"WATERFALL" VALUE PROPOSITION OF LARGE-SCALE SOLAR POWER TECHNOLOGIES IN CALIFORNIA

Summary

May 2009

Report Background

This report emphasizes the strengths of large scale solar power technologies in terms of avoided fossil fuel use and avoided combustion-related air emissions, protection from fossil fuel price volatility, and job creation. Such benefits will help achieve the state's air quality and climate goals, economy, and the health of all Californians.

This analysis examines the benefits that investment in large-scale solar power (LSSP) technologies can provide to California today in the context of their displacement of natural gas-fired peakers and combined cycle plants.

The results of the analysis do not include or reflect solar technology costs or power purchase agreement costs. Rather, this report demonstrates the stand-alone value of the benefits provided by utility-scale solar projects based on valuation of attributes.

This report characterizes both thermal electric and photovoltaic systems as a single group called Large-Scale Solar Power ("LSSP"), and includes six different technologies in the analysis.

Thermal Electric Systems: Parabolic trough systems, dish/engine systems, solar power tower systems, and compact linear Fresnel systems

Photovoltaic (PV) Systems: Concentrating PV systems and large-scale (non-concentrating) PV systems

All values are expressed in terms of cents/kWh of LSSP electricity generated.

Methodology and Results

When displacing a natural gas-fired peaker, the benefits of LSSP in California range from 13.9-32.7 cents/kWh for LSSP systems. When displacing a natural gas combined cycle plant, the value ranges from 9.4-22.9 cents/kWh.

2020 Installed Capacity

The projected 2020 California LSSP installed capacity used in this analysis is approximately 10,000 MW. This is equal to 15-20% of the screened potential identified by the California Renewable Energy Transmission Initiative.

Thermal Electric Storage (TES)

LSSP systems without TES are largely a peaking resource, but the peak generation often occurs several hours before California's mid-afternoon peak demand period. TES may either extend the range of operating hours and operate as an intermediate load generation resource or rely on TES to enhance peak period availability.

Avoided Generation Fuel-Related Costs

LSSP technologies rely solely on sunlight to generate electricity (with the potential for TES to make the solar-generated electricity dispatchable for limited periods). Therefore, all of the fuel required by the avoided central station generator is avoided due by LSSP systems.

Natural gas futures prices are notoriously volatile. Since solar energy as a fuel source is cost-free, LSSP systems provide a natural hedge that allows customers to avoid natural gas price volatility for all electricity generated by those LSSP installations.

The annual value to Californians of the natural gas savings attributed to LSSP would range from $0.7-$6.3 billion in 2020.

Net Job Creation Potential

LSSP systems have local and statewide economic developmental benefits because long-term fuel costs associated with conventional electricity generation (*e.g.*, natural gas) are replaced with operations and maintenance costs (*i.e.*, labor). Much of the money that would otherwise be spent on monthly fuel costs is instead spent on LSSP-related salaries. LSSP systems can create three types of jobs: operations and maintenance; construction; and manufacturing.

The job creation values calculated in this analysis reflect the *net* jobs, meaning that the analysis does consider jobs assumed to be lost against the natural gas peaker and combined cycle plant.

