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**VCE Community Advisory Committee Meeting
June 24, 2021 via video/teleconference**

Item 7 – Renewable Technologies (front of the meter)



Public Comments

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Item 7 – Renewable Technology Discussion

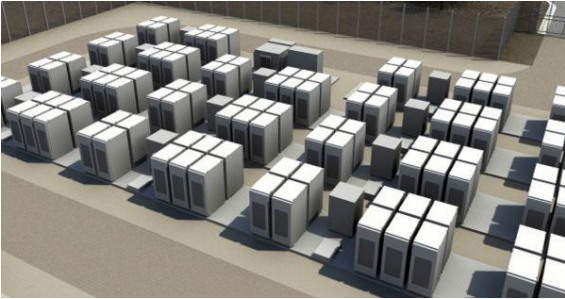
- As staff, the CAC Carbon Neutral task group, and consultant move forward with a study in the second half of 2021, hearing views from the CAC of several of the primary front-of-the meter (FOM) utility scale resources would help inform the study¹
- The technologies presented are those that are proven and primarily used today²



- 1) Behind the meter (BTM) resources will also play a role in the portfolio and will be discussed at a later date.
- 2) As other technologies mature, VCE will assess their fit in the portfolio.

Item 7 – Renewable Technology Discussion

- **Front of-the-meter (FOM) or utility-scale resources**



Examples of FOM installations:

- **Photovoltaic (PV); pairing with battery energy storage system (BESS)**
- **Wind (excl. off-shore)**
- **Geothermal**
- **Biomass**
- **Energy storage**

Item 7 – Renewable Technology Discussion

Photovoltaic

- High upfront investment but low on-going maintenance costs
- Intermittent resource, substantial land footprint
- Fixed systems are angled for optimum production, while single-axis tracking (SAT) systems rotate to follow the sun from east to west. SAT energy output is approximately 25% more than a fixed system.
 - SAT systems increase the value of the energy delivered, as a portion of that additional output is in the late-afternoon hours when load is at its peak
 - SAT price typically > Fixed systems (most of the time this additional cost is worth it because of the improved output)



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Photovoltaic with storage (PVS)

- PV systems can be directly paired with energy storage systems such as batteries to increase dispatchability and dependable capacity to the grid.
- Greater efficiencies are possible with paired systems than with separate PV and storage systems.
- Charging the batteries exclusively with solar energy for the first five years enables them to receive the same Investment Tax Credit (ITC) as solar generation
- Typical systems are priced with an energy component (\$/MWh) + a capacity payment (\$/Kw-mo)

Item 7 – Renewable Technology Discussion

Wind

- Like other renewable energy resources, the primary challenge of wind energy is its variable generation
- However, energy storage projects can allow this technology to integrate into the portfolio
- The typical profile of certain regions may align nicely with VCE's load shape and compliment the profile of the PV systems that VCE has contracted with
- High upfront investment but low operating costs
- May result in deaths of bats and birds¹
- Contracts are typically “must-take” \$/MWh



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Geothermal

- Geothermal energy provides carbon-free baseload power
- Reliable and predictable source of energy
- Small land footprint
- Nearby counties have existing geothermal resources
- New geothermal construction is very costly and tends to be more expensive than other renewable alternatives

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Biomass¹

- Although biomass facilities utilize a combustion process that emits CO₂, they are widely considered “carbon neutral”
- Biomass fuels are primarily wood or wood byproducts. However, they can include dried municipal solid wastes, feedlot and dairy manure, crop wastes and sewage digester sludge
- The majority of biomass electricity is generated today using a steam cycle where the biomass is burned in a boiler to produce steam
- Most biomass facilities are considered “baseload”
- Costs are greatly impacted by the transportation cost of the fuel to the facility



1) Biofuel energy can consist of fuel sources such as ethanol, biodiesel, biomass, wood chips, municipal waste, among others.

