

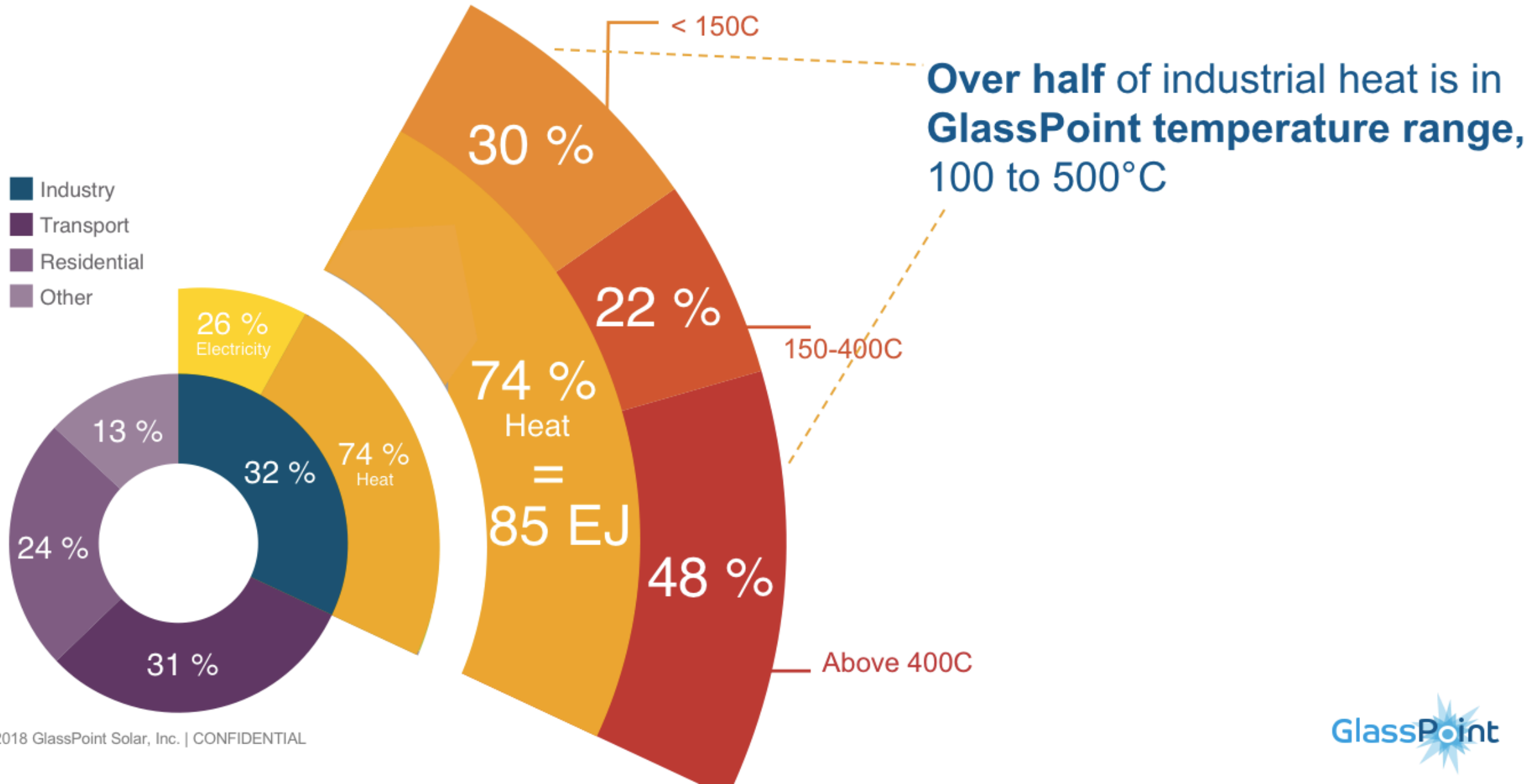
GlassPoint

Solar Thermal Energy for Industry

November 2019

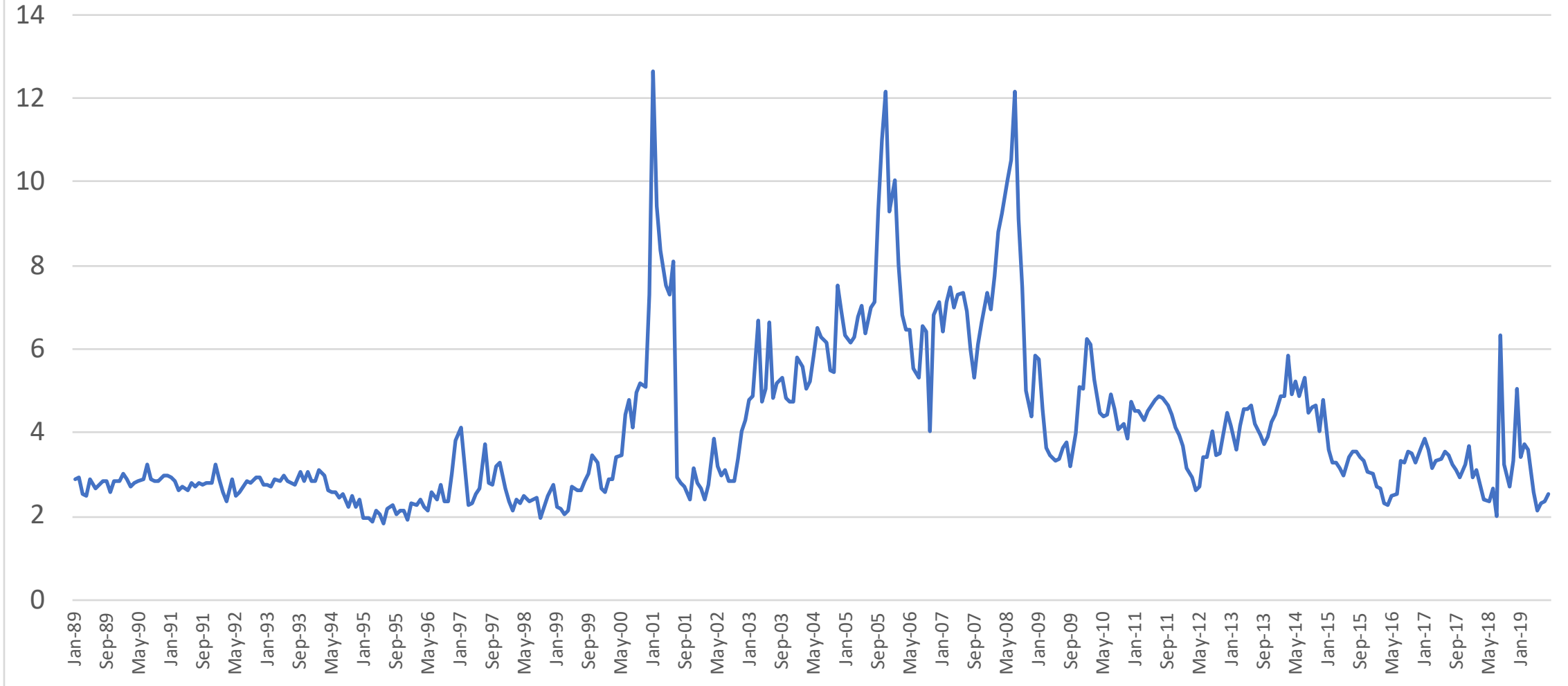


World Energy Use

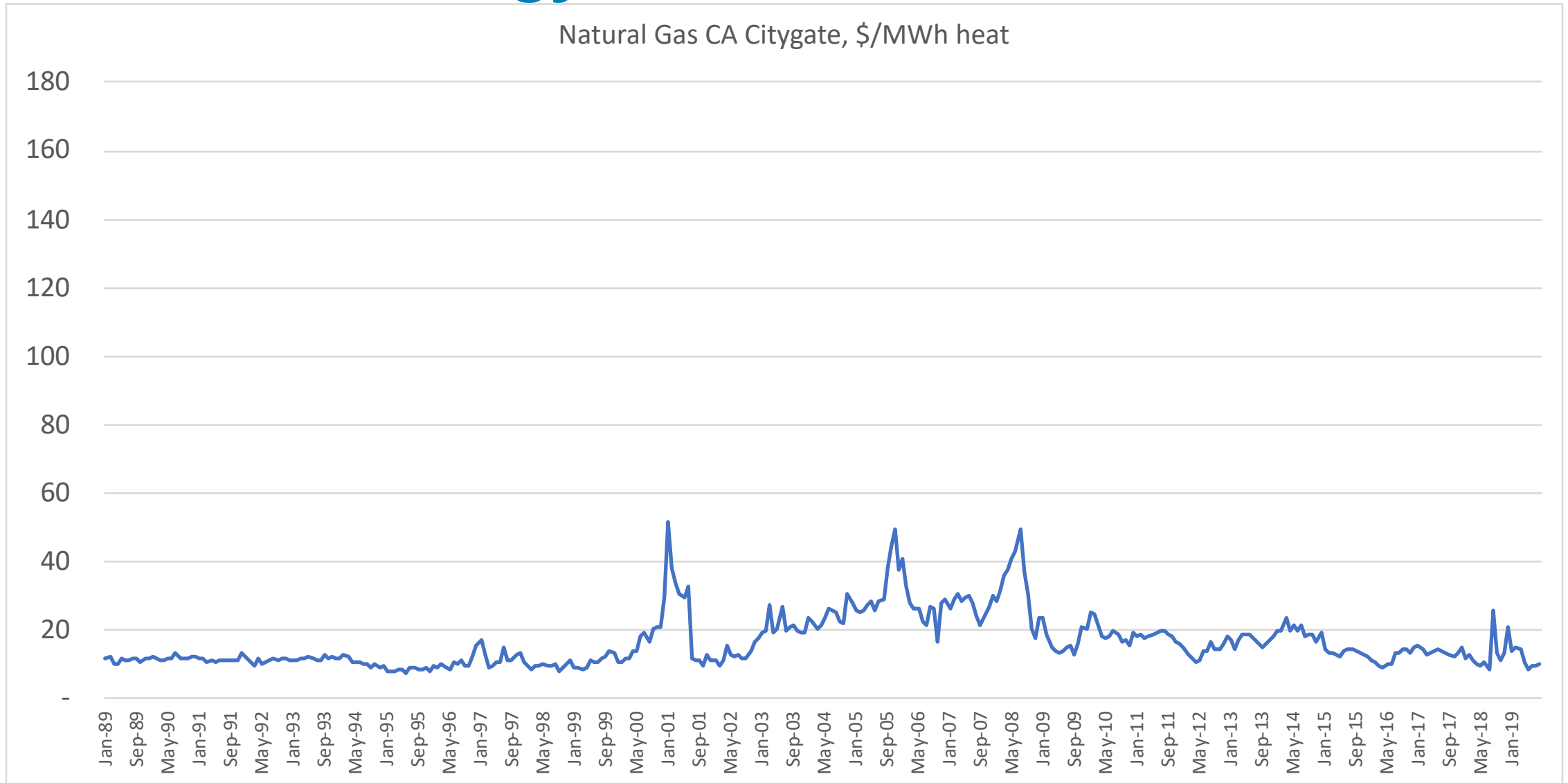


Energy Prices in California

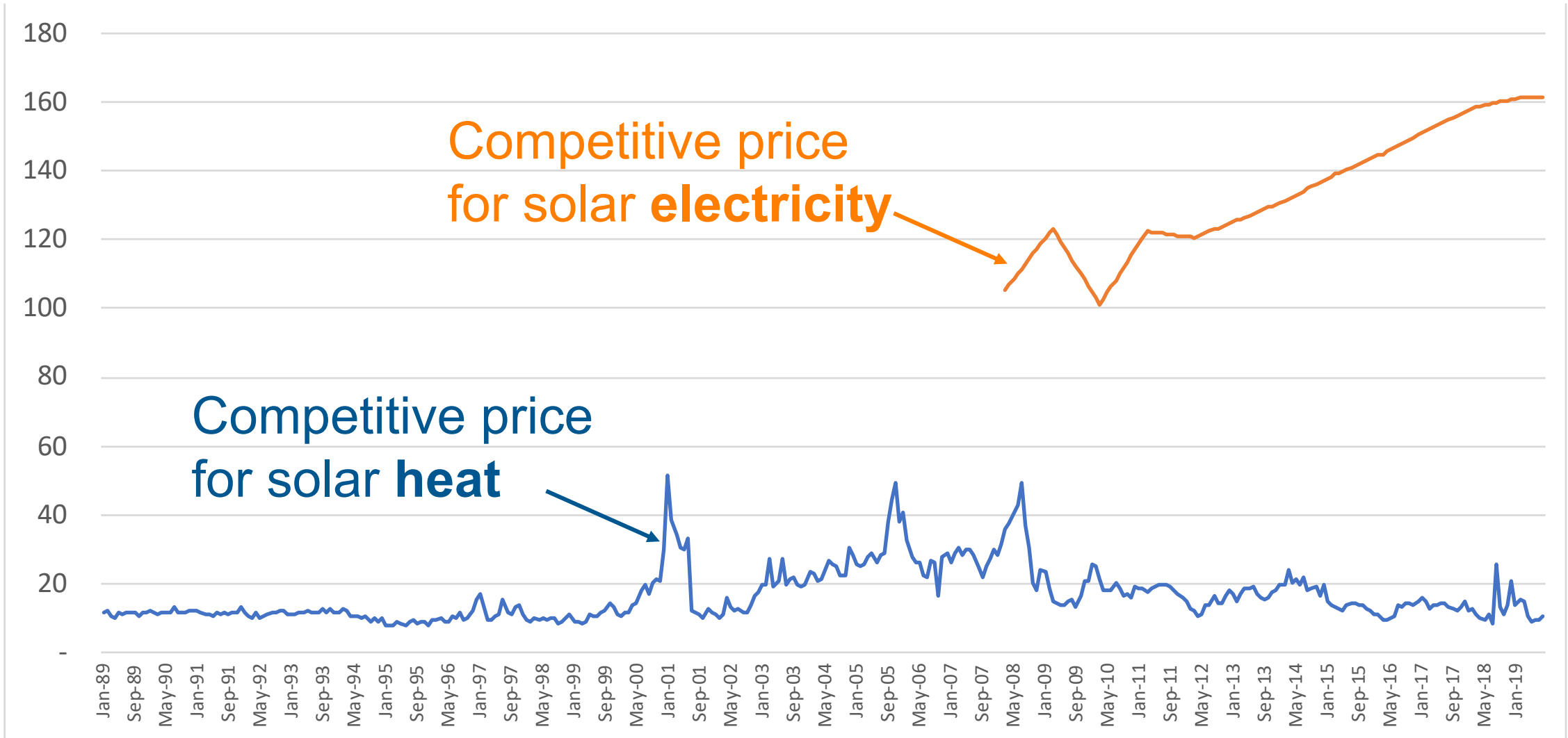
Natural Gas CA Citygate, \$/MCF