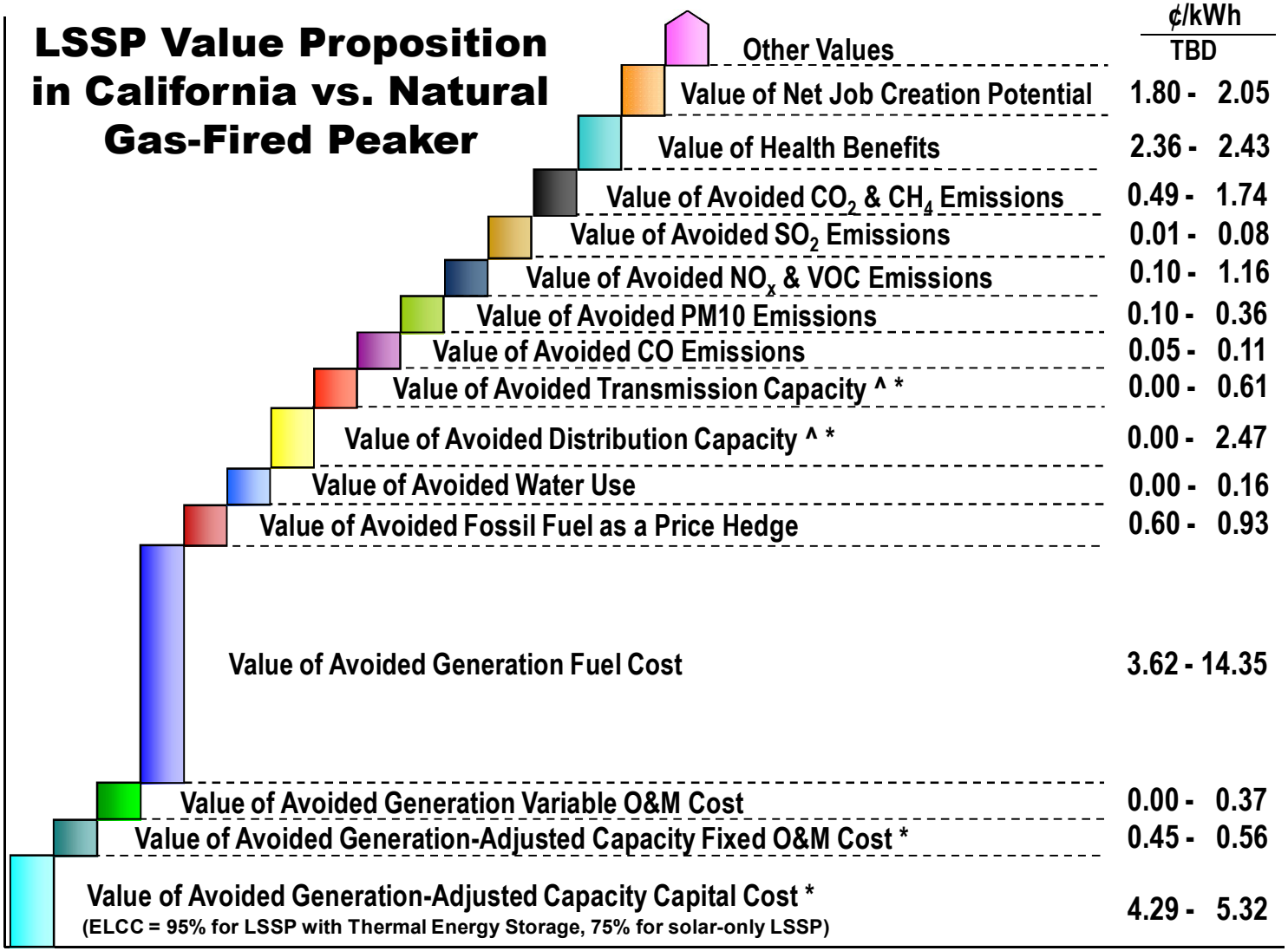
Avoided Emissions and Related Health Benefits

LSSP technologies have no generation-related emissions. Therefore, all of the CO_2, CH_4, NO_X, SO_2, VOC, and PM emissions from the avoided generating units are avoided. These avoided emissions will create enormous health and air quality benefits throughout California.

A significant build-out of LSSP to 10,000 MW by 2020 will contribute 12 to 16 million metric tons of CO_2 emissions reductions, which will significantly help the state's electricity sector achieve California's 2020 greenhouse gas reduction goals.

Conclusion: The Waterfall Analysis suggests that the deployment of a diverse array of LSSP technologies will maximize the economic, environmental and health-related benefits to the state through the displacement of natural gas generation. It argues for a thoughtful build-out of solar technologies to achieve California's myriad goals.

