



# Renewable Energy Overview

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# Agenda

- APS Introduction
- CSP, Storage and Peak Needs
- CSP Market Developments
- Solana Generating Station
- Distributed Renewable Generation



# APS Overview

- APS has the 5<sup>th</sup> Largest Service Territory in US & over 1M customers
- Arizona is one of the fastest growing states
- Energy demand will double in 20 yrs (3.6% yearly increase)
- Our customer growth is **3 times** U.S. Average
- 5,039 miles of transmission lines in APS territory



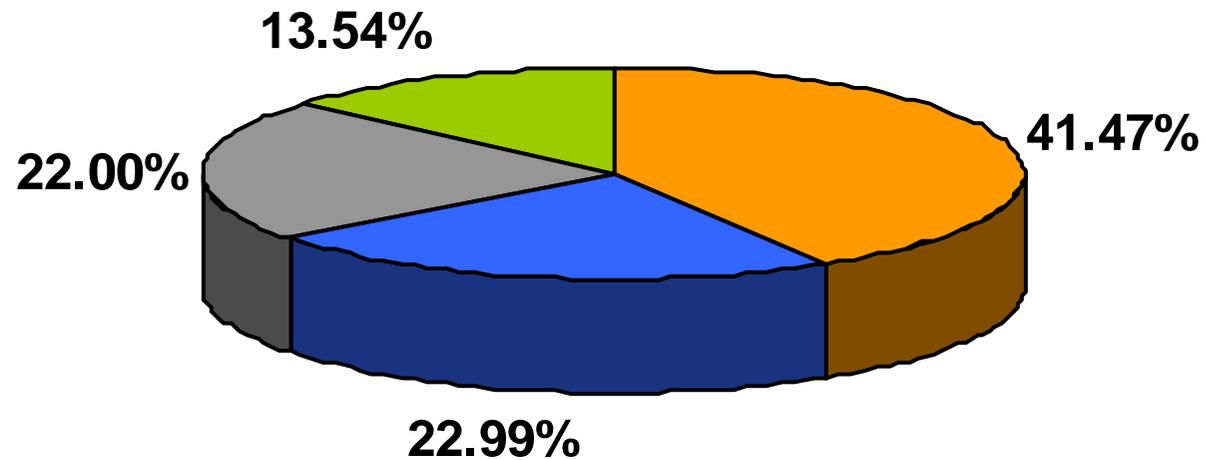
 APS Retail Service Territory



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# APS Generation Portfolio

## APS Energy Mix



■ Coal ■ Gas/Oil ■ Nuclear ■ Other

# APS Renewable Generation

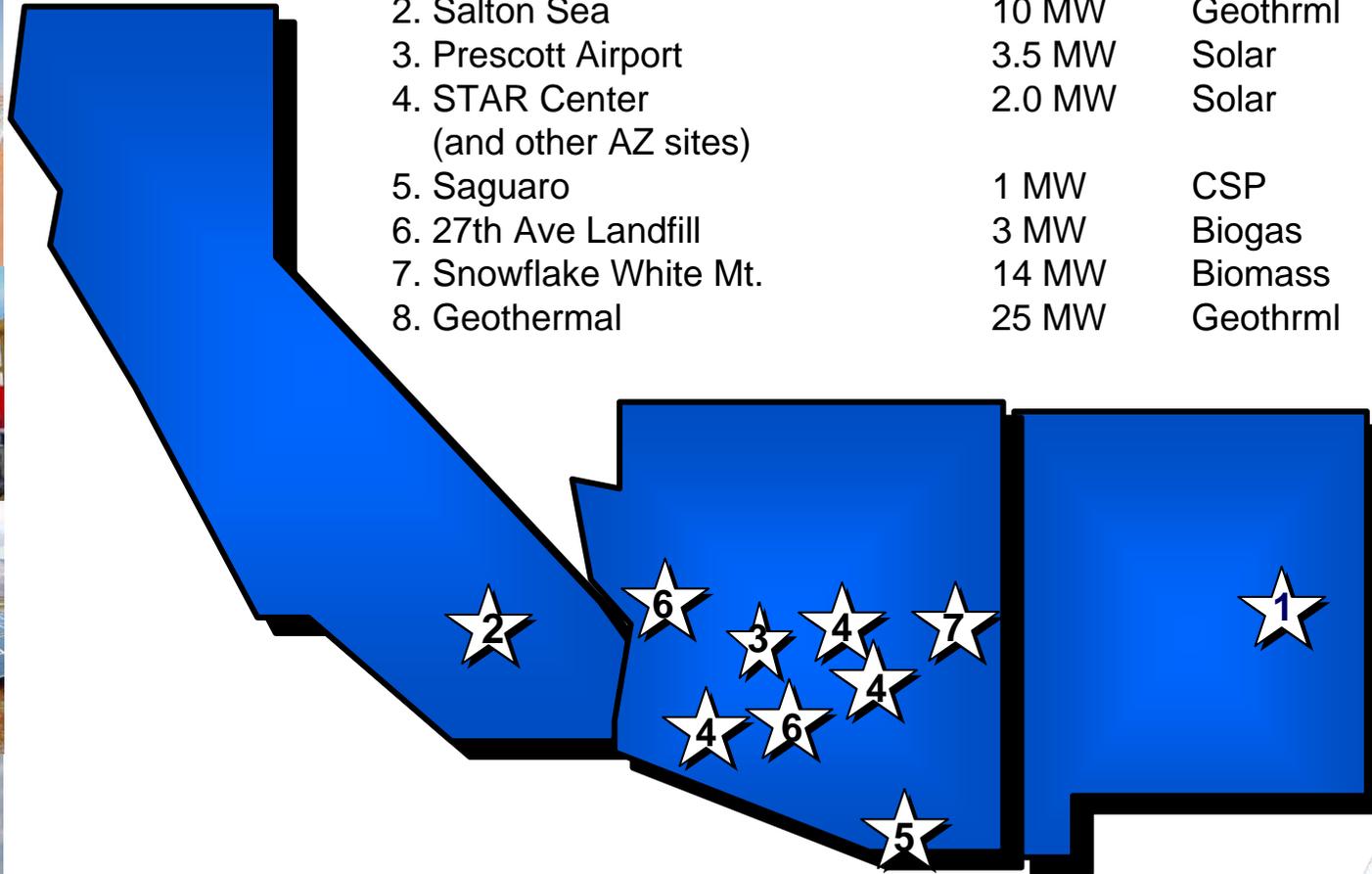
**Current Capacity - 130 megawatts (MW) – enough for over 30,000 homes**