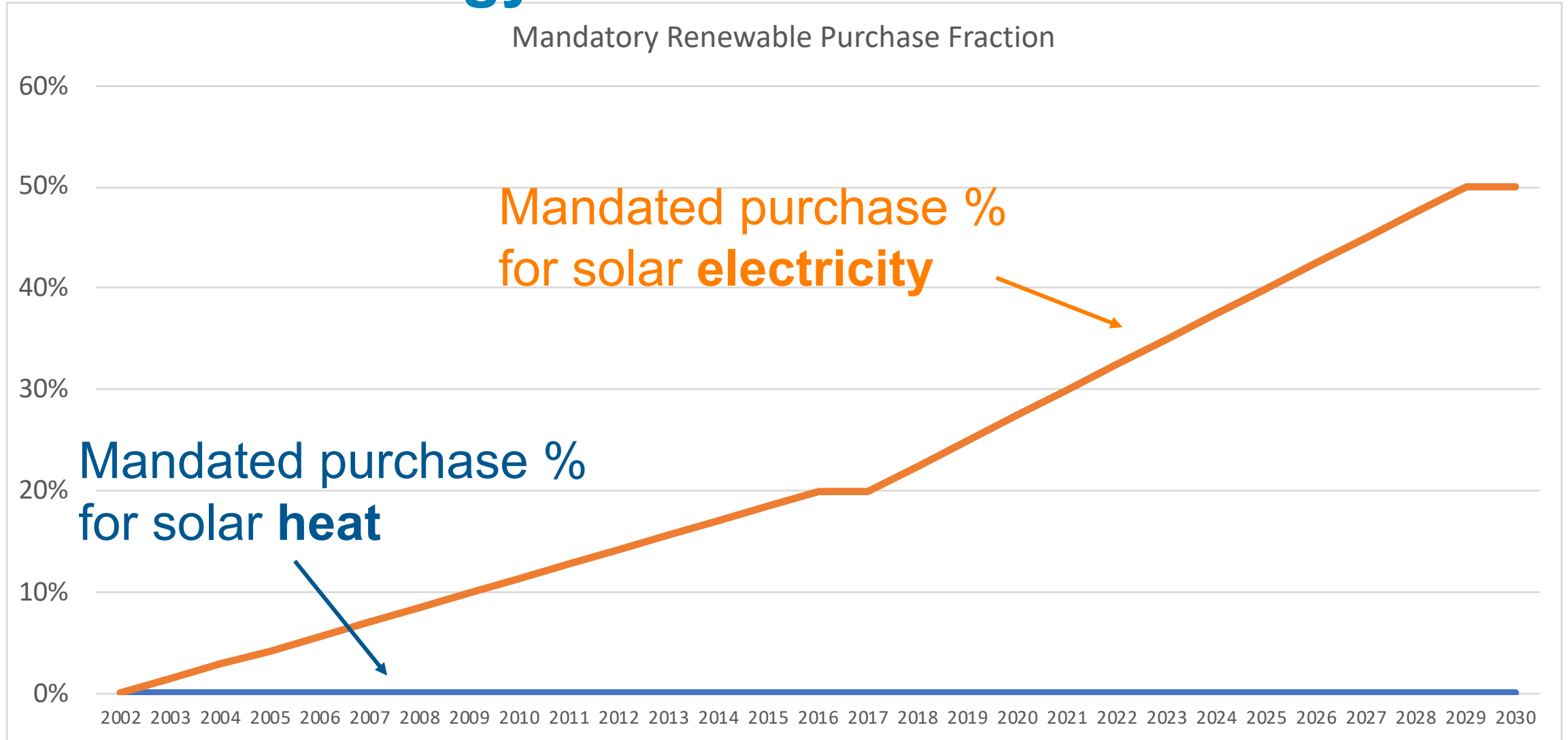
Energy Prices in California



Energy Prices in California



Energy Mandates in California



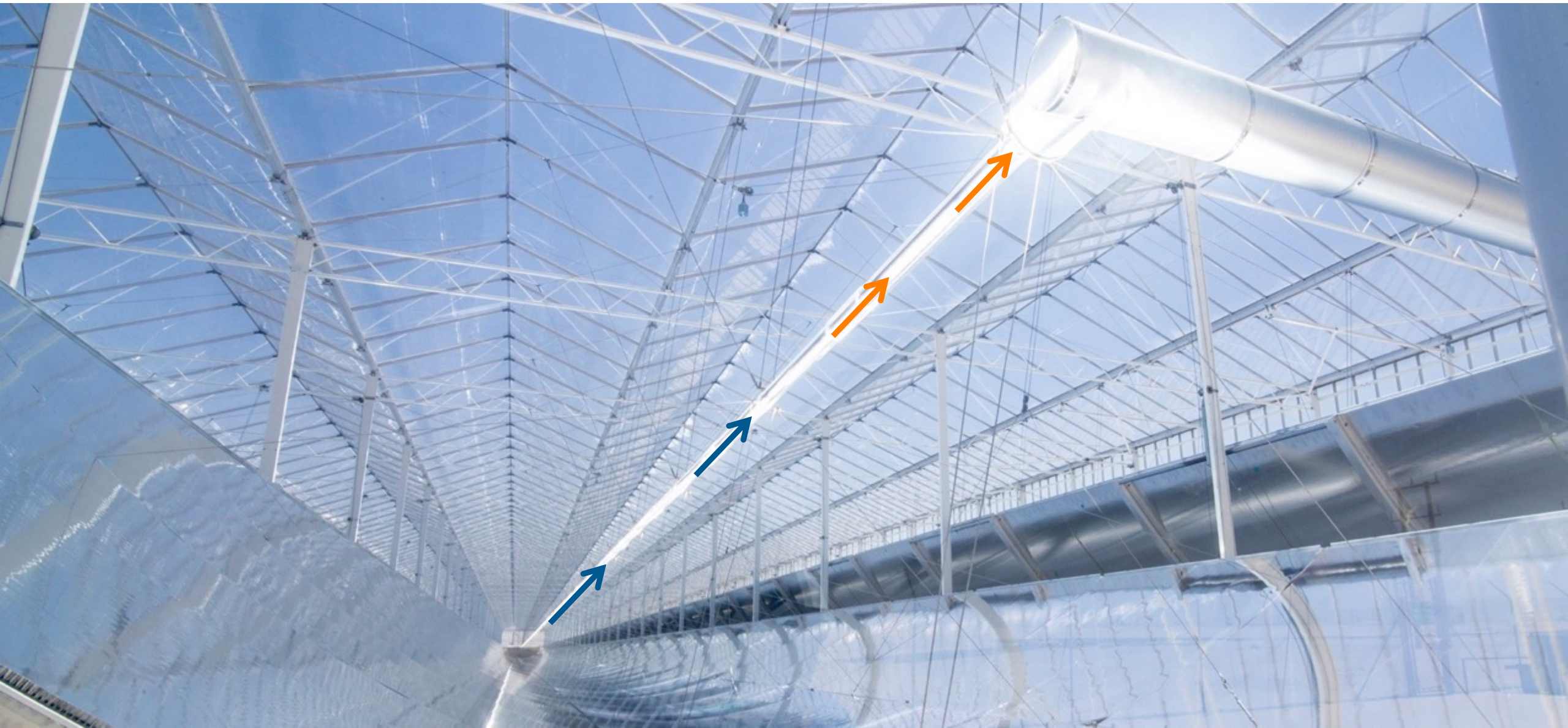
Starting the Virtuous Cycle

- VOLUME VOLUME VOLUME
 - Solar thermal technologies will come down in cost with volume
 - Learning curve similar to PV but deployment volumes to date are tiny
- No mandates: it must be cheaper from the beginning (very hard)
- Competitive energy cost is much lower (very hard)
- Solar heat projects must be co-located with end user (hard)
- Land costs and permitting costs are much higher at industrial sites
- Solar heat projects serve only one plant, maybe <20y plant life

