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PROPOSED SUNSET FALLS HYDROELECTIC PROJECT (14295)

CRITIQUE OF THE PUBLIC UTILITY DISTRICT NO. 1 OF SNOHOMISH COUNTY'S 2010 INTEGRATED RESOURSE PLAN & NOTICE OF INTENT/PRE-APPLICATION DOCUMENT

Prepared for

Hydropower Reform Coalition

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1 EXECUTIVE SUMMARY

On August 17, 2010 the Public Utility District No. 1 of Snohomish County (SnoPUD) approved its 2010 Integrated Resource Plan (IRP)[1] and adopted a mid-term assessment of this Plan on December 20, 2011.[2] On March 21, 2013 SnoPUD submitted a Notice of Intent to File License Application (NOI) and Pre-Application Document (PAD) for the proposed Sunset Fish Passage and Energy Project (Sunset Falls) with the Federal Energy Regulatory Commission (FERC).[3] The Commission formally noticed this filing on May 20, 2013.[4]

In the NOI and PAD, SnoPUD falsely claims power from the proposed Sunset Falls project would:

- Be competitive with other renewable power alternatives
- Complement wind and solar generation
- Provide reliable power
- Be a good fit for their load curve, and
- Provide power for 10,275 homes.

This Rocky Mountain Econometrics (RME) report finds that SnoPUD's statements that proposed project power costs would be competitive with other renewable alternatives are misleading.

In the PAD, SnoPUD states that the Sunset Falls project would have an "assumed cost of power of $72.50 MWh, "and an annual revenue requirement of $8,982.750.[5] However, the PAD provides no guidance on how SnoPUD arrived at this cost of power other than Figure 6.9-8, a graph from the Northwest Power and Conservation Council's (NWPCC) 2010 Sixth Power Plan. In 2010, the NWPCC was decidedly less optimistic regarding new hydropower than is SnoPUD regarding this current proposed project. "Hydropower development costs are sensitive to project configuration, size, and site characteristics. A review of recent projects shows costs ranging from $65 to over $200 per megawatt-hour and a weighted average cost for committed and completed projects of $88 per megawatt-hour." [6] Note that three years of inflation would bring today's average up to approximately $94/MWh.

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[1] http://www.snopud.com/Site/Content/Documents/custpubs/IRPfinal_091511.pdf
[2] http://www.snopud.com/Site/Content/Documents/custpubs/irp_midtermfinal012312.pdf
[3] FERC Accession No. 20130321-5054.
[4] FERC Accession No. 20130520-3007
[5] "The District's projections indicate that the nominal levelized cost for the Sunset Fish Passage and Energy Project, with self-financing may be in the range of 63 mills/kWh to 82 mills/kWh (depending upon actual construction cost, contingencies, assumed term and discount rate). This potential range is comparable or better than other renewables as identified by NWPCC. For an average annual generation of 123,900 MWh and an assumed cost of power of $72.50/MWh annual revenue from the Project would be $8,982,750." [Emphasis Added] Pre-Application Document Part 2, 6.9.4 Project Economics, pp. 277.
[6] http://www.nwcouncil.org/media/6284/SixthPowerPlan.pdf, pp. 6-19.

This RME report finds that, adding in project related costs of financing, operations and maintenance, the proposed Sunset Falls project's actual cost of power would be much higher at $ 166 MWh, with a revenue requirement of nearly $21 million.[7] If externalities are included, such as aesthetic losses, the cost increases to $167.72 / MWh.

Sunset Falls would, if built, be the second highest cost plant on SnoPUD's PAD list of potential new resources, almost triple the cost of "Favorable" hydro and nearly twice as expensive as "Representative" hydro.

In addition, this report finds that contrary to SnoPUD claims, the project would produce much of its power in the spring when it is not needed.

