



- The following presentation was prepared for the April 22, 2014 “Pricing Forum” initiated by, and hosted at the offices of, the California Independent System Operator. In this presentation, Calpine concludes that uplifts are detrimental to the efficient allocation of resources and capital, and will likely grow in scale as penetration of variable resources increases.
- This presentation addresses many of the topics contained in the Notice of Workshop and subsequent Supplemental Notice of Workshop in the Commission’s Price Formation proceeding in Docket No. AD14-14-000.
- At the September 8 Work Shop, comments made by Calpine Vice President of Market Design, Mark J. Smith, will be drawn in part from the following presentation, in addition to issues addressed in the “Staff Analysis of Uplift in RTO and ISO Markets.”



# Key Questions

- What is Uplift and Why Should We Care?
- Will Uplifts Grow Over Time?
- What Can We Do About Them?

# What is Uplift?

- Uplift is make-whole payments
- It's historically \$100MM annually
  - Strikingly, it is split evenly between DA/RUC and RT
  - Bid-Cost Recovery in CAISO-speak
- Dominantly from units at Pmin ("MLC")
  - MOC commitments
  - IFM / RUC / RTPD commitments
  - Multi-hour commitments
  - Resource constraints
- Not all uplift is bad, knowing the reason for the commitment is key
  - Transparency is important
  - Understanding uplift drivers allows for consideration of market changes

Figure 1.20 Monthly bid cost recovery payments

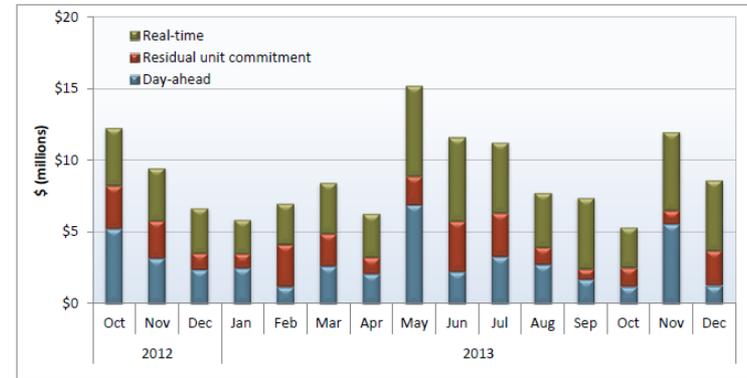
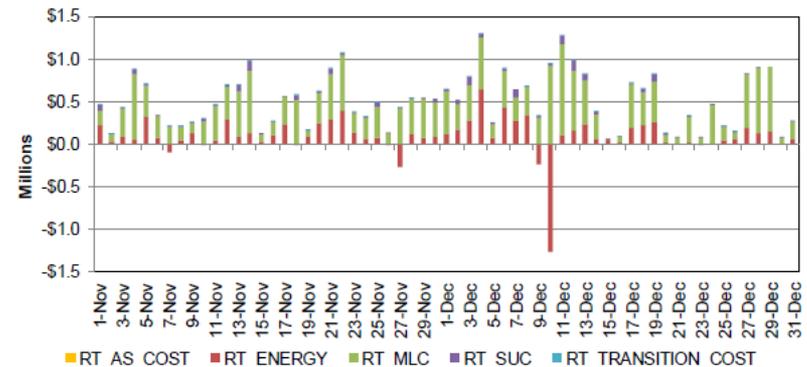
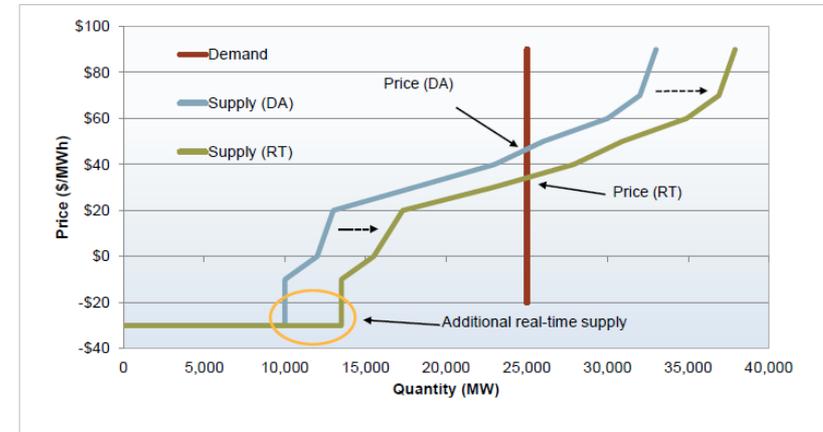


