Item 33

LAcitycouncil03182015

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03182015 10:00 LA City Council Chambers, Room 340, LAX City Hall, 90012, Item 33.

1.0 Introduction

Expensive electricity is bad for the environment no matter how it is produced.

2.0 Background

http://ens.lacity.org/clk/councilagendas/clkcouncilagendas394167_03182015.html

Item 33: Don A. Campbell 2 Geothermal Energy Project Power Sales Agreement No. BP 14-032 and Agency Agreement No. BP 14-033

3.0 Results

LADWP Board of Commissioners, men and women:

I oppose Item 33, Don A. Campbell 2, because of negative environmental benefit. Expensive electricity is bad for the environment. Each 10 USD spent on anything puts a kilogram carbon into the sky (3.7 kilograms CO2). I believe the Don A. Campbell 2 Geothermal, effectively ~12 cents per kilowatt-hour, is a net CO2 emitter because it increases the marginal price of all LADWP power. While geothermal provides dispatchable power, the marginal power cost increase results in a net carbon emission increase. For geothermal power to make a net carbon benefit, it must provide 270 MWe nameplate generation to LADWP by 2020. Nowhere near this amount is projected to be available. Result is from following crude calculation.

Wm. Schenewerk 03/18/2015

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4.0 Design Input

4.1 LADWP BP 14-032 LADWP for 16.2 MWe from WRGP, Ormat Nevada, Inc. 90% utilization, $81 per megawatt-hour (0.081 USD/kWh) for 20 years.

4.2 Ormat Technologies (NYSE: ORA), Established 1965 as Ormat Turbines, Ormat Energy Converter (OEC) power generating unit. Main components: Vaporizer/preheater, turboenerator, air-cooled or water-cooled condenser and controls. Ormat has supplied more than 900 MWe geothermal and recovered energy generation (REG) power units, OEC technology, logging millions of hours.

4.3 Each kg-C from 50% efficient CCGT burning natural gas generates 8.54 kWh.

5.0 Assumptions

5.1 BP 14-032 gets 0.0225 USD/kWh Production Tax Credit +30% investment tax credit.

5.2 20 a wholesale power 0.05 USD/kWh: quotes.ino.com: 0302015 2027 gas: 4.64 USD. If the 2027 gas futures is too thinly traded, perhaps buy mineral rights.

5.3 BP 14-032 effective power cost: 0.081 USD/kWh * 1.3 investment tax credit + 0.0225 USD/kWh production tax credit = 0.1278 USD/kWh.

5.4 Grid cost of LADWP power set by dispatchable Geothermal effective cost. Geothermal is the only disptachable "renewable energy" being used by LADWP.

5.5 LADWP fossil carbon represented by CCGT: 1 kg-C/8.54 kWh = 0.12 kg-C/kWh.

5.6 LADWP demand estimate, from Reference 6.2
One-in-ten Peak GW = 6.0 GW + 0.08 GW/a * (year - 2010); 2020 peak = 6.8 GW.
LADWP GWh = 26,000 GWh + 320 GW/a * (year - 2010); 2020 Power Sales = 29200 GWh.

6.0 References

6.1 Ronald O. Nichols, Aram Benyamin, LADWP 2011 IRP, 12222011.

6.2 Aram Benymin, Ann M. Santilli, 2011 Electric sales and Demand forecast 02182011

7.0 Calculations

7.1 Carbon Emissions per USD C MW = 12; CO2 MW = 44
Preindustrial atmospheric CO2: 280 ppm CO2 = 609 trillion kg-carbon
Atmospheric Carbon = 280 ppm + Exp(0.0225/a * (2015 - 1800 a) = 406 ppm-C
2015 carbon increase: 0.0225/a * Exp(0.0225/a * (2015 a- 1800 a)) = 2.84 ppm/a
Industrial carbon emissions = (3/2) atmospheric increase * 2.84 ppm/a
* 609 trillion kg-C/280 ppm preindustrial = 9.27 trillion kg-C/a (34 Tkg-CO2/a).
2015 World GDP ~90 trillion USD/a: 10 USD spent on puts 1 kg-C into the air.

7.2 Effective carbon emissions from geothermal production economic activity:
0.1278 USD/kWh * 1.0 kg-C/10 USD = 0.01278 kg-C/kWh.

7.3 Effective carbon emissions caused by Geothermal effect on power marginal cost:
(0.1278 USD/kWh - 0.05 USD/kWh) * 1.0 kg-C/10-USD = 0.00778 kg-C/kWh

7.4 Minimum Fraction LADWP power that can be dispatchable geothermal to acheive net Carbon benefit = Marginal CO2 increase caused by higher marginal costs/
(CCGT carbon emissions - geothermal carbon emissions) =
0.00778 kg-C/kWh /(0.12 kg-C/kWh - 0.01278 kg-C/kWh) = 0.073
2020 Geothermal requirement = 29200 Gwh/a * 0.073/(0.90 * 8766 h/a) = 0.270 GWe