



Getting to the Future: Infrastructure and the Energy Transition

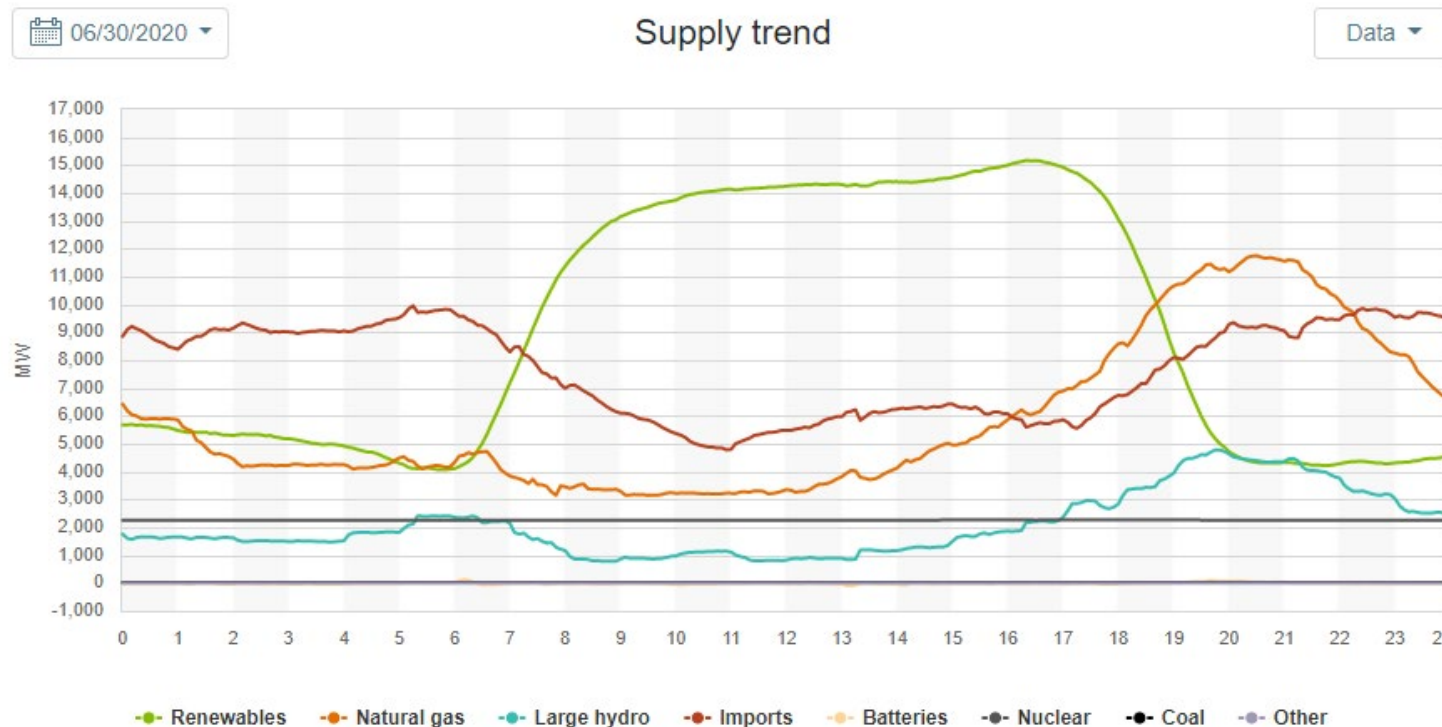
Jean Spencer and James McGarry



Gas: Future Goals vs. Present Needs

- California's goals require a transition away from fossil gas
- Can't get to the future without getting through the present
- Today, California's electric system depends on gas for reliability