## Projects Online

## Capacity Type

## Acquired

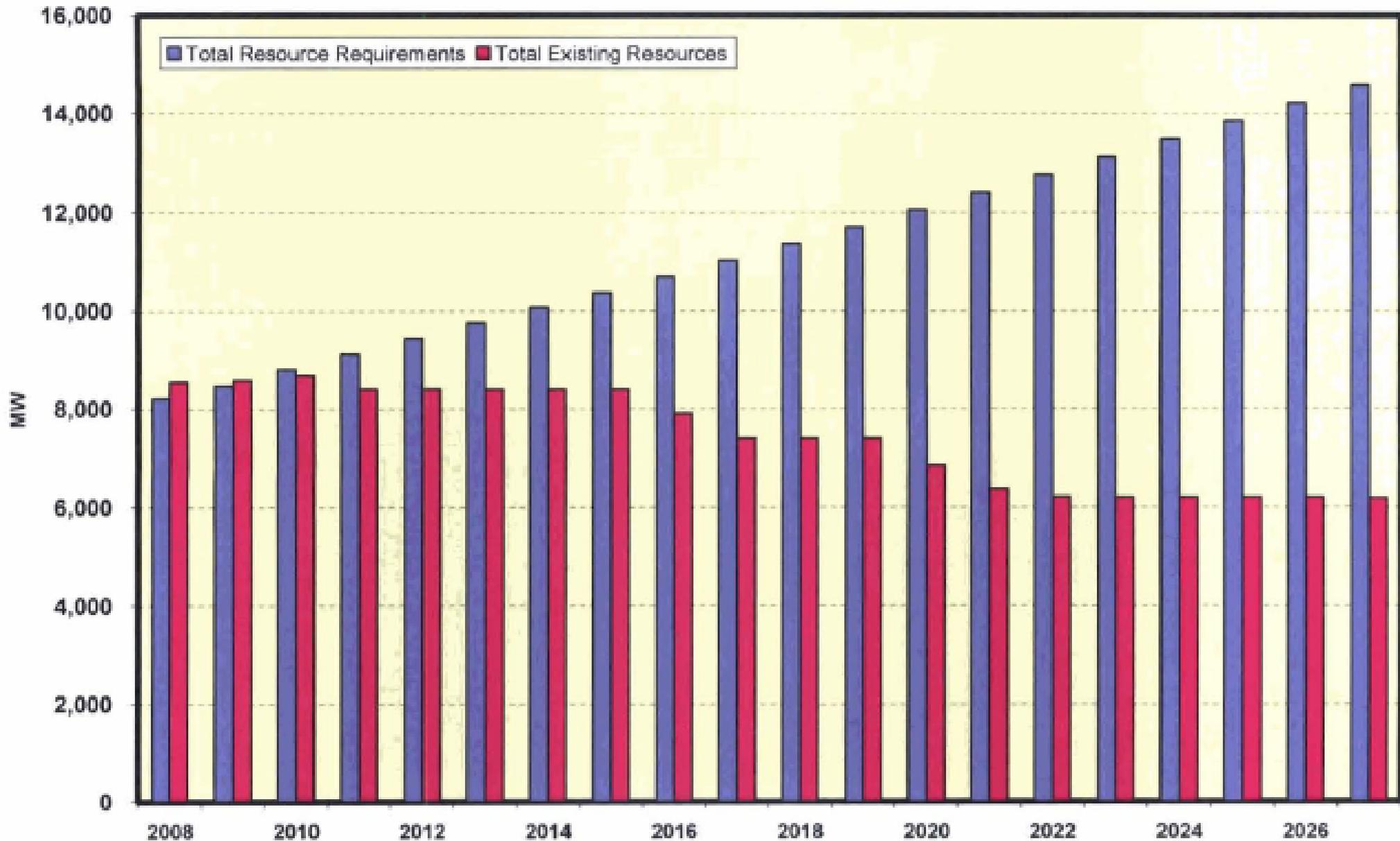
1. Aragonne Mesa	90 MW	Wind	Long-term contract
2. Salton Sea	10 MW	Geothrml	Long-term contract
3. Prescott Airport	3.5 MW	Solar	APS owns
4. STAR Center (and other AZ sites)	2.0 MW	Solar	APS owns
5. Saguaro	1 MW	CSP	APS owns
6. 27th Ave Landfill	3 MW	Biogas	Long-term contract
7. Snowflake White Mt.	14 MW	Biomass	Long-term contract
8. Geothermal	25 MW	Geothrml	Short-term contract