LSSP Value Proposition in California vs. Natural Gas-Fired Peaker



^ Location Dependent
* Impacted by Storage

TOTAL LSSP VALUE PROPOSITION: 13.9 – 32.7¢/kWh

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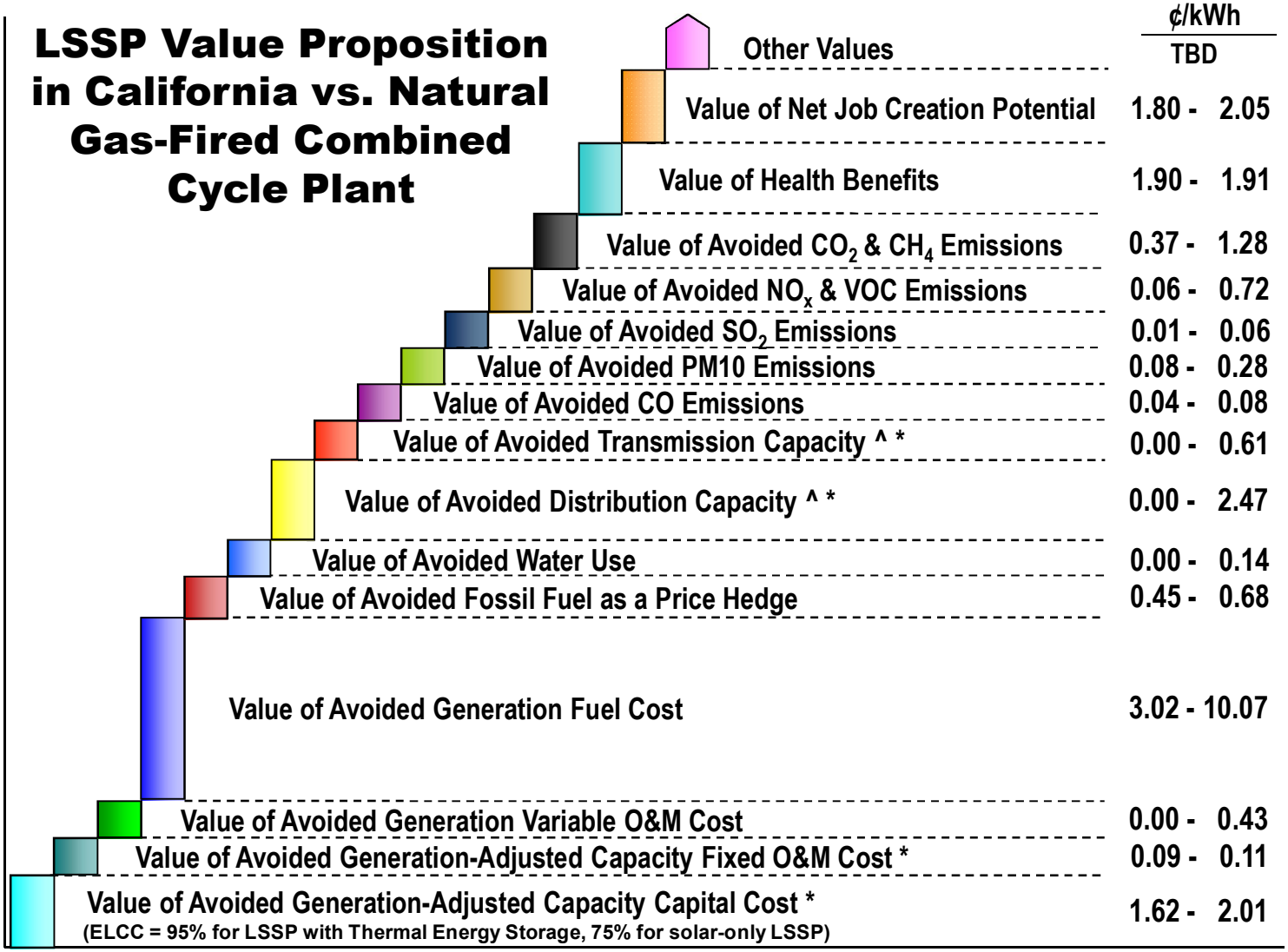
LSSP Value Proposition in California vs. Natural Gas-Fired Combined Cycle Plant



^ Location Dependent
* Impacted by Storage

TOTAL LSSP VALUE PROPOSITION: 9.4 – 22.9¢/kWh

4/21/2009 EF R7