

The Water and Light Advisory Board feels that the acquisition of renewable energy is progressing appropriately and is well demonstrated in the 2016 Renewable Energy Report. However, we have some concerns about the method used to calculate the “impact on rates” from obtaining renewable energy as it is presented in the Report.

A) Photovoltaic Electricity

An initial disagreement with the method used to calculate the impact on rates used in the 2016 Renewable Energy Report is the charge of \$0.0917 for each kWh of electricity produced by owner installed photovoltaic systems, *i.e.* net metered customers. This is done on the basis that CWL did not collect much revenue from this energy. There is no direct payment to these PV owners. This *reasoning* is very similar to saying that the energy efficiency savings of 30% *achieved by* City Hall should *be considered* an impact on rates *because it* did not pay for the energy it would have used had it not *been so* efficient.

We agree that it is appropriate to include the cost to CWL of the rebates provided for the installation of PV systems. This has been included in the Report as a separate item. In the numbers presented below in these comments it was included as a cost of Net Metered energy.

As the number of homeowner installed PV systems increases the \$0.0917 per kWh cost *will increase substantially*. There are problems with recovering costs for transmission and backup capacity from homeowners with PV systems. CWL is working *to address that issue*.

The costs of transmission and backup capacity for PV systems need to be recovered and CWL is working to address that issue. It is not appropriate to assign \$0.0917 / kWh as an impact on rates for renewable energy, and thus reduce the final quantity of renewable energy which can be purchased in the future.

B) Intermittent Renewable Energy

The major disagreement which the Advisory Board has with the method used to calculate the impact on rates is how that impact is calculated for electricity coming from the intermittent energy sources of wind and solar energy.

CWL spent \$56.63 per MWH on intermittent renewable energy in 2015.

CWL spent \$55.67 per MWH on non-Intermittent renewable energy in 2015.

CWL spent \$61.61 per MWH on non-renewable energy in 2015.

Intermittent renewable energy made up half of our renewable energy last year. Future

wind energy is anticipated to cost [close to] *approximately* \$30 per MWH.

The two *non-intermittent* renewable energy sources are landfill gas, *from which we expect* only modest increases. The second biomass-burning, which we could increase by converting one boiler at the Columbia Power Plant. This conversion is desirable, if cost effective, but would add only a moderate amount to the total renewable energy. In 2015 non-intermittent renewable energy cost \$55.67 per MWH.

The current system used to calculate the Renewable Energy Standard cost impact on rates substantially overestimates the cost of intermittent renewable energy obtained from wind and solar sources.

There are several ways in which one could calculate the cost impact on rates of intermittent renewable energy, four of which are outlined below.

1) **A Dollar to Dollar Comparison**

A direct comparison of what was paid for intermittent renewable energy, \$56.63, compared to the cost paid to three companies from which we purchase coal-fired electricity, \$61.61. This is probably what the voters were expecting when they passed the referendum by 68% in 2005.

Thus the impact on rates would be a savings of \$4.98 per MWH.

The Advisory Board agrees with staff that a direct comparison of payments to fossil-fueled companies and intermittent renewable energy companies is not a realistic comparison because the non-renewable energy is always available and wind and solar energy is not.

2) **Comparison to MISO Market Price**

This is the comparison which the Advisory Board believes is inappropriate and greatly over estimates the cost of renewable energy.

Intermittent renewable energy cost is currently compared to the Midwest Independent System Operator (MISO) market energy cost to calculate the impact on rates. This market is the cost of energy bid into the market for energy which is not committed to existing contracts. It is essentially the marginal cost of electricity, the price needed to justify producing additional energy at a power plant. It is (A) mainly fuel cost combined with (B) additional maintenance, (C) additional operating costs and (D) profit. It does not cover the capital cost of constructing the power plants as those are covered by electric distribution companies which have long term contracts similar to CWL's contracts. The cost of energy for the MISO market varies hourly on the day ahead market around the mid \$20 per MWH at the node where Columbia connects to the grid

and \$10 at the Crystal Lake wind farm node. The calculated cost averages \$15.42 per MWH in the 2016 Renewable Energy Report.

The cost of intermittent renewable energy, \$ 56.63 per MWH, which when compared to the MISO energy market price, \$15.42, as it is in the 2016 Renewable Energy Report, places an unrealistically high cost on the impact on rates.

Thus the impact on rates would be an impact of \$41.21 per MWH.

This is an unrealistic comparison.

Columbia's contracts with fossil-fueled power plant have two parts. 1) Capacity charges: cover the cost of construction (bonds) and 2) Energy charges cover the cost of fuel, maintenance and operation. For the three companies with which Columbia has contracts, the cost of Capacity *ranges* from 62% of the total *charge* for the least cost capacity to 70% for the highest cost capacity. Those ratios are based upon the companies producing electricity every hour of the year, a very rare occurrence. Since capacity charges are fixed, the capacity cost percentage increases with reduced electricity generation.