Daily Ramp, CAISO 6/30/2020

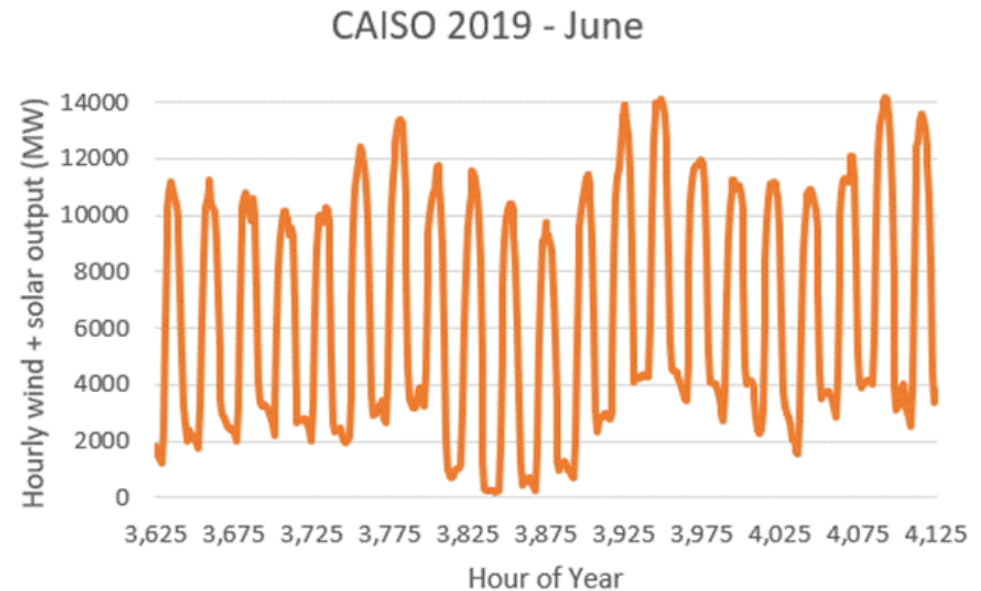
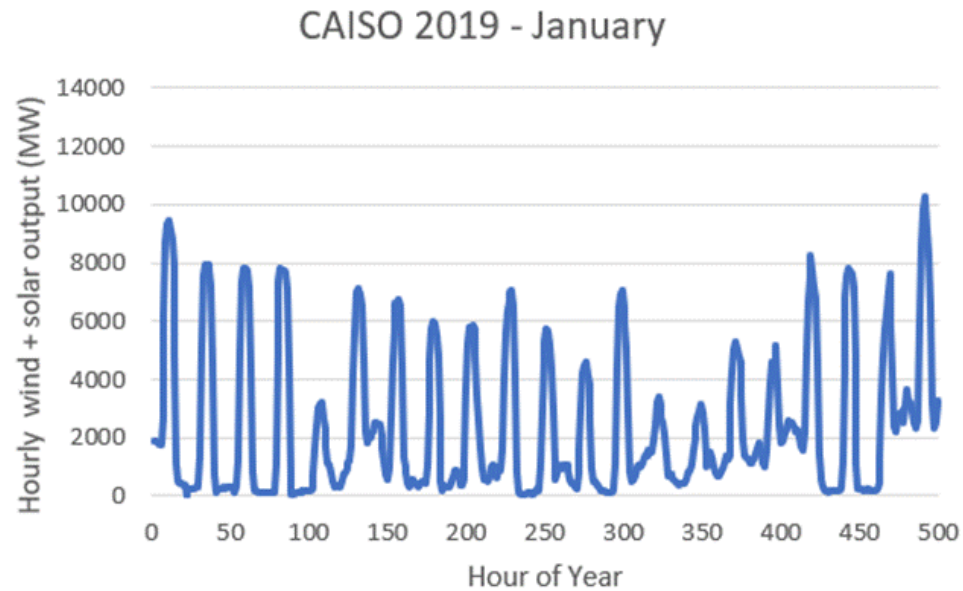


Average ramp of ~11 GW
from 5 to 8 PM



Gas: Future Goals vs. Present Needs

- Dunkelflaute refers to dark, windless periods in winter
- Low-solar, low-wind periods can last several days and occur at precisely the time when demand for residential heat is highest





Safe, Reliable Infrastructure + Just and Reasonable Rates

- The CPUC's mandate is to provide safe, reliable service at just and reasonable rates
- That means gas infrastructure must be maintained and kept affordable for as long as it is needed
- The state's gas infrastructure is old and in some cases in need of repair or replacement





Safe, Reliable Infrastructure + Just and Reasonable Rates

- Most high-pressure gas transmission pipelines were built ~50-70 years ago.
- Older pipelines are more likely to have problems:
 - 2010 PG&E San Bruno Pipeline Explosion (1956)
 - 2017 SoCalGas Line 235-2 Pipeline Explosion (1957)
- Aging pipelines: To act or not to act