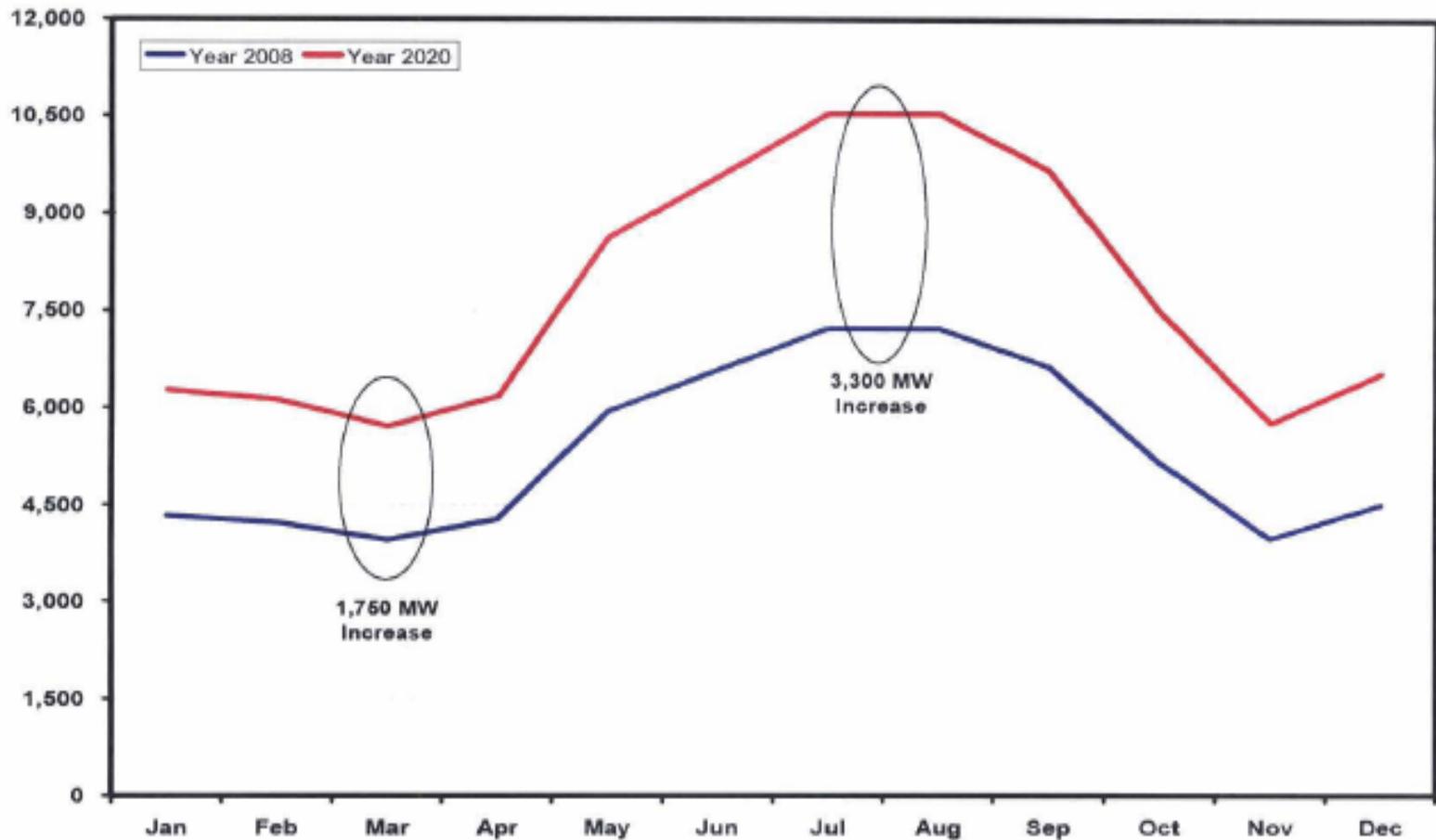
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# Summer Capacity Gap

