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Release Date: July 7, 2010

Economic Benefits of a Comprehensive Feed-In Tariff:
An Analysis of the REESA in California
Executive Summary

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In this analysis we estimate that the Feed-In Tariff (FIT) enacted by the Renewable Energy and Economic Stimulus Act (REESA) will have a range of economic benefits to the state of California over the next decade versus a "business-as-usual" scenario of renewable energy supply. We find that the Feed-In Tariff will:

- Create three times the number of jobs from 2011-2020. This equates to generating about 280,000 additional direct job-years or 28,000 job-years on average per year from 2011-2020 with an additional 27,000 indirect and induced jobs per year. More jobs are generated in the first part of the decade than in later years.
- Increase direct state revenues by an estimated $1.7 billion from sales tax, use tax, and income taxes over the next decade and estimated induced revenues of about $600 million from increased employee compensation and the impact of FIT program costs. This does not include any savings to the state in avoided unemployment benefits.
- Stimulate up to $50 billion in total new investment in the state which in turn is eligible for up to $15 billion in Federal tax benefits for project developers.

As a result the REESA FIT provides a highly cost-effective avenue to assist in the state's efforts to achieve the 33% Renewable Portfolio Standard (RPS) target by 2020.

Background

The REESA is a legislative proposal for California that institutes a statewide Feed-In Tariff (FIT), or a pre-specified electricity price paid to mid-sized clean energy distributed generation installations (1-20 MW) with rates set commensurate with the projected cost of generation. Well-designed FIT programs are acknowledged to be the lowest cost way to reduce greenhouse emissions (GHG) in the power sector and have successfully promoted clean energy investment, wide spread industrial development and higher employment[1].

FIT programs "level the playing field" for developers, since the FIT price is specified for years while the streamlined development process further reduces barriers and costs. Furthermore, the REESA fills a gap in the current regulatory structure with the California Solar Initiative (CSI) and Small Generator Incentive Program

[1] LABC 2010, Designing An Effective Feed-In Tariff For Greater Los Angeles, Los Angeles Business Council and UCLA Luskin Center, 2010.

(SGIP) covering smaller installations up to 1MW, and the existing RPS program targeted at larger installations greater than 20 MW. At present the state's RPS will fall well short of the 20% target for 2010. To energize the clean energy market, and meet the next goal of 33%-by-2020, wholesale distributed generation (WDG) offers an excellent mechanism to build a cost-effective job-generating market because it can be implemented rapidly and builds market certainty.

The proposed FIT will stimulate very significant in-state investment in WDG. Significantly more jobs and greater tax revenues are projected than a business-as-usual renewable energy supply case since in the WDG case, virtually all economic activity (production and distribution of energy) remains in the state.

FIT economic modeling

Employment is determined by an output-based model including incremental costs to ratepayers, and revenue is estimated based on the investment requirements relative to a business-as-usual case of renewable energy supply assuming a 33% RPS target in 2020. The FIT build out assumes all additional renewable resources required for a 33% RPS are provided by distributed solar PV. The business-as-usual reference case is the California Air Resources Board (CARB) 33% scenario based on increased generation by geothermal, solar thermal and wind technologies[2].

In reaching these conclusions, we considered two cases based on work at the CARB: a low load case and a high load case that differ based on the amount of Combined Heat and Power (CHP) and energy efficiency implemented by 2020. The FIT rate starts at $0.16 / kWh in 2011 and decrements to $0.10 / kWh in 2020, based on a National Renewable Energy Lab (NREL) cost model for solar PV. The avoided cost is taken as the Market Price Referent (MPR)[3] as defined by the CPUC with Time-of-Day (TOD) adjustments for peak solar PV power output. Installed costs for renewable energy sources are taken from 2009 California Energy Commission (CEC) estimates[4], the NREL-Solar Advisor Model[5], and market estimates.

Employment

For each scenario, the annual production supplied by each source is projected and employment in job-years associated from each source for each year is calculated based on a recent clean energy employment study from the University of California (http://rael.berkeley.edu/greenjobs). Employment multipliers include two types of direct jobs: "deployment" jobs in construction, installation and manufacturing, and "ongoing" jobs in operations, maintenance, and fuel purchase if applicable. Summing up all job-years over the ten-year period yields the total number of job-years for each scenario. The FIT case is then compared to the reference 33% case.