Figure 18: Bid Cost Recovery Allocation in RTD



# Why Should We Care?

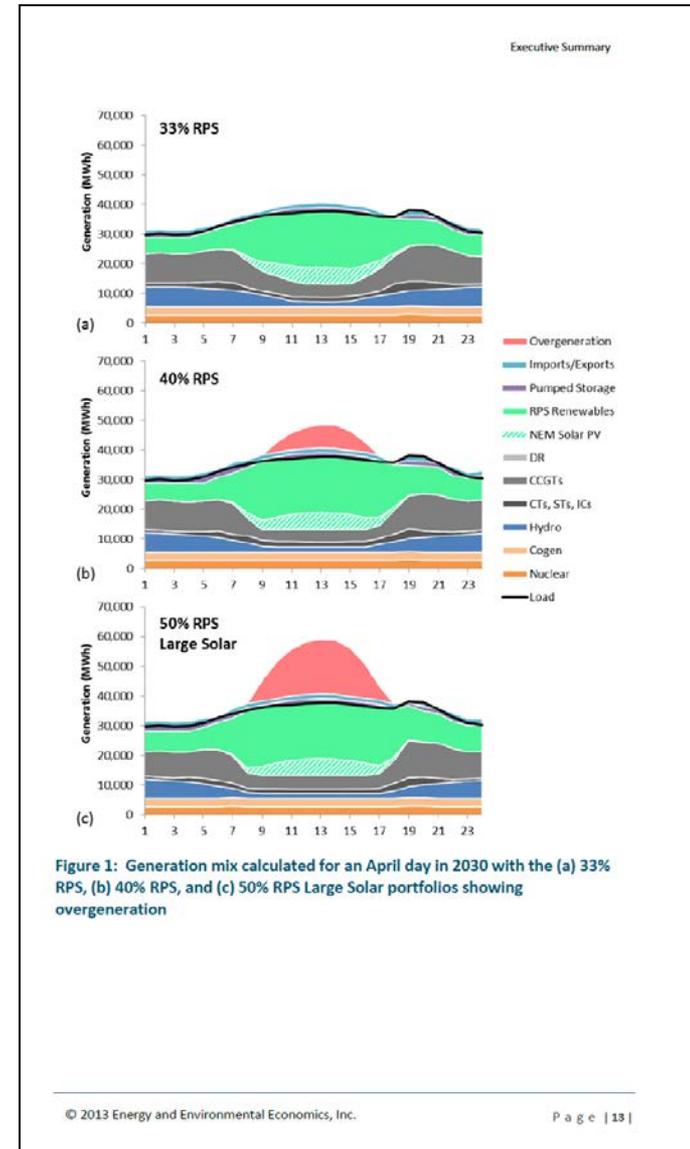
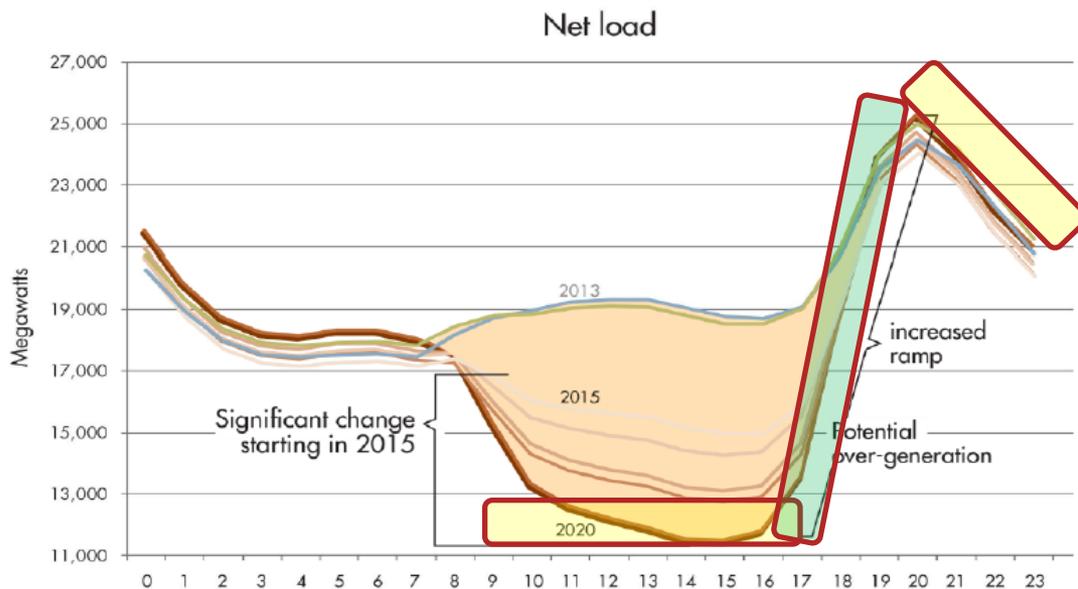
- Units at min load cannot set LMP
  - Supply curve shifts right (green curve)
  - LMPs are lowered
- Flexibility investments are discouraged
  - Auxiliary boilers
  - Steam turbine blankets
  - Attemperators
- DR and EE incentives are reduced
- Uplift costs cannot be hedged
  - Not part of LMP and not predictable
- Uplift allocations are controversial
  - Regional shifts / burdens
  - Current BCR allocation taxes virtual bids