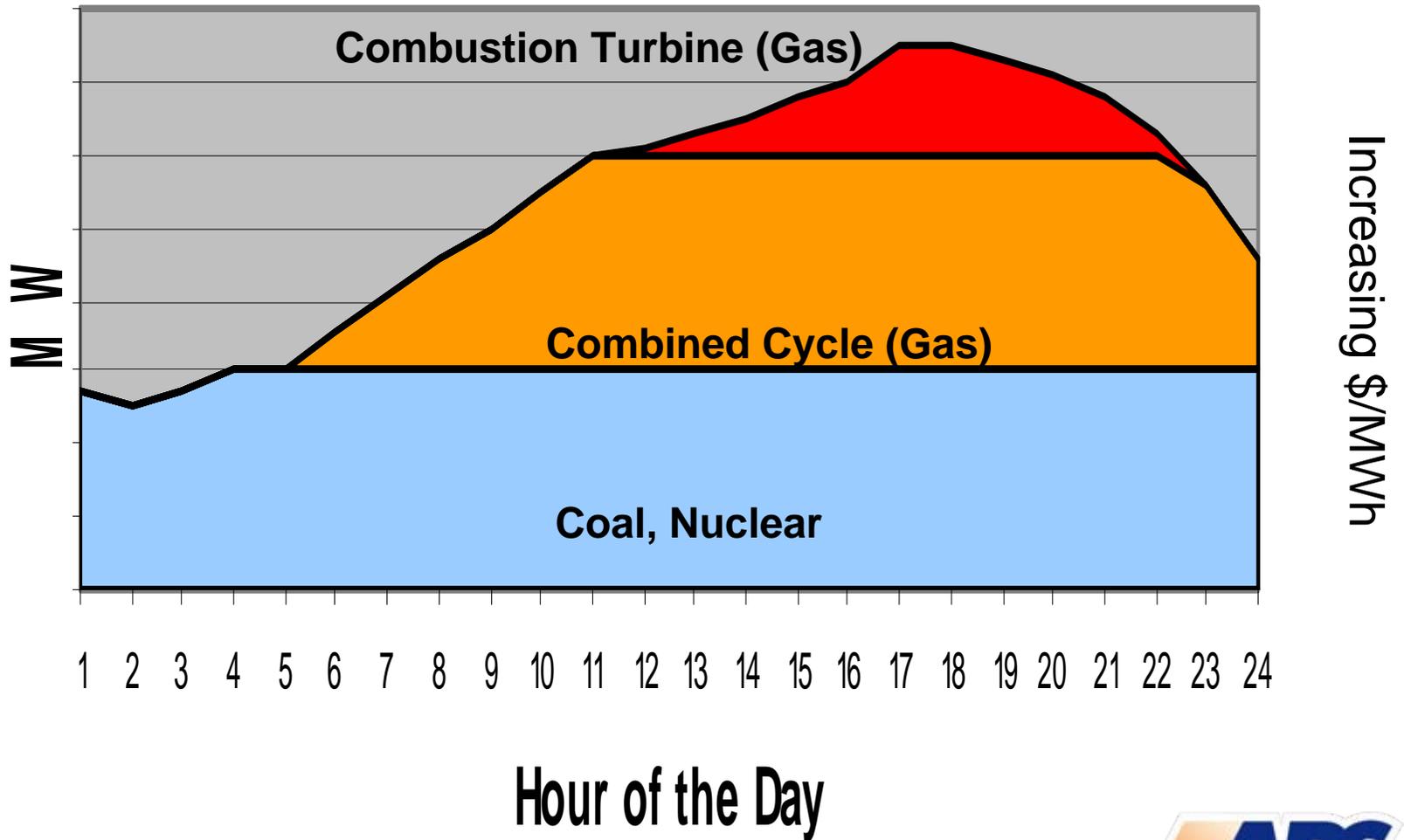


# Monthly Peak Load Capacity



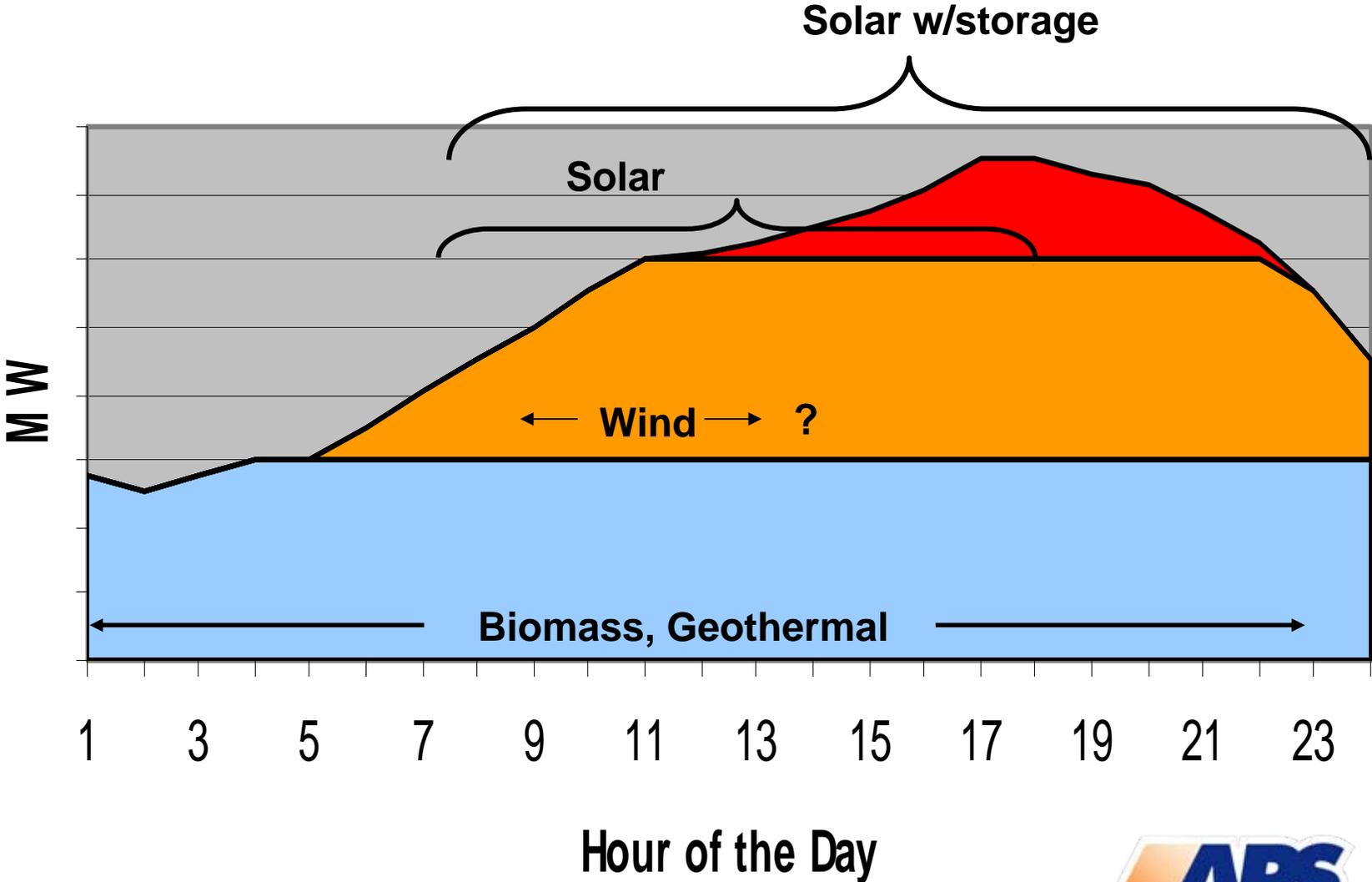
# Summer Generation Profile

## Traditional Resource Fit



# Summer Generation Profile

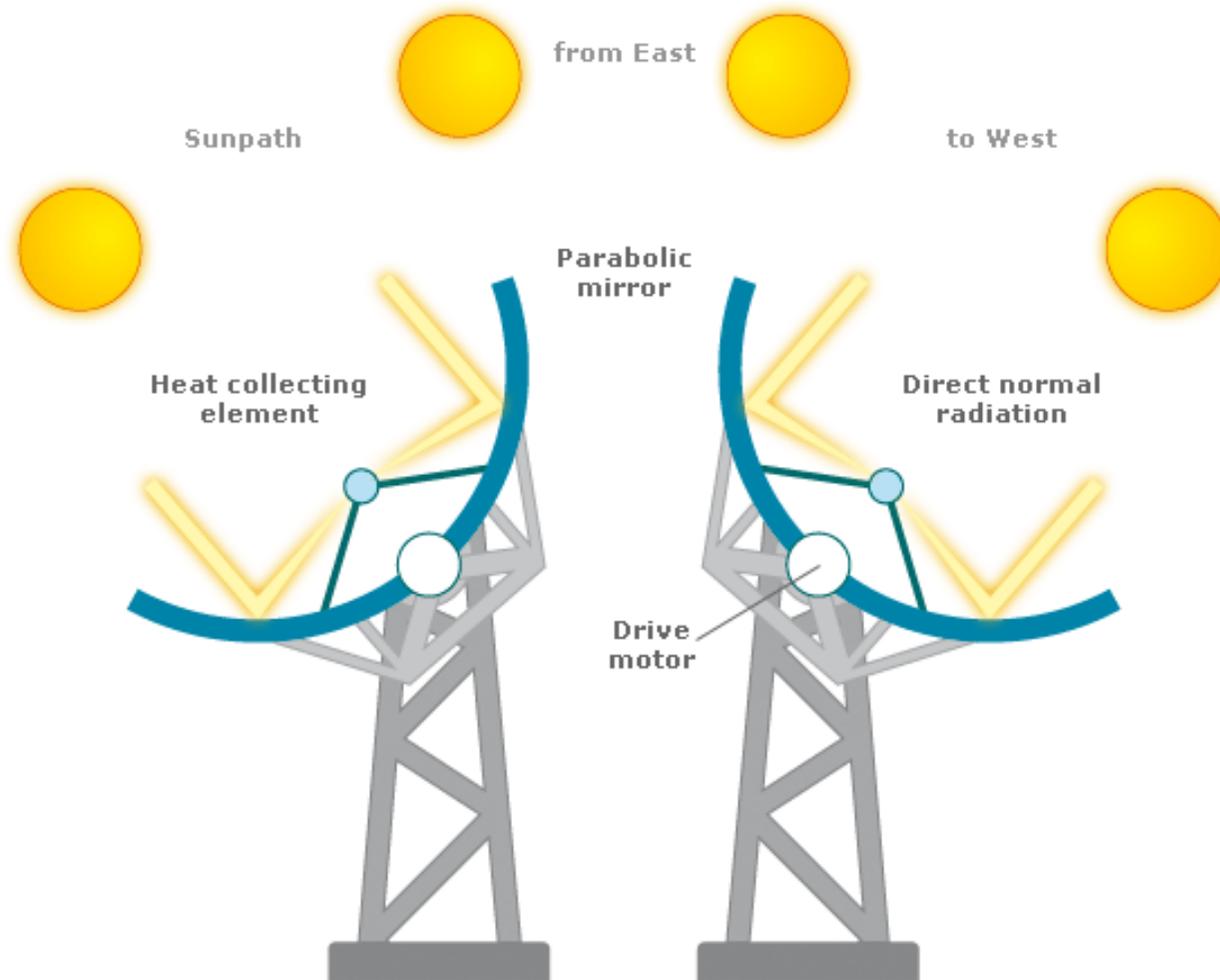