Additional Report Findings:

- In twenty or thirty years, SnoPUD would pay off Sunset Falls' debt and the energy cost would fall. However, in an interest free scenario, it would take until the year 2152 for SnoPUD ratepayers to see the benefit of building Sunset Falls instead of a geothermal, combined cycle, animal waste, or other equivalent plant.
- If we apply a minimal interest rate of 3 percent, the potentially lower generation costs at Sunset Falls after debt retirement would never offset the high generation costs during the initial decades of the project's operation.
- For the relatively small amounts of power SnoPUD proposes to acquire via Sunset Falls; the open market can be a very attractive option[8] Purchasing power on the open market has the long-term ability to supply SnoPUD's needs, with no capital outlay, for about $120 / MWh less than Sunset Falls.
- Sunset Falls would be a run-of-river project with essentially zero ability to choose the time it generates power. As a result, SnoPUD is incorrect when it claims Sunset Falls would be an effective complement to wind and solar generation.[9]
- Sunset Falls would not be much better than wind or solar when it comes to the firmness of its generation. Wind and Solar plants often have production factors as low as 30%. In low water years, Sunset Falls' production factor would be a scant 31%. A typical year's production factor would be better, at 50% but, come February, one of SnoPUD's highest demand periods, periodic winter droughts leading to low water flows would force Sunset Falls to be down one year out of every ten.

[7] See Appendix B, pp. 29, for details.

[8] Page 10 of the PAD states that the Sunset Falls project has an estimated nameplate capacity of 30.0 megawatt (MW), generating approximately 123.9 gigawatt hours (GWh) annually. In the Overview section of the Sunset Fish Passage and Energy Project Question and Answer page, the average annual output is listed as 13.7 MW. http://www.snopud.com/Site/Content/Documents/sfpep/QandAv201304.pdf

[9] RME takes the term, "complementary to wind/solar" to mean the ability to store, or delay without significant loss, for generation at a later time. Sunset Falls would not be able to do that.

- SnoPUD falsely claims that Sunset Falls would be a good fit for their load curve and that the plant would provide power for 10,275 homes. In reality, most of Sunset Fall energy production would be in the spring when the needs of these 10,275 customer's needs are low. In the winter, when SnoPUD's load peaks, Sunset Falls would not be capable of meeting the needs of 10,275 customers. The average annual cost of shaping Sunset Fall's generation in a manner that would truly make it a viable resource for 10,275 homes would be $1,513,873.

2 PROJECT COSTS

The PAD presents the first detailed cost estimate for Sunset Falls. It comes in at $133 million. SnoPUD also lists a potential high cost of $175 million, and a potential low cost of $110 million.[10] While SnoPUD detailed the potential cost of building Sunset Falls, they did not provide any detail on financing costs, operating costs, maintenance costs, depreciation, etc.

In the following table and paragraphs, RME estimates the potential costs of operating Sunset Falls on an ongoing basis, to produce a $ / MWh estimate. To the extent possible, RME used numbers from other SnoPUD documents, such as their recent IRP's, and annual reports, to insure that the resulting calculations are consistent with historic SnoPUD activities. In other cases, such as maintenance and operating costs, RME surveyed FERC documents to determine standard operating costs for other hydro facilities in the region.

Sunset Falls – Projected Construction, Finance, and Operating Costs

Description /Amount	Base Case	High Est. +30%	Low Est. -20%)
TOTAL COST	**$133,021,338**	**$175,000,000**	**$110,000,000**
Construction Phase Carrying Cost (30 Months)	$8,358,228	$10,995,905	$6,911,712
Installed Cost	$141,379,566	$185,995,905	$116,911,712
Years	20	20	20
Interest Rate	**5.0%**	**5.0%**	**5.0%**
Annual Revenue Rqmt.	$11,344,662	$14,924,793	$9,381,298
Maintenance &Operation @ 5%	$7,068,978	$9,299,795	$5,845,586
Load Shaping Costs	$1,513,873	$1,513,873	$1,513,873
Total Ann. Rev. Rqmt.	$19,927,513	$25,738,460	$16,740,756
Annual MWh Sales	**120,000**	**120,000**	**120,000**
Break Even $/MWh (Base)	**$166.06**	**$214.49**	**$139.51**
Externalities			
Aesthetics Losses	$2,472,300	$2,472,300	$2,472,300
Break Even $/MWh Including Aesthetics Losses	$167.72	$216.14	$141.16

See appendix for additional detail.

In addition to the construction cost, there would be interest charges as money is spent during the

[10] PAD, Part 2, pp. 275.

three years it takes to build the plant, ranging from $7 to $11 million depending on cost scenario.

Amortized over 20 years at a system average of 5%[11] interest, servicing the debt on Sunset Falls, if the project is built, would cost SnoPUD ratepayers $11.3 million each year.