A New Type Of Solar Energy



A New Type of Solar Energy



Mirrors $<1.5 \text{ kg/m}^2$



1/6 the the weight of reinforced glass mirror

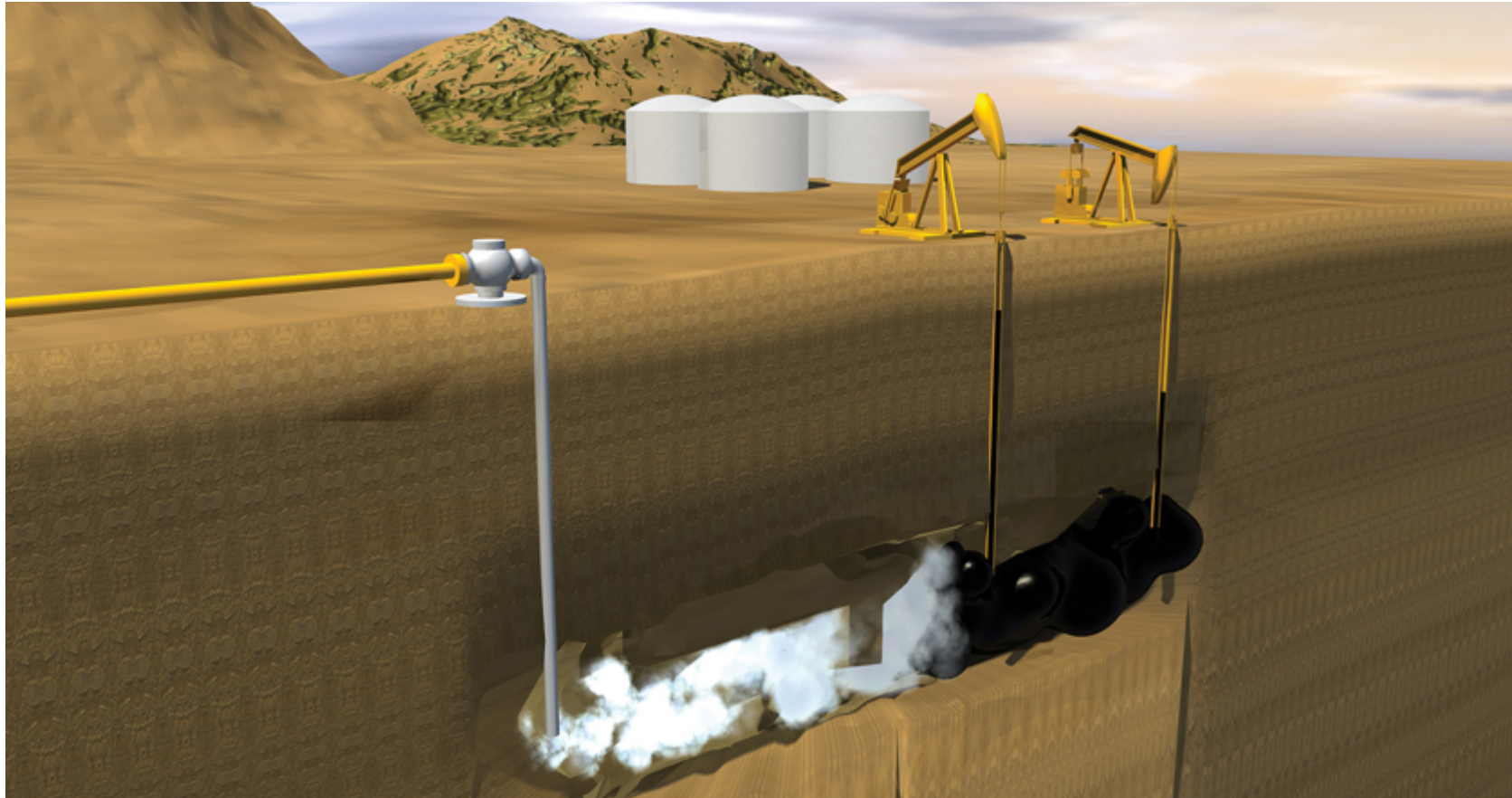
>6,000,000 Worker Hours LTI Free



Meet Miraah

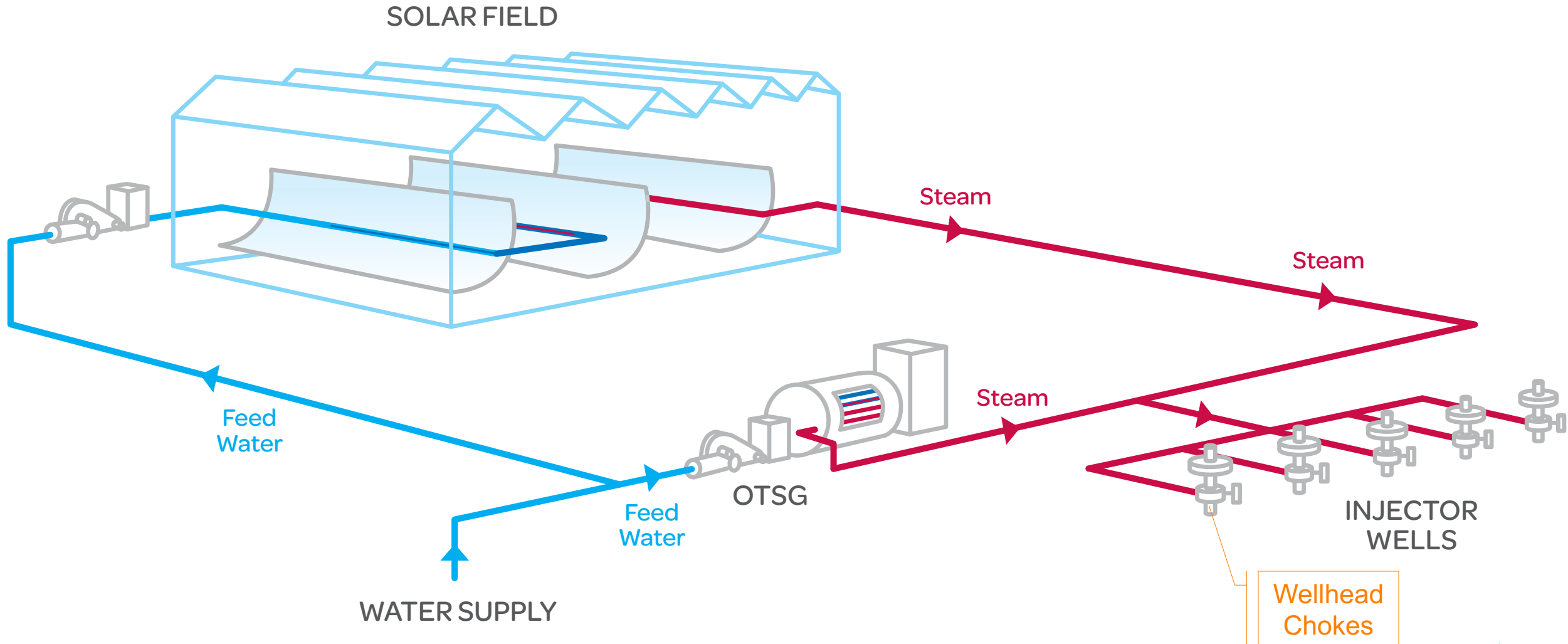


Thermal Enhanced Oil Recovery (EOR)