## Renewable Resource Fit



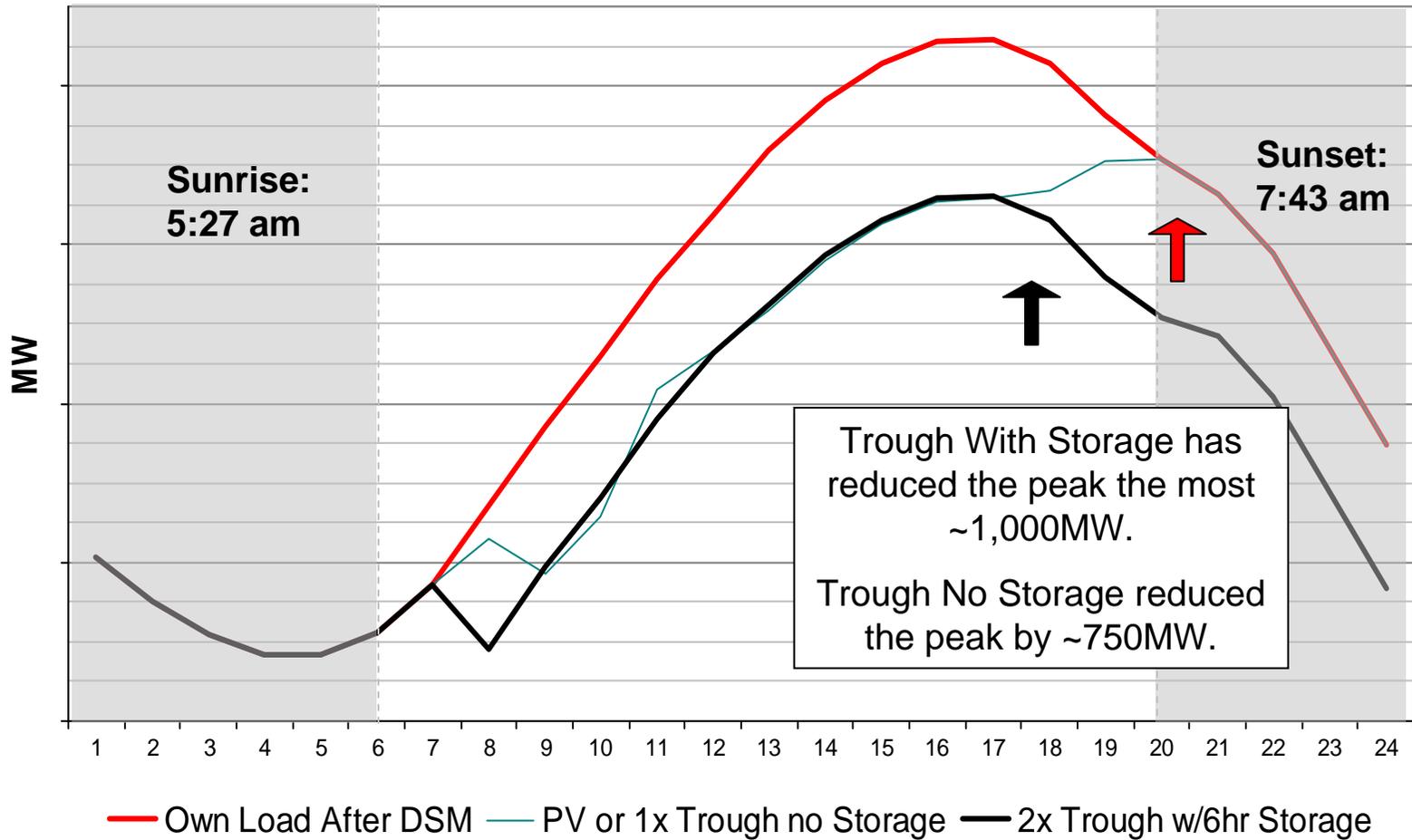


Given APS' strong growth and summer peak needs, APS requires technologies which provide capacity through the summer peak period.