**Bottom Line - Pricing constraints and thereby reducing uplifts allows proper resource and capital allocation decisions.**

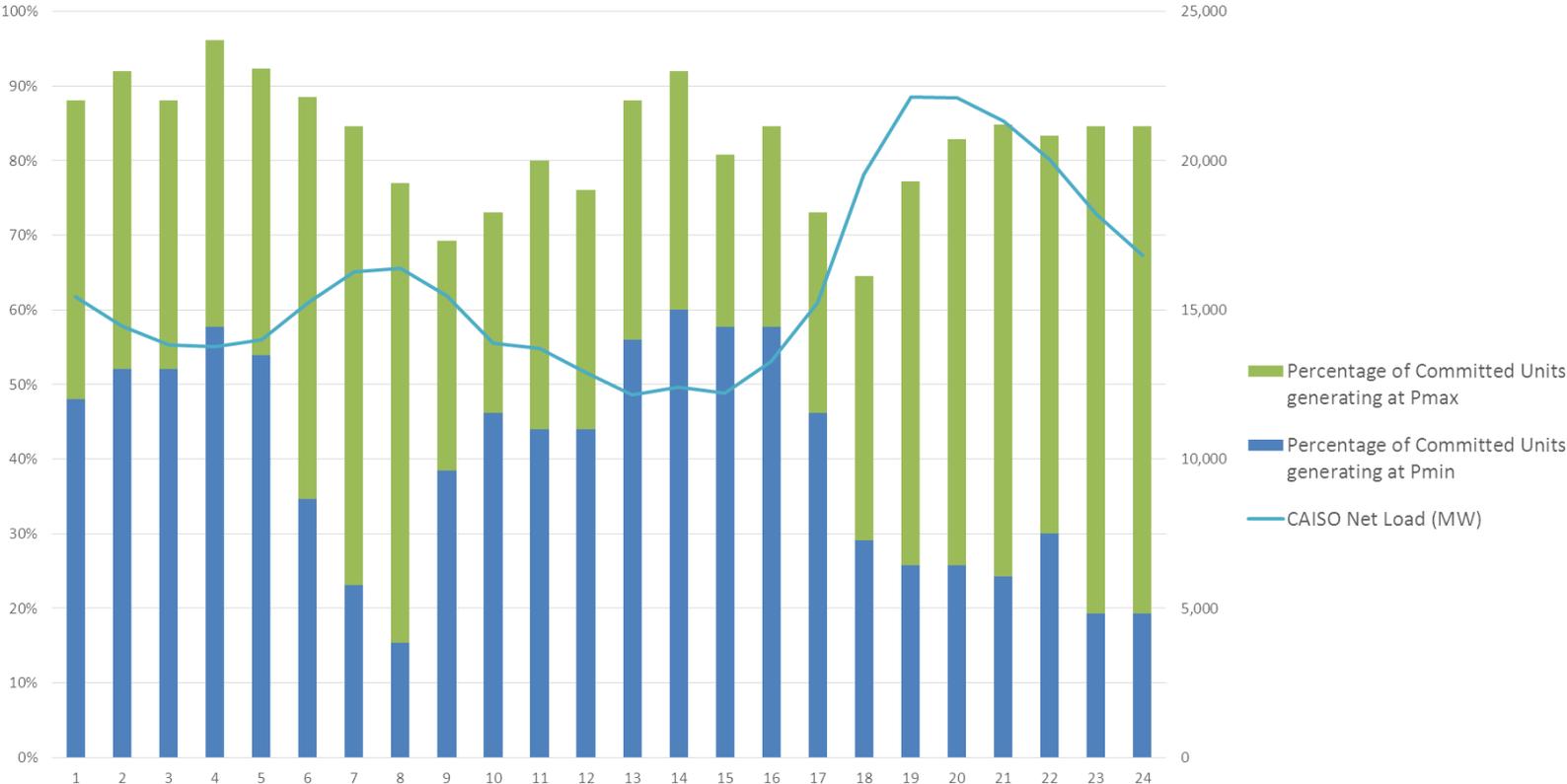
# Will Uplifts Grow Over Time?? Yes.