2019 GRC Application (A.17-10,008)

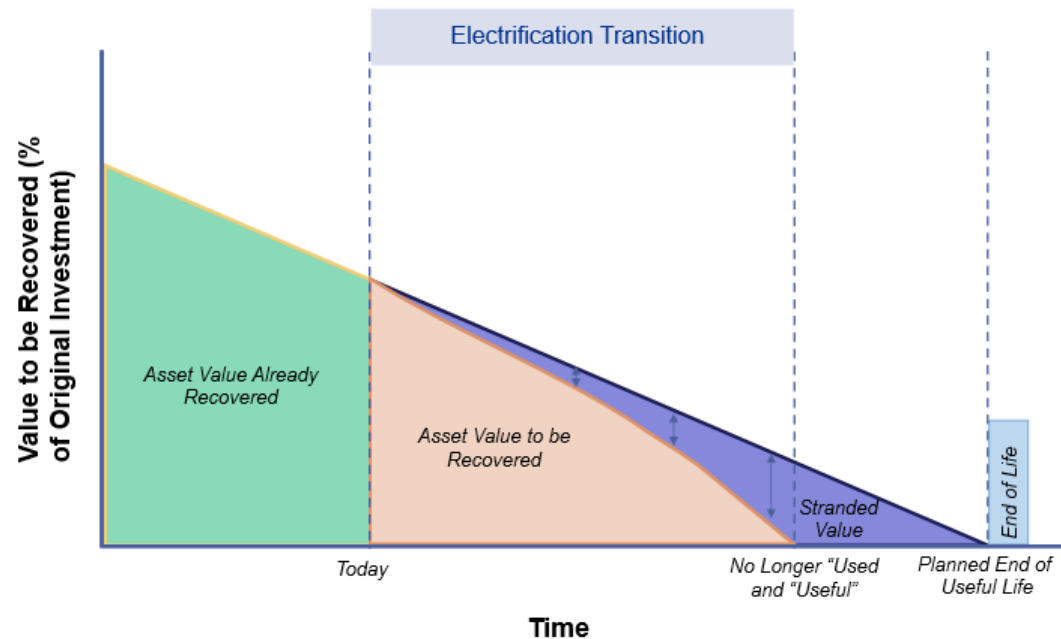
1011-P2-01	3-Project Development	1947
1030-P2-Hydro ^(R)	2-Preliminary Design	1955
225-P2A-North ^{(R)(S)}	2-Preliminary Design	1959
2000-E ^{(R)(T)}	2-Preliminary Design	1947
2000-P2-02 ^(T)		
2000 Chino Hills	3-Project Development	1947
2000 Blythe to Cactus City Hydrotest	2-Preliminary Design	1947
2000-E Cactus City Compressor Sta	2-Preliminary Design	1947
2001E-P2-Blythe to 1030 Hydro ^(R) (15)	2-Preliminary Design	1954
2001W-P2-Cactus To 1030 Hydro ^(R)	2-Prelimin Vintage year	1953
2001 West - C, D & E ^(T)		
2001WC-P2	4-Construction	1953
2001WC-CHLA-P2	3-Project Development	1947
2001W-D-P2	2-Preliminary Design	1950
2001W-D-BADL-P2	2-Preliminary Design	1950
2001 West - E	2-Preliminary Design	1953
2005-P2-Hydrotest ^{(R)(S)}	3-Project Development	1950
36-1032-P1B-11	2-Preliminary Design	1939
36-1032-P1B-12	3-Project Development	1943
36-1032-P1B-13	2-Preliminary Design	1928
36-1032-P1B-14	3-Project Development	1928



Safe, Reliable Infrastructure + Just and Reasonable Rates

- The need to spend ratepayer funds to maintain safe and reliable infrastructure must be balanced with the need to avoid stranded costs
- The CPUC has opened the Gas Long-Term Planning Rulemaking (R.20-01-007) to examine these and other gas transition issues

Overview of Stranded Value



Source: EDF: Managing the Transition



Transmission: Old but Necessary

- Overall gas demand: decreasing
- Summer peak demand: decreasing
- Winter peak demand: essentially flat between now and 2030
 - Less electricity available for import as neighboring states move away from coal and towards gas and renewables
- Gas infrastructure is designed to meet peak day demand
- Therefore, gas transmission infrastructure may need to be maintained at its current level



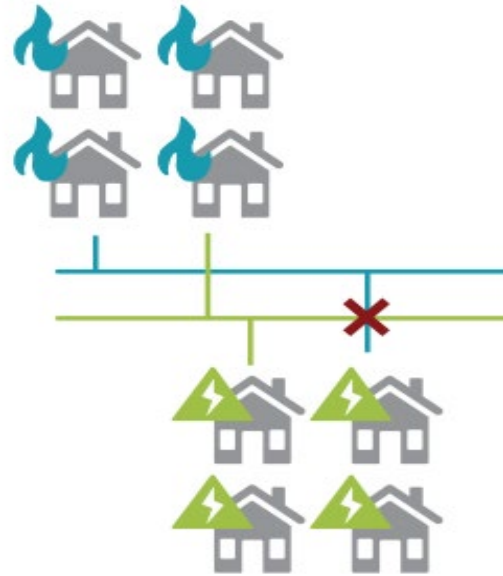
Prioritized Pruning

Source: E3

UNTARGETED ELECTRIFICATION (No retirements)