# Concentrating Solar Power (Trough)



# Impact of 1,000MW on Peak Summer Day

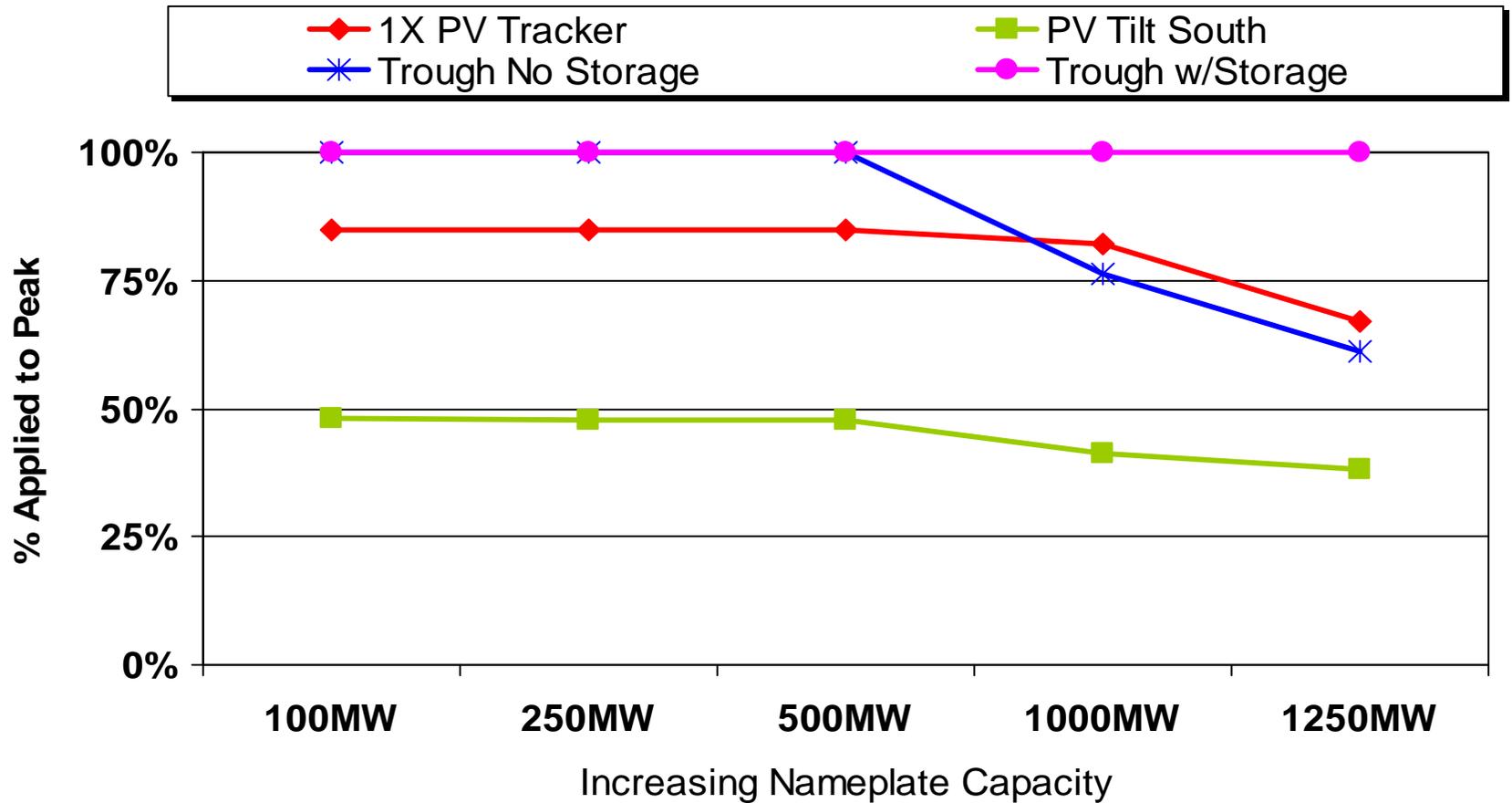


# Capacity Contribution

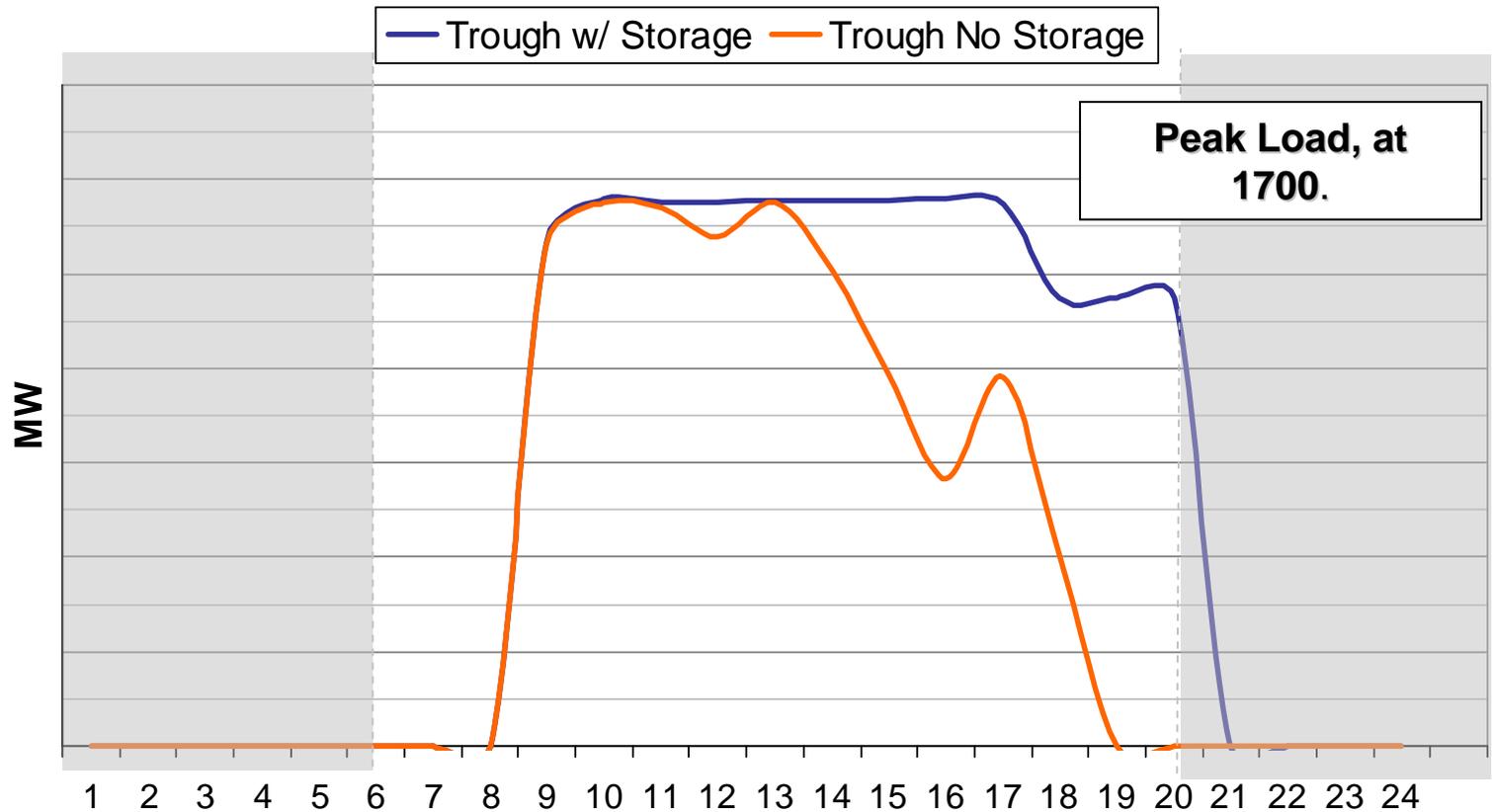
(Reduction in Peak Load on Peak Day)