The overall employment number is taken as the average of the two cases (low load and high load). The solar PV based FIT scenario employment benefits from three key factors: (1) high employment multiplier per GWh electricity produced; (2) sharply decreasing FIT rates reflecting rapid technological progress and industry learning; and (3) more in-state jobs since virtually all solar PV is deployed in state.

Additional direct job-years vary from an estimated 22,000 - 25,000 per year on average for the low load case to 30,000 - 34,000 per year on average for the high load case. This represents an average of 2-3 times more jobs

[2] CARB hearing, Sacramento, California, April 5, 2010.
[3] E3 MPR 2009 estimates can be found at http://www.ethree.com/MPR.html.
[4] http://www.energy.ca.gov/2009publications/CEC-200-2009-017/CEC-200-2009-017-SD.PDF
[5] NREL-SAM 2010. Solar Advisor Model at https://www.nrel.gov/analysis/sam/

per year than the reference case for the low load case and 2.5 to 3.5 times more jobs per year than the reference case for the high load case. The total average additional employment is about 28,000 jobs per year.

Induced and indirect jobs are taken as a unity multiplier of direct jobs based on job estimates from a number of references[6]. Indirect jobs associated with "supply chain" employment will depend on where supply parts are manufactured i.e. are they produced in state or imported from out of state. Induced jobs are estimated from the impact of higher electricity rates. The annual net cost of an aggressive PV implementation is compared to the avoided costs of a reference combined cycle gas turbine (CCGT) plant, the base technology for market price referent (MPR) calculations by the CPUC. Annual net costs are translated to loss in consumer disposable income since we assume annual net costs translate directly into electricity rates. In the low load case, there are about 4,900 fewer induced jobs in the ten-year period; for the high load case, there are about 6,400 fewer induced jobs. Costs are taken after federal incentives. (Federal Production Tax Credit (PTC) and Investment Tax Credit (ITC) are assumed to continue at current level beyond their expiration dates in 2013 and 2016, respectively.)

Including indirect and induced jobs and including the induced job loss, we arrive at the following employment numbers: 42,000-49,000 total additional job-years per year on average for the FIT case in the low load case, and 60,000-67,000 total additional job-years per year on average for the FIT case in the high load case, or an average of 55,000 total additional job-years per year on average, of which 28,000 are direct job-years and the remainder are indirect and induced jobs.

Revenues to state

A total of $1.7 billion in additional tax revenue is expected over the ten-year period from additional sales tax, use tax, and income tax on an undiscounted basis in 2009 constant dollars. Again, this is the average of the additional revenue expected from the low load and the high load cases above versus a 33% RPS reference case. This revenue is derived by disaggregating the installed cost for each technology into materials, labor and other (e.g. design, permitting, and profit). All construction and installation costs are assumed to be in-state. Sales tax from the cost of materials accounts for the bulk of this revenue. For equipment that is produced outside the state, we assume that a use tax is levied at the same rate as the sales tax. Induced revenue is based upon additional employee compensation in the FIT case leading to more consumption and therefore more sales tax. It is calculated on an annual basis by considering additional employee compensation less the net FIT rate impact. Induced revenue from this effect is calculated to be about $600 million over the next decade. Furthermore, the FIT would result in up to $50 billion additional investment over the next decade; and, assuming a 30% ITC through 2020, developers would be eligible for up to $15 billion in federal tax credits. On average, an increase in investment of about $38 billion is projected with the FIT over the reference 33% RPS scenarios.

Conclusions

The REESA FIT can drive a massive volume of cost-effective renewable energy in the near-term. With virtually 100% of the deployments in-state, the program will result in significant employment and tax revenue benefits to California, stimulate activity in the renewable energy industries, increase our ability to get federal dollars into California, and provide money to local economies and to employ workers in sustainable jobs.

[6] NREL JEDI model 2010; R. Pollin, J. Heintz, and H. Garrett-Peltier, *The Economic Benefits Of Investing In Clean Energy: How The Economic Stimulus Program And New Legislation Can Boost U.S. Economic Growth And Employment*, Center for American Progress and Department of Economics and Political Economy Research Institute (PERI), University of Massachusetts, Amherst, June 2009.