Heat lowers heavy oil viscosity and allows pumping to surface

Solar Energy Replaces Combustion of Natural Gas

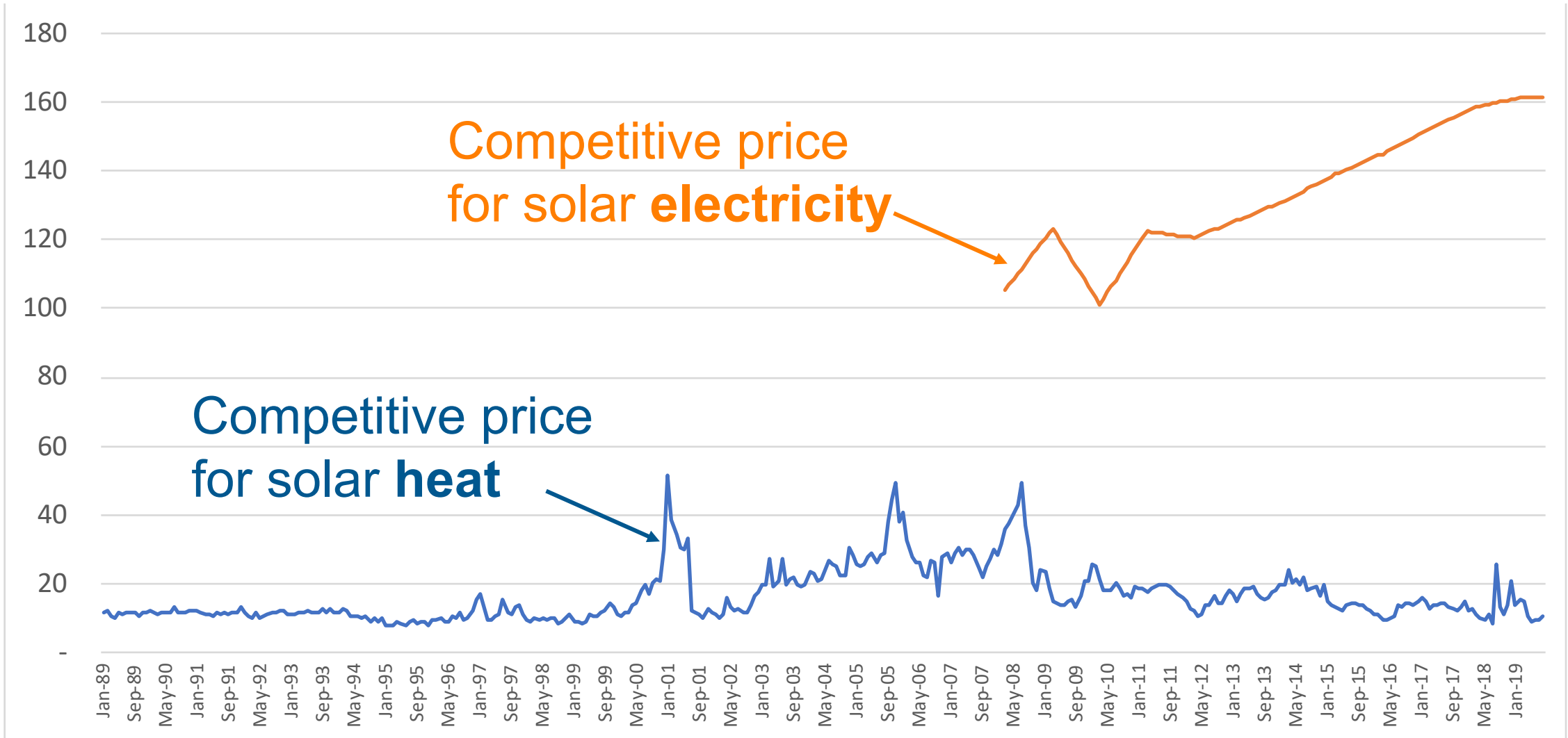


GlassPoint

10 year old company started in California
Operations in California, Oman, China, and Chile
Initial 100% focus on EOR to drive volume
Now serving broader range of industrial markets

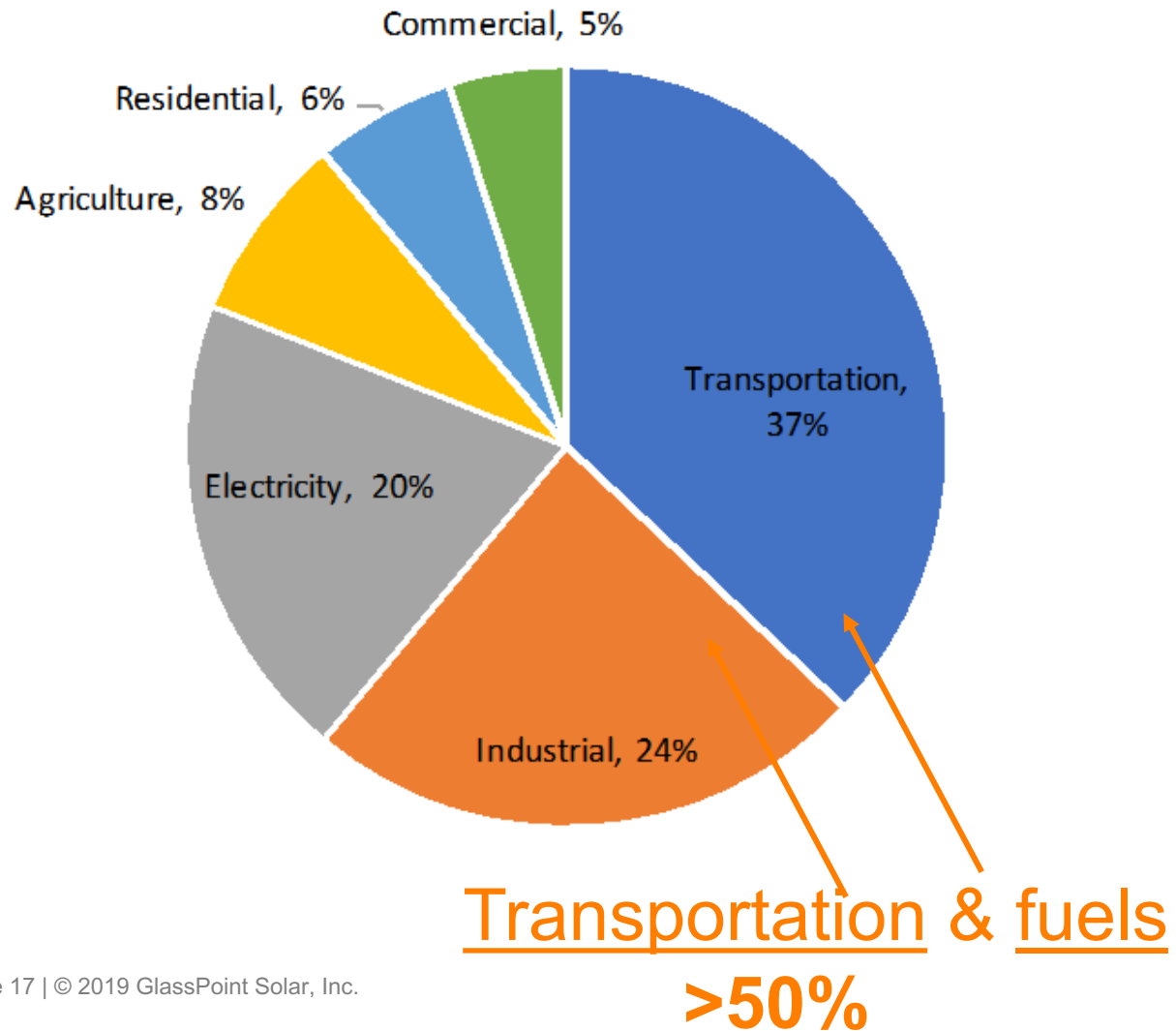
Name	Customer	Location	Size (MW)	Status	Operation Date
21Z Pilot	Berry	California USA	0.3	Pilot Complete	1Q 2011
SSGP	PDO	South Oman	7	Pilot Complete	4Q 2012
Miraah	PDO	South Oman	1000	300 MW online	3Q 2017
Belridge	Aera (Shell/Exxon)	California USA	850	Contract Signed	4Q 2021
Mukhaizna	Occidental	South Oman	2000	Announced	2022