Rating	1x Tracker	30 Degree Tilt South	Trough w/ No Storage	Trough w/ 6hr Storage
@110MW	85	50	110	110
@275MW	215	120	275	275
@550MW	425	240	<b>550</b>	<b>550</b>
@1,100MW	822	415	<b>750</b>	<b>1,100</b>
@1,350MW	840	480	<b>750</b>	<b>1,350</b>

# Peak Summer Day Effectiveness



# Summer Monsoon Contribution





**Over the past few years, the CSP market has experienced significant growth and has continued to mature.**

# A Narrowing Cost Gap

**CSP**

- ✓ Large Scale Projects
- ✓ Global Uptake
- ✓ Strong Developers
- ✓ Incentives

- Carbon Policy
- Fuel Risk

**Traditional  
Resources**

- ✓ Increasing Fuel Prices
- ✓ Environmental

# Solana



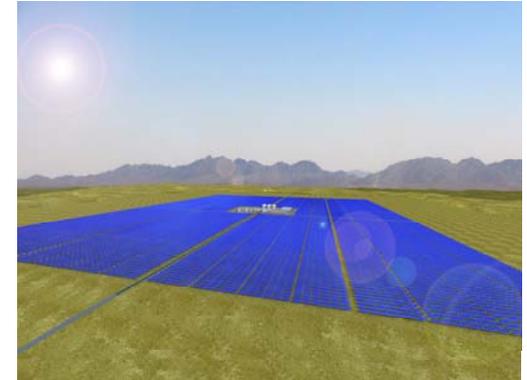
## INTRODUCING SOLANA. ARIZONA'S LARGEST SOLAR GENERATION STATION.

On February 21, APS announced plans for the Solana Generation Station - a 280-megawatt concentrating solar power plant that, when completed in 2011, will be one of the largest solar plants in the world. When operating at full capacity, Solana will serve 70,000 Arizona homes.

# Solana

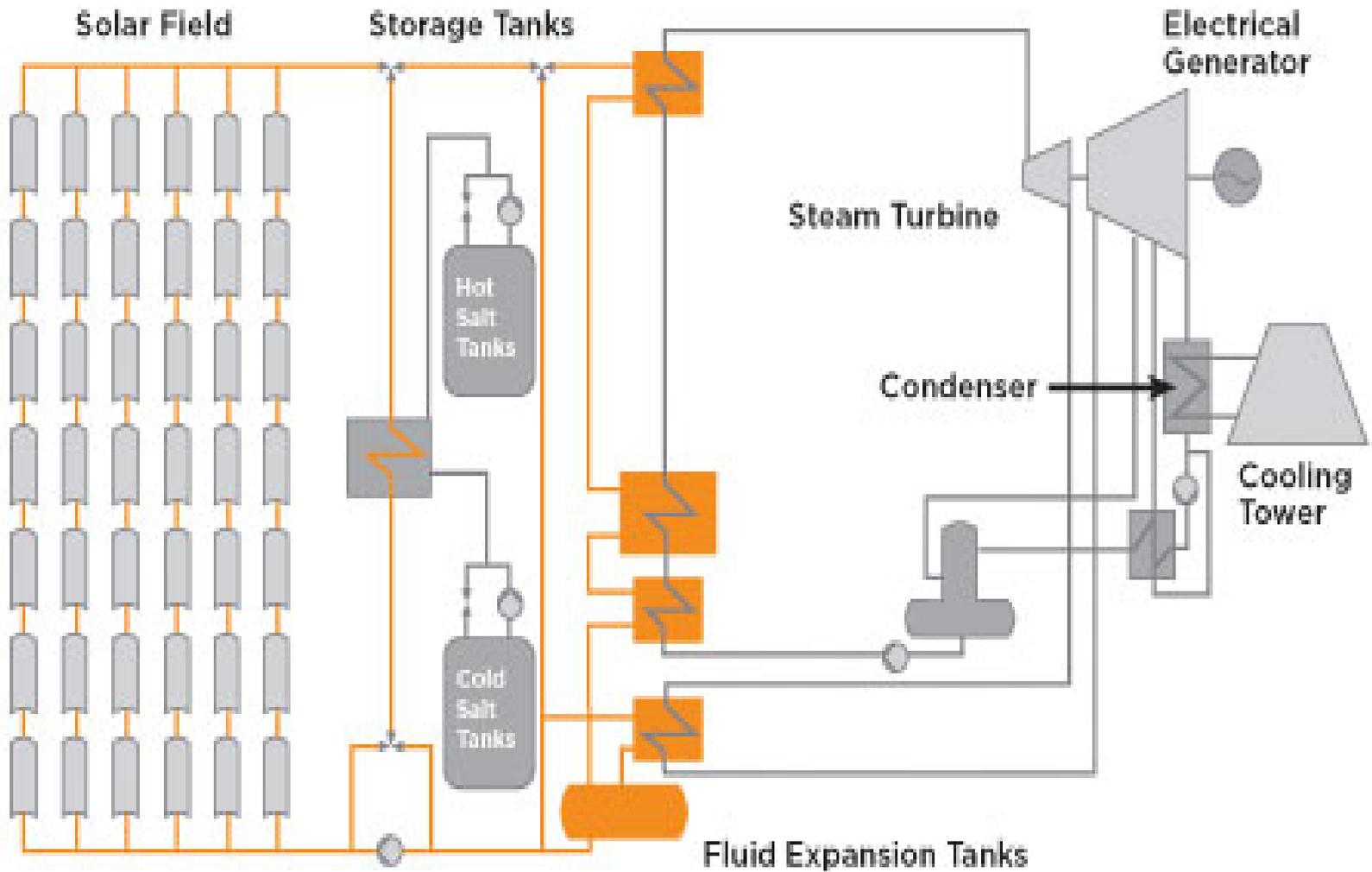
## Project Facts

- 30 year PPA with all the energy delivered to APS.
- Solar trough with 6 hours of thermal storage
- Located 70 miles southwest of Phoenix.
- 2,700 parabolic trough collectors covering 3 square miles.
- 280 megawatts (enough for 70,000 homes).
- Tentative completion date of 2011 and will employ 85 highly skilled technicians when fully operational.
- APS selected Abengoa Solar as the project partner.