TARGETED ELECTRIFICATION (Targeted retirements)



 Mixed fuel house
(Natural gas and electric)

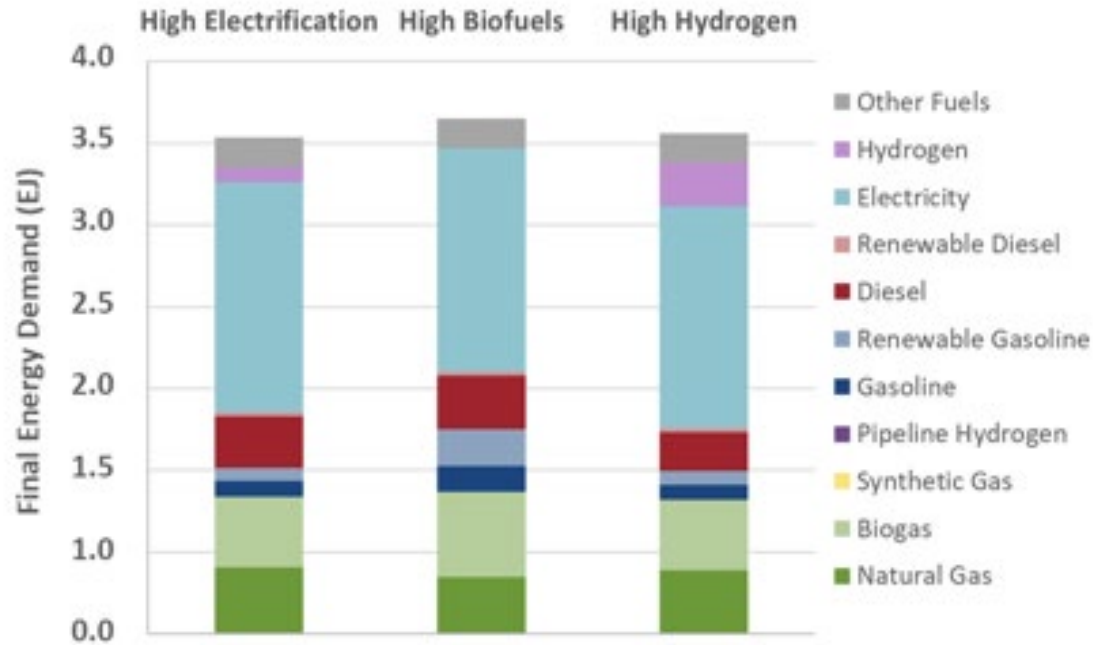
 All electric house

- Challenges to strategic electrification:
 - Obligation to serve
 - Jurisdictions with the most political will to electrify are not necessarily the places where old or problematic pipelines need to be replaced

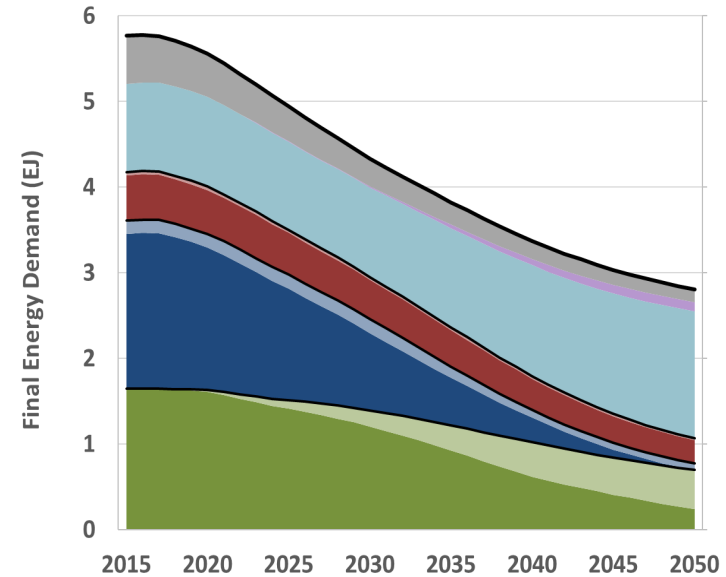


Final Energy Demand by Fuel, Statewide

2045 – Comparison Between Scenarios



High Electrification



- Demand for electricity, hydrogen and biofuels varies by scenario



Key Scenario Metrics in 2045