Energy Prices in California



Energy Policy in California

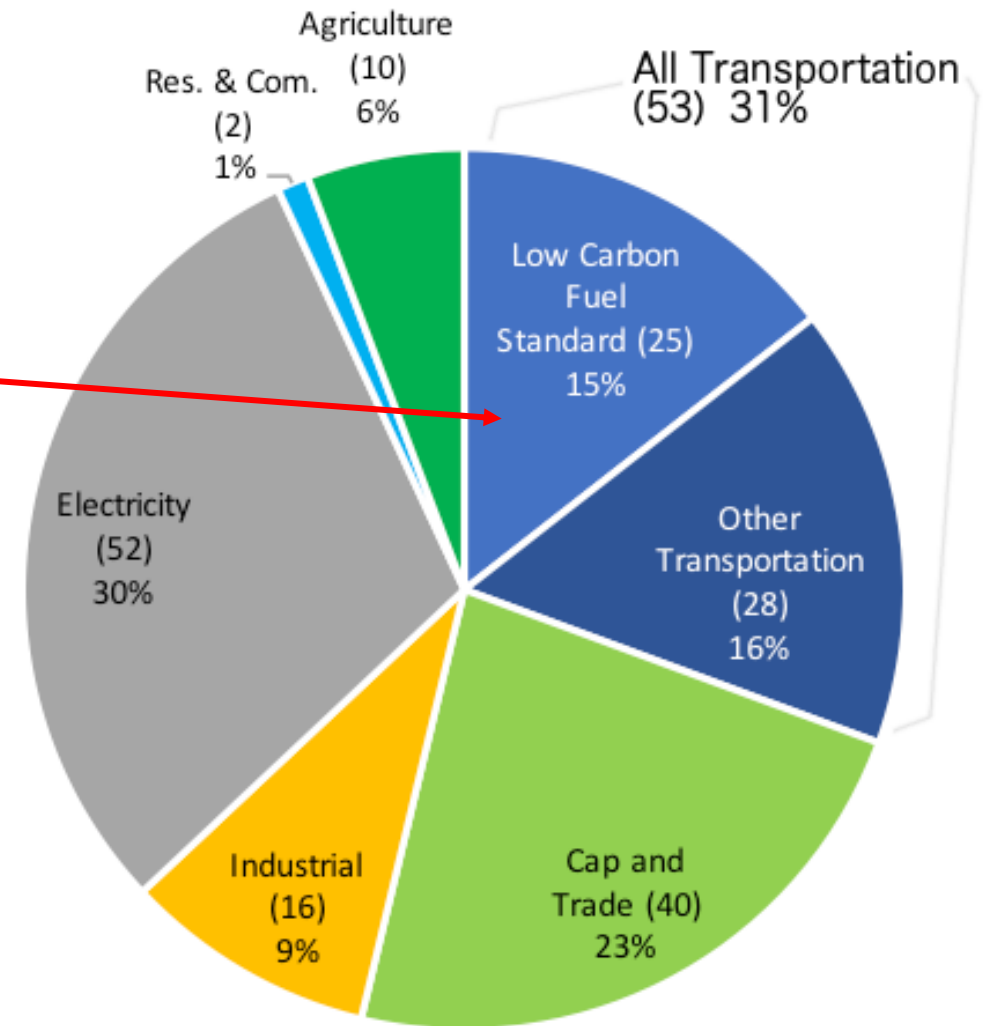
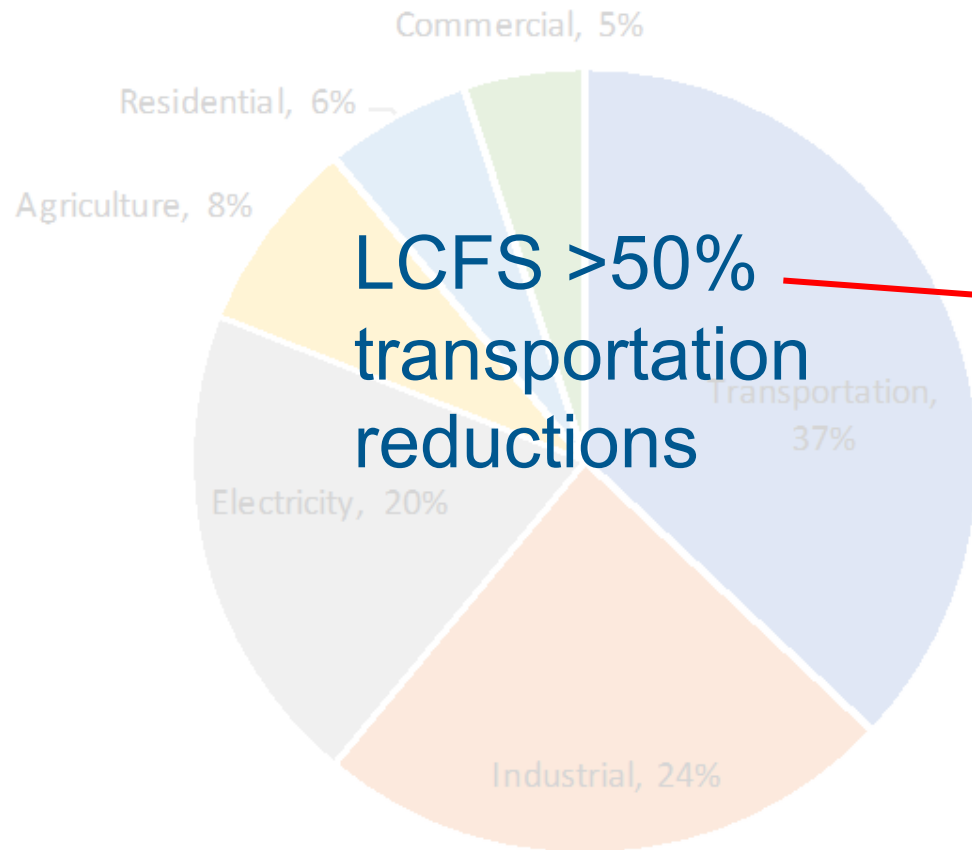
California 2014 Emissions By Sector