# Solar Thermal

Focusing Solar Energy Onto a Heat Transfer Fluid



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# Molten-Salt Storage System



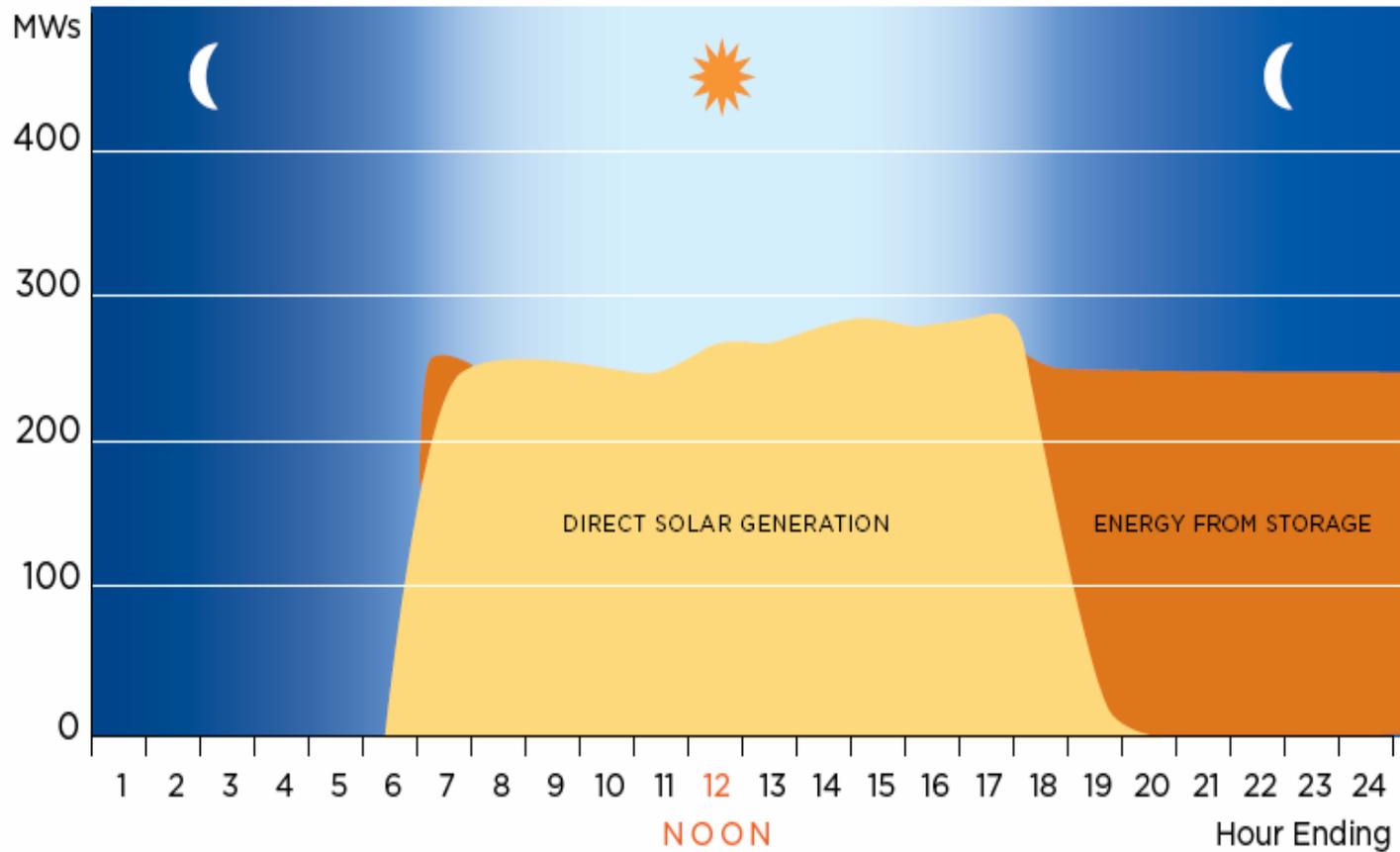
- Spain – 7hrs, 50MWe  
APS – 6 hrs, 280 MWe
- Over 4 times as large
  - 6 tanks

Molten-salt storage  
used at Solar Two



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# Solana Summer Operation



# Selecting Abengoa

Mature	Founded 1941
Profitable	Sales and Gross Cash Flow in 2006 of \$4 billion US and \$435 million, respectively
Focused	Innovative Solutions for long term Sustainability
Global	Present in more than 70 countries, 55% of business outside Spain
Large	Over 23,000 employees
Public	Quoted on the Madrid Stock Exchange (ABG)

# RFP Initiatives

## Joint Development Group (JDG) – RFP

- Up to 250 MW CSP (storage preferred)
  - Minimum of 100 MW
- Utility partners
  - SRP, TEP, Arizona Electric Power Coop, Xcel Energy and Southern California Public Power Authority
- RFP Filters
  - Proven Technology - 10% of technology in commercial operation for (1) year
  - Experienced counter-party – (5) years of experience in construction management, plant management, project development, etc.

## 2008 RFP

- All Renewable Technologies

# Distributed Generation

## APS has significant interest in distributed renewable technologies, specifically PV

- RES requires 30% (of 15%) of renewables to be from distributed renewable technologies
- Distributed energy goals will be a challenge to meet
  - Free market approach
  - Looking for creative ways to make distributed valuable



# Distributed Generation Initiatives

## Distributed Renewable Energy Valuation study

- Study will determine the value and operating impacts on the APS system
- Will address resource, distribution and transmission values as they relate to strategic deployment scenarios

## Smart Grid, Storage and other “stuff”



# Conclusions

- **The Market is Rapidly Developing**
  - Large credible, financially stable developers
  - Financial support
  - Real projects
- **CSP with Thermal Storage is a Proven Technology**
  - Ability to meet utility needs at system peak
  - Potential for cost competitiveness
  - Particular value in Southwest
- **Policy Decisions will Maintain Momentum**
  - Long term ITC extension
  - Removal of utility exclusion



**a better tomorrow**  
starts today

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