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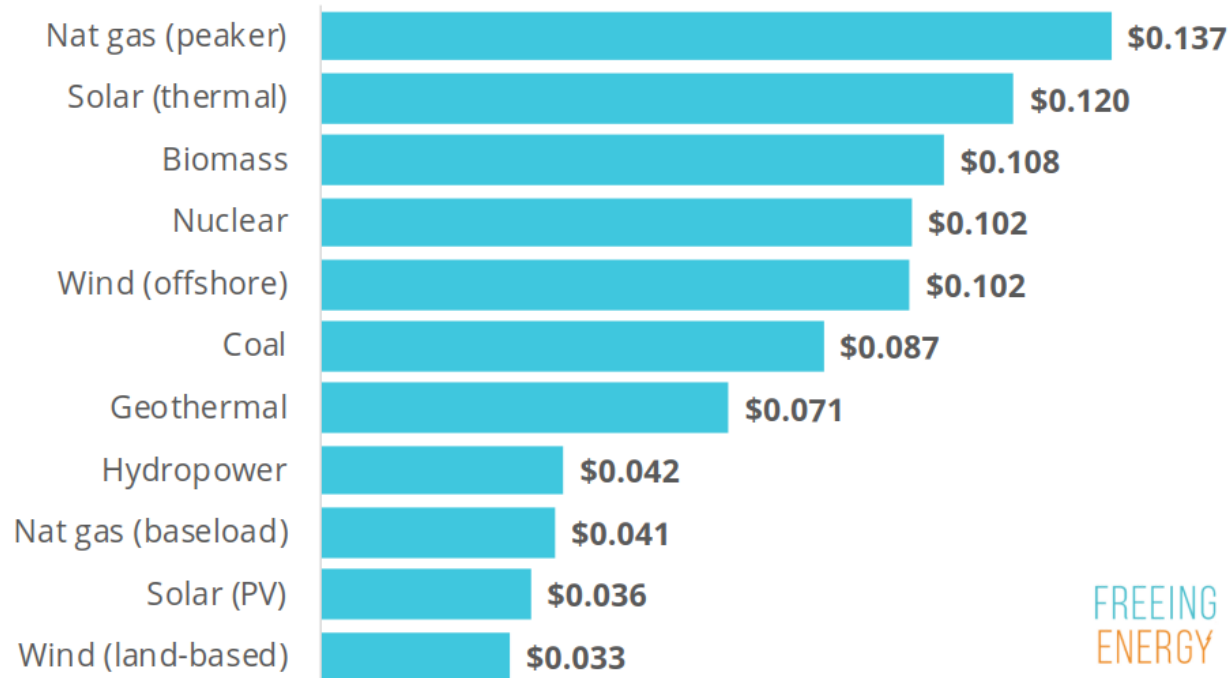
Energy storage

- Critical technology to completely achieving a clean energy future
- Increases the value of renewable resources while improving grid reliability and stability
- Small land footprint, and potential future investment tax credit (ITC) legislation
- Storage addresses the PV versus demand misalignment by harvesting the solar energy that is produced during midday hours and then dispatching it in the evening during peak customer demand
- Many types of energy storage that are at different stages of maturity, have different use cases, and significantly different cost projections:
 - Batteries (Lithium-ion, flow, molten salt, lead-acid, zinc-air)
 - Compressed-air energy storage (CAES)
 - Pumped Storage
 - Flywheels
 - Concrete gravitational potential energy storage

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Cost of building electric power plants

(levelized cost of electricity (LCOE) in US dollars per kilowatt hour)



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Calculated by Freeing Energy from sources including EIA, NREL, LBL, GTM/MacWood, Lazard, BNEF \ <http://fep.link/g108>

1) Data as of May 2020



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Item 8 – Update on Net Energy Metering (NEM) 3.0



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Item 8 – Update on Net Energy Metering (NEM)

3.0 Proceeding

- NEM in California began in 1995
 - Several revisions since
- Currently most customers are NEM 2.0
 - Differences from NEM 1.0: TOU rates; NBCs paid
- Proceeding is in process
 - Expectation is a decision from CPUC by end of 2021
- Many stakeholders engaged in the proceeding
 - AB 1139 (bill is “dead”)
 - IOUs and Solar Advocates

Item X – Update on Net Energy Metering (NEM) 3.0 Proceeding

- Key issues to be considered by CPUC:
 - Potential cost shift from NEM to non-NEM customers
 - Compensation for surplus generation; how this affects solar's value proposition and solar industry
 - Equitable access to RE for low-income customers
- Additional Considerations to track (how these values are incorporated into NEM 3.0):
 - Avoided grid costs from NEM customers
 - GHG emissions reductions
 - Contributions to RPS goals
 - T&D efficiencies



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