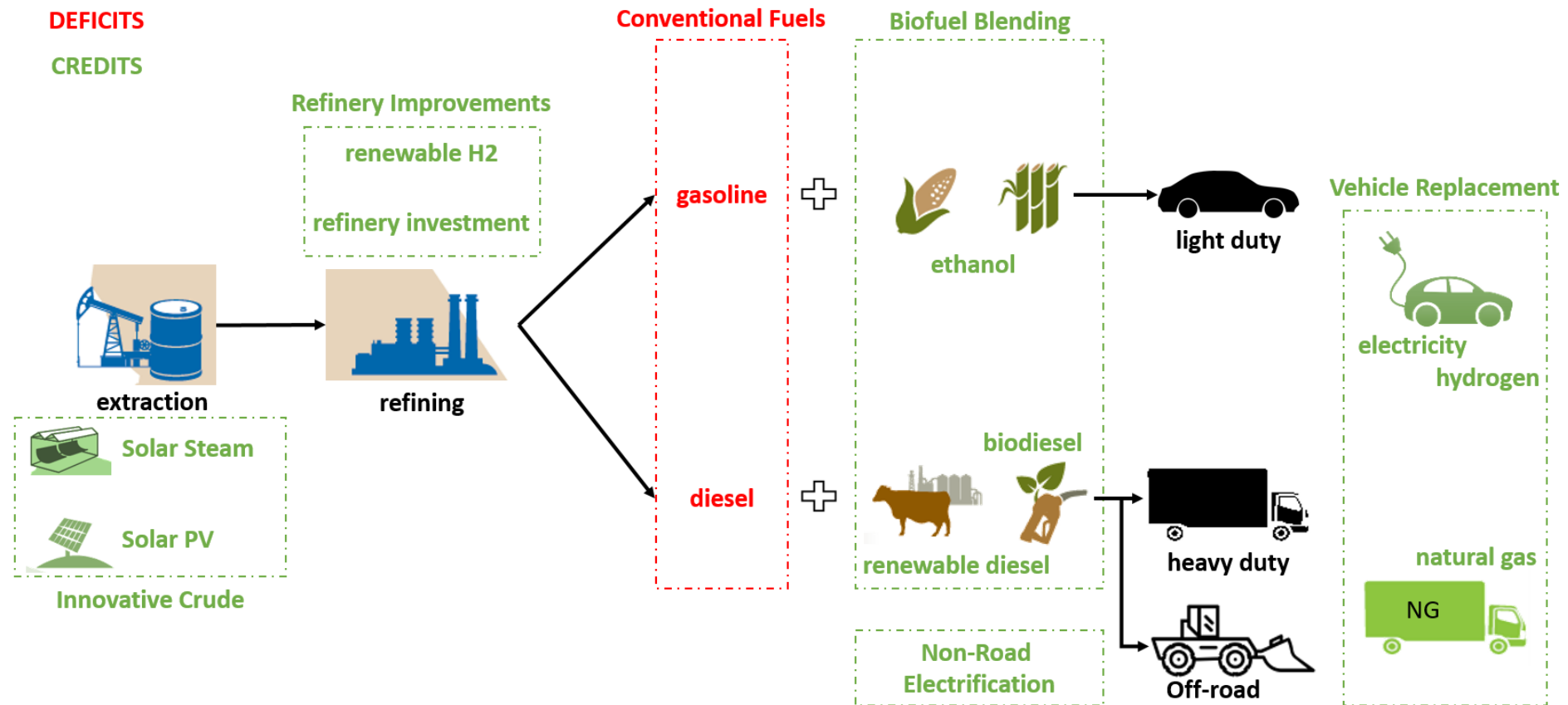
Energy Policy in California

2030 Scoping Plan

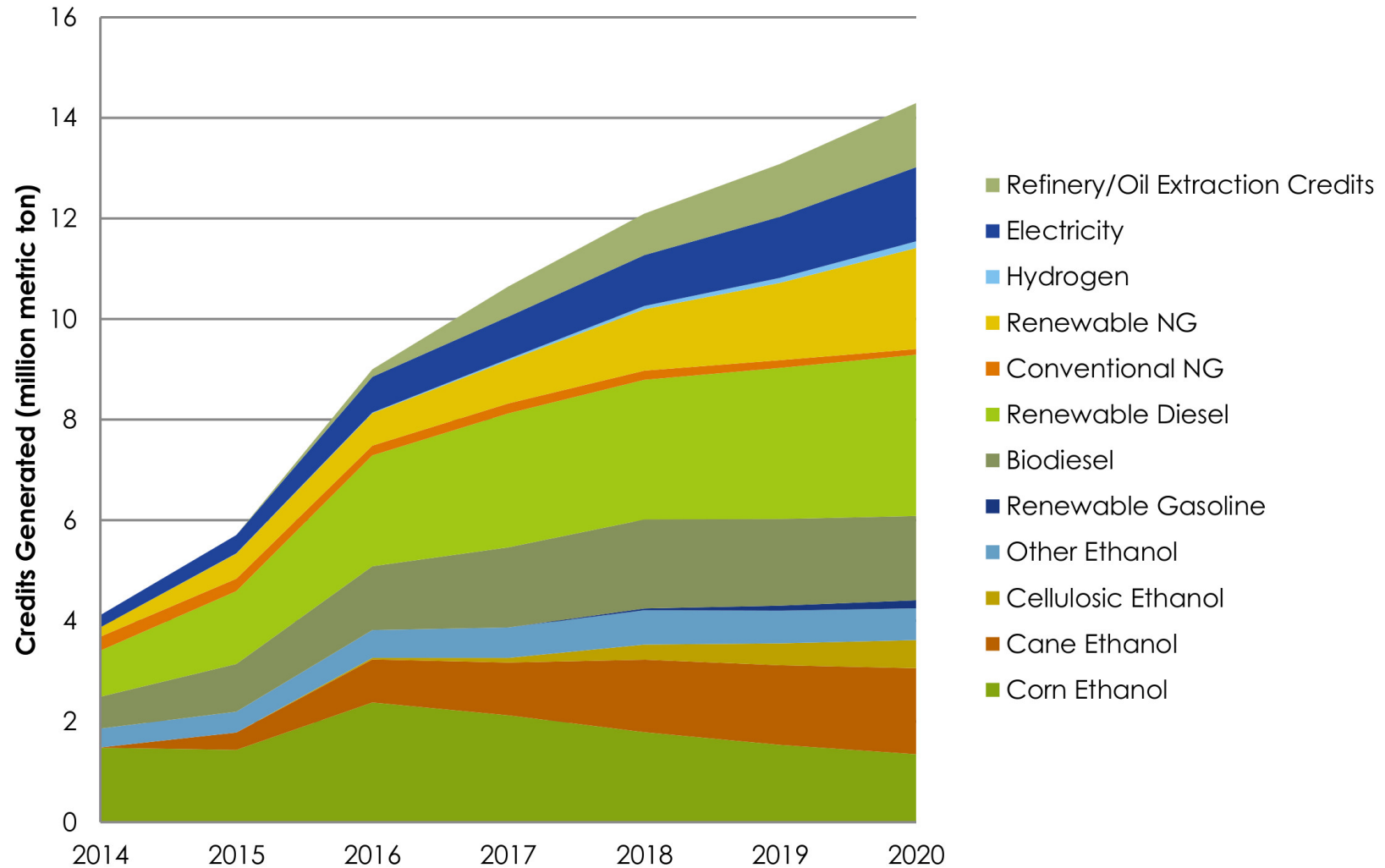
California 2014 Emissions By Sector



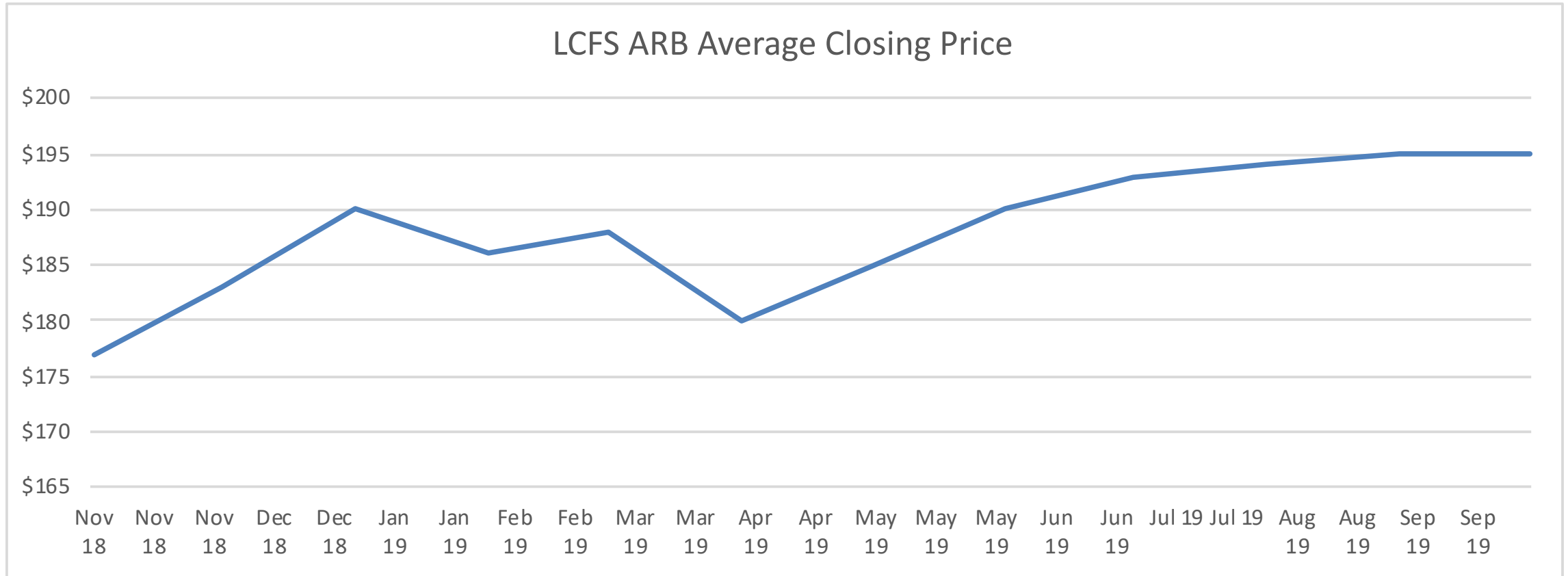
Solar Heat: Credits per ton avoided CO2



Multi-Million Ton CARB Forecast

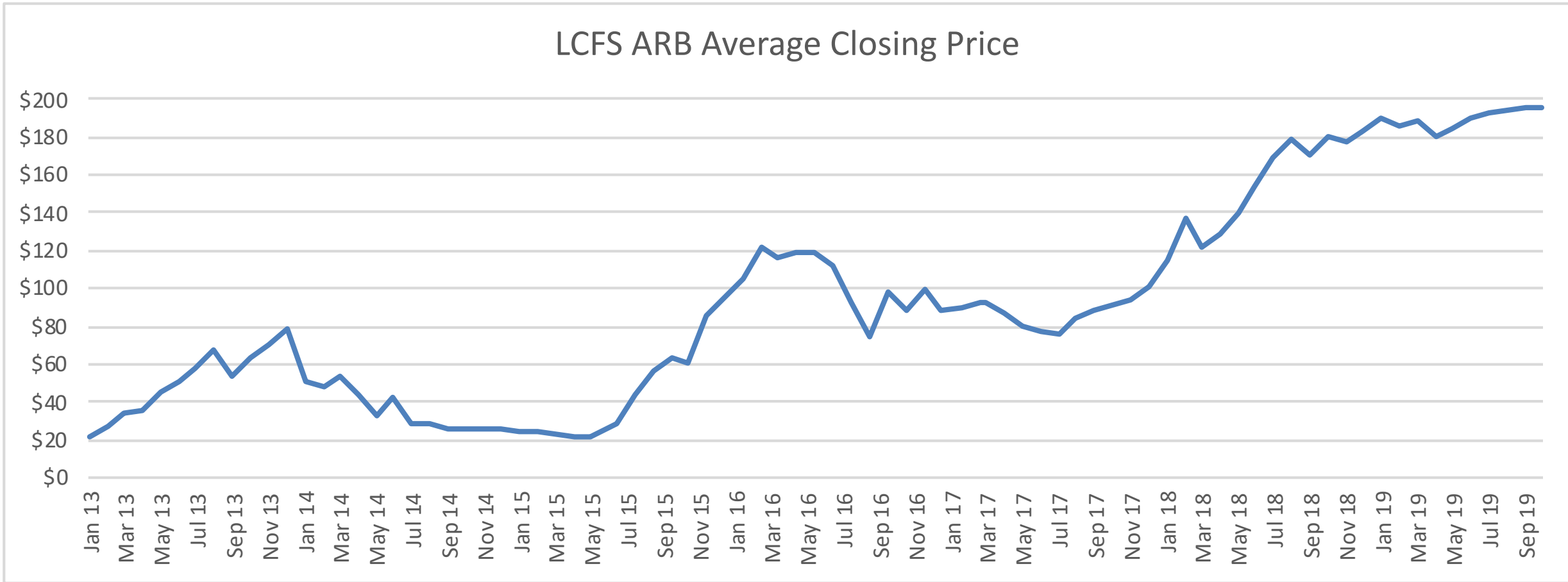


\$190/t, \$13/MMBTU, \$55/MWh



Recent History

LCFS ARB Average Closing Price



Challenges / Opportunities

- Unlike cap & trade, no “floor”, but hard “cap”
- Repeated regulation changes create concern re future changes
- Solar heat is all capex, very low opex
 - 20-year credit price and program stability are critical to investment
- No measures have been put in place to address these risks
 - Dairy digester projects have “contract for difference” in development
 - “Green bank” and other underwriting programs have been proposed



Fully Automatic Washing With Water Recovery