- CAISO penetration studies point to growing constraints
  - Units at min, max or transitioning cannot set LMP
  - Neck is a classic problem
  - Belly and beak issues will grow
- E3 Study extends the analysis up to 50 percent RPS
  - Significant overgeneration
  - All dispatchable units at min load 10 hours/day



# Over 80 percent of the Committed Gas-Fired Units Cannot Set LMP

## Units Unable to Set LMP on 5 March 2022 2012 LTPP -- 33 Percent RPS



Data Analysis by Energy Exemplar, LLC  
Does not include CCGT Transition constraints

# What Can We Do To Reduce Uplift?

1. Continue the development of reserves-like products
  - Uncompensated capacity constraints in an energy market lower LMPs
2. Make commitment drivers visible and price otherwise non-priced constraints
  - CAISO - Take appropriate actions to preserve reliability
  - Show us what you have done
  - Adjust market design to align prices and dispatch
3. Consider extensions of classic eLMP
  - Drivers and non-convexities need research

# Reserves-like Products Reduce Uplift

- Redouble efforts to implement FlexiRamp Up/Down Product
  - Biddable, co-optimized DA reserve product
  - Provides opportunity-cost payment to capacity held for ramping
  - Allows LMP adjustments to reflect ramping re-dispatch
  - Other benefits harmonize RTPD/RTD markets
- Finalize and implement Contingency Modeling reforms
  - Compensates capacity held for SOL (N-1-1) contingencies
  - Unique to WECC
  - Compensation proposal is similar to FlexiRamp
  - Solves and prices many MOC and ExD constraints
- Consider *expansion of nodal reserves concept*
  - All MOCs (transmission and stability) may be solved with nodal reserves
  - Compensation based on opportunity cost

# Preserve Reliability, Be Transparent, Price the Actions

- The CAISO must retain reliability
  - But unpriced constraints increase uplift and distort prices
    - Reconsider Frequently Mitigated Unit threshold/demand curve
    - Consider administrative prices when ExD, A/S conversion
    - Continue to drive DR into wholesale markets
- Considerations to improve transparency and pricing
  - MOC can only be properly demonstrated counterfactually
    - MOC affects unit commitment and LMPs
    - An in/out analysis should be performed to show the effects of large MOC commitment
    - The nodal reserves construct could price MOC commitments
  - RUC procurement algorithm and results must be visible
    - RUC is affecting the efficacy of virtual bidding and RT prices
    - RUC has expanded dramatically beyond the original intended purpose
    - RUC drivers could lead to reserves pricing or better allocations
  - RTPD/RTUC commitment magnitude is baffling
    - 50 percent of the uplift is related to 3 percent of the load
    - Disclosure of the drivers to RT commitments will help with pricing
      - Why are so many units committed in RT vs. DA?
      - What role does the FlexiRamp constraint play?

# Consider Extension to “Classic” eLMP

- Hybrids of eLMP have been developed to include uplifts into LMP
  - Creates locational price signals
  - Resolves thorny uplift allocations
  - Allows hedging
- Most hybrid applications target COGs where  $P_{min}=P_{max}$ 
  - COGs are not evident in CA
  - Units at  $P_{max}$ ,  $P_{min}$  and in Transitions will be the issues here
  - Need review and analysis of anticipated frequency and drivers
  - These constraints may or may not represent similar non-convexities
- Conceptually, uplifts could be reallocated within the run cycle
  - Min Load uplifts could be included into ramp LMPs
  - Avoid uplift inclusion when generation is not needed (belly)
- Engage / perform a conceptual review
  - Assess academic theory in light of CAISO uplift
  - Propose range of possible mechanisms
  - Propose reasonable set of alternative pricing solutions