Intermittent power producers fueling with Wind and Solar sell electricity do not split their charges into capacity and energy. Since their fuel is "free" all charges are rolled into a single fee per MWH. As a per MWH charge it makes it look like an "energy" cost when compared to typical electrical contracts despite the fact that it is in reality a capacity cost.

Contracts with wind and solar producers, in addition to contracts with fossil-fueled power plants, are long term contracts with cost stability.

Wind and Solar prices need to be realistically compared to fossil-fueled prices and the MISO market is not a realistic comparison.

3) Comparison of Cash Payments vs. Intermittent Energy Sources Payments with a Capacity Charge

One approach to addressing this problem is to calculate a cost which can be added to the cost of the intermittent renewable energy costs which reflects the cost of making energy available all the time. Columbia Energy Center was purchased with this in mind. It was a very cost effective price for Capacity but not [a very cost effective plant] for generating electricity. We [hardly ever] *rarely* use it for producing electricity for CWL because the fuel costs are too high, but we do sell some energy from CEC into the MISO market when requested to do so by MISO.

Columbia Energy Center permits us to purchase energy, without accompanying capacity, from the MISO market. It also permits us to sign contracts to buy energy from

intermittent renewable energy sources which have low capacity recognition.

We can assign a portion of the cost for the Capacity expense of CEC to the cost of contracts for intermittent renewable energy in our accounting to calculate the impact on rates of renewable energy. This generates an average \$8.95 / MWH cost which can be added to the cost of intermittent renewable energy. Thus resulting in a cost of intermittent renewable energy of \$65.58 per MWH.

Thus the impact on rates would be an impact of \$3.97 per MWH.

4) Comparison of Iatan II Payments vs. Intermittent Energy Sources with a Capacity Charge

Another way we could obtain a realistic comparison of intermittent renewable energy with fossil fueled energy would be to compare it to the cost of another contract for fossil-fueled energy. In 2013 we cancelled a contract with Nearman for 20 MW of capacity with energy because the price of their electricity was increasing too much, primarily due to having to pay local taxes where it was generated. In 2014 CWL sought bids for 20 MW to replace that contract. A contract was not signed because of the inability to come to an agreement on terms of the contract. This attempt to obtain additional fossil-fueled energy illustrates what we would have been paying for such energy at present. Iatan II with our 20 MW contract is the closest we have to that failed contract.

Since then CWL has not sought bids for new contracts from non-renewable energy companies.

Since Columbia owns the Columbia Energy Center (CEC) with about half of the capacity which Columbia is required to have available to meet peak demand we can purchase a significant fraction of our energy from the MISO market which provides no capacity with energy purchases. It is technically possible for CWL to find a buyer for our contract with Iatan II and purchase an equivalent amount of energy on the MISO market for much less cost, saving about \$4,000,000 annually. However, this is roughly what the impact would have been of following through with the contract proposed in 2014. The Advisory Board agrees with the staff that selling Iatan II would not be wise as market prices are subject to unpredictable forces and long term contracts provide cost stability.

The current quantity of renewable energy from intermittent sources is about a quarter of what we would receive from 20 MW of capacity producing energy every hour. The contract with Iatan II is for 20 MW and without the related transmission costs results in a payment of \$53.34 per MWH. This can be compared to a cost of intermittent renewable energy of \$65.58 per MWH.

Thus the impact on rates would be an impact of \$12.24 per MWH.

Summary Table of the Alternative Comparison Methods

Comparison of Comparison Energy Costs	Impact on rates	Intermittent Energy	vs. Energy
Cash outlays \$61.61 / MWH	\$5.41 / MWH	\$56.63 / MWH	vs.
MISO market \$15.42 / MWH	\$41.21 / MWH	\$56.63 / MWH	vs.
Cash outlays with Intermittent energy \$61.61 / MWH charged Capacity	\$3.97 / MWH	\$65.58 / MWH	vs.
Iatan II outlays with Intermittent energy \$53.34 / MWH charged Capacity	\$12.24 / MWH	\$65.58 / MWH	vs.

The last two ways for calculating the impact on rates for intermittent renewable energy are acceptable to the Water & Light Advisory Board.

Up to this time the quantity of renewable energy has been so low that the manner in which the calculations are done to generate the “impact of the cost of renewable energy on rates” has been of little consequence. Using the current calculation process with the inappropriately high apparent cost will still probably still permit us to obtain 15% renewable energy in 2018. It would be impossible to reach the 2022 goal while staying within the 3% of retail electricity sales cap. This is particularly true if we have a more appropriate split in renewable energy between wind and solar. Each should be about half to more closely match our load. The cost of wind has come down considerably below the cost of solar and will likely stay that way.

The Advisory Board has recommended several times that a realistic method of making estimating that cost be developed. Since it has not we recommend that the City Council adopt an appropriate methodology.