



SMUD 2019 IRP Discussion

October 16, 2019

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Vote Solar

Some General Observations on IRP (1)

- Resource planning is now all about optimal capacity allocation rather than optimal generator dispatch
- SMUD and other California load serving entities will be making major changes to the energy supply mix over the next 20 years in response to SB 100
- The bulk of new sources of generation in California and throughout the Western Interconnect (WECC) will be as-available variable output generation (wind and solar)
- Flexible demand (load shifting) is crucial for the cost-effective integration of more variable output renewable energy
- SMUD enjoys a substantial amount of goodwill with customers that can be used to promote flexible demand
- Electrification of transportation and buildings will create more opportunities for flexible demand

Some General Observations on IRP (2)

- Distributed energy resources (DERs) need to be integrated into the integrated resource planning process
- Optimization of the development and operation of DERs will require a more granular grid needs assessment process (distribution planning and budgeting)
- DERs need to be analyzed as packages of resources that can be co-optimized to avoid distribution investments and provide grid services
- There is a big opportunity to co-optimize DERs in new homes and commercial buildings (promote local solar and storage)
- Integrated resource planning should engage disadvantaged communities and identify opportunities for community participation
- Disadvantaged community focus should include both the development of new shared community resources as well as the reduction of existing sources of air pollution

Some Specific Recommendations to SMUD

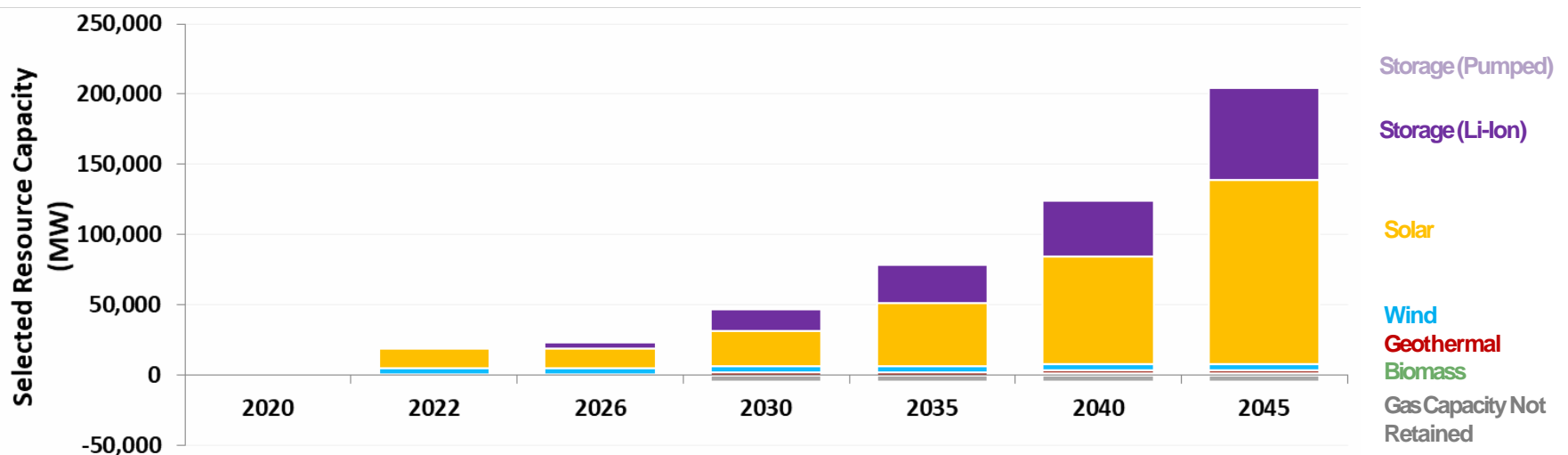
- SMUD's IRP needs to look out over a long-term time horizon to create a low-cost pathway to reducing GHG emissions with a goal of achieving zero carbon emissions in the electric sector by no later than 2045
- SMUD needs to analyze the impact of longer-term decarbonization goals in other sectors of the economy to inform policies like community solar implementation, rate design and near-term procurement.
- SMUD should implement grid modernization technologies (e.g. Advanced Distribution Management Systems) to accommodate the rapid growth of DERs and promote flexible demand
- SMUD should seek out opportunities to collaborate with other load serving entities including other municipal utilities and community choice aggregation agencies in meeting system, local and flexible resource adequacy needs
- SMUD should learn from its experience in the CAISO Energy Imbalance Market on how participation in regional energy markets can help meet SMUD's decarbonization goals while maintaining reliability and controlling costs

Key Takeaways from the CPUC SB 100 Framing Study

- Looking beyond 2030 helps to inform near-term thermal power plant retention decisions
- Resource build under a more ambitious 2030 GHG reduction target (30 MMT statewide) is more in line with 2045 scenarios to meet SB 100 requirements
- All 2045 framing study scenarios rely heavily on solar and batteries to meet load and GHG policy requirements
- Availability of out of state or offshore wind displaces in-state solar and batteries and may lower costs. Resource diversity lowers the cost of meeting long-run GHG goals
- The GHG targets used in PATHWAYS (E3 model) assume maximum achievement in other sectors of the economy but it is not clear to what extent these other sectors will achieve

Resource Build: High Electrification Scenario

- Resources in chart are selected by RESOLVE and are in addition to baseline resources
- RESOLVE does not retain some thermal resources starting in 2030



- Solar and batteries dominate
 - Li-Ion batteries have 6-8 hours of duration from 2030 on (through 2045)
- Approximately 450 MW of long duration (12-hr) pumped storage is selected in 2026
- Wind:
 - Maximum resource potential built for onshore wind. Only in-state wind allowed in base case.
 - The option to build offshore wind is allowed in a 2045 sensitivity.
- Biomass and geothermal provide resource diversity but are a small portion of the portfolio