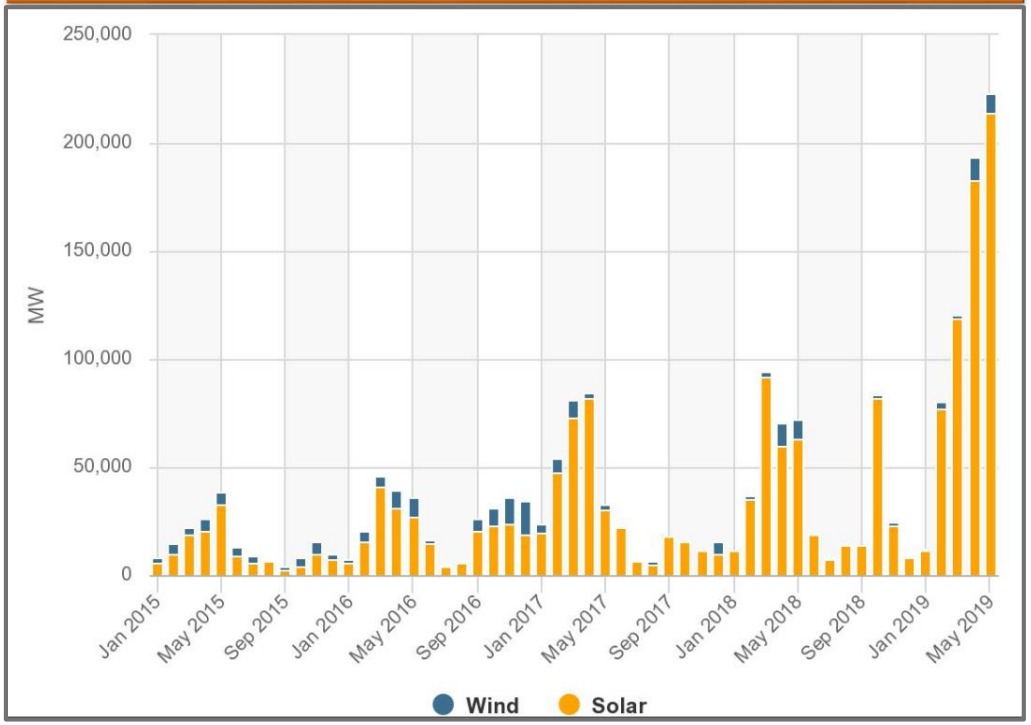
100% Renewable Solar Generation

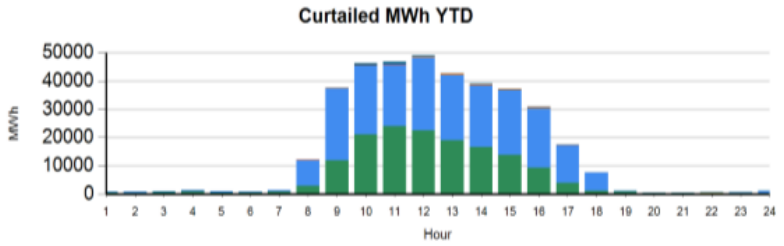
- Renewable goal increases mid-day production to nearly three times customer load
- Use of grid during all hours – for load service or export

Solar Overproduction

- Renewable resources economically curtailed to ensure grid stability
- Approximate renewable curtailment in CAISO
  - 2017: 380,000 MWH
  - 2018: 461,000 MWH
  - 2019 YTD May: **630,864** MWH
- Solutions to solar overproduction
  - Energy Imbalance Market
  - Storage
  - Solar + Storage
  - Demand response
  - TOU rates
  - Customer involvement

CAISO Wind and Solar Curtailment by Month





http://www.caiso.com/informed/Pages/ManagingOversupply.aspx

APS is taking leaps forward towards a Clean Energy Future

1. Modern Rates
2. Distributed Solar
3. Utility Scale Solar
4. Energy Storage
5. Rewards Program
6. Microgrids