A survey of FERC Form No. 1 [12]suggests that it would cost about $7.1 million each year to operate and maintain (M&O)[13] Sunset Falls. Also, the load shaping costs associated with supplying 10,275 homes with Sunset Falls energy would be about $1,513,873.[14] The addition of these two items brings the annual revenue requirement to about $19.9 million.[15]

Dividing $19.9 million by 120,000 MWh, results in a base case operating cost of about $166.06 / MWh.

To put that into perspective, power purchased on the open market is available year round at an average cost of $ 33/MWh.

There would also be a value for aesthetic losses. The US Fish and Wildlife Service published a report on April 2, 2012 that "provide(s) an estimate of the increased property tax base that local communities enjoy as a result of the NWR's (National Wildlife Refuges)[16] and their provision of open-space amenities to nearby homeowners."

In particular the study found that property values are:

- _4% - 5% higher in the Northeast region;
- _7% - 9% higher in the Southeast region; and
- _3% - 6% higher in California/Nevada region.

Using 5 percent for the value added portion of the lots, residences, and vacation properties in proximity to Sunset Falls, a preliminary estimate of the amount local landowners would lose if the project were constructed is $2,472,300.

If SnoPUD were held responsible for these costs, they would become a construction cost and would be included in financing and rate base, and would be a burden on ratepayers. The net

[11] Finance term lengths and interest rates taken from SnoPUD Mid-Term IRP to provide consistency and enable direct comparisons with other SnoPUD generation proposals.

[12] **FERC Form No. 1 - Electric Utility Annual Report**

[13] RME survey of FERC Form 1s. Median M&O of 43 northwest hydro facilities.is 5.87 percent of installed cost. RME used a lower 5% to give SnoPUD the benefit of the doubt for Sunset Falls.

[14] See discussion on pp. 18.

[15] See appendix for more detail.

[16] Amenity Values of Proximity to National Wildlife Refuges, April 2, 2012 U.S. Fish and Wildlife Service, U.S. Department of the Interior.

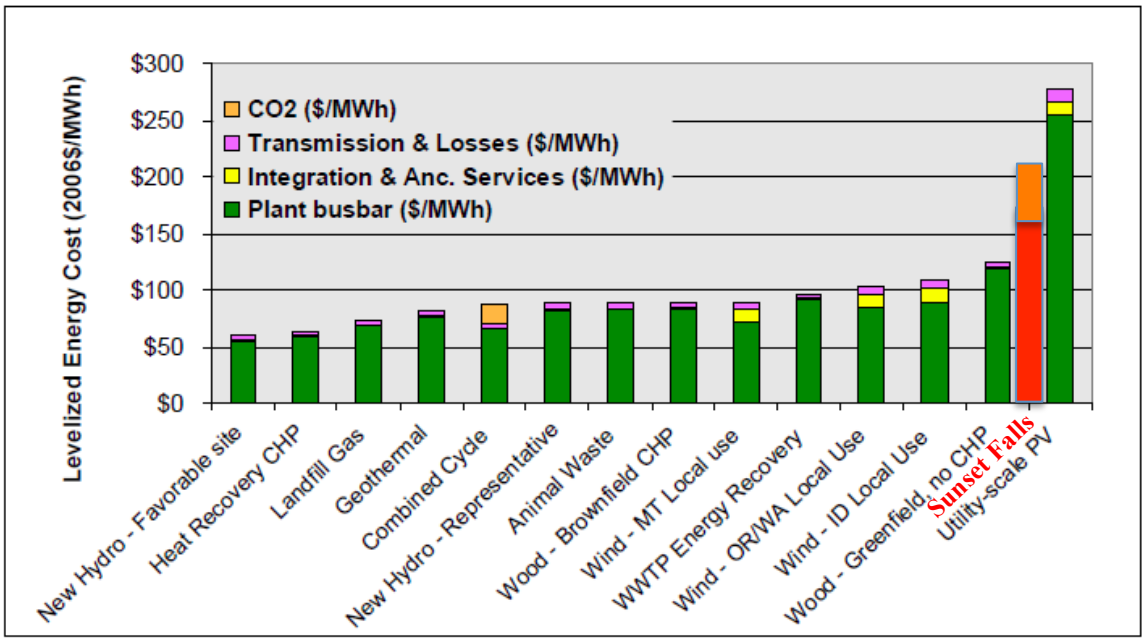
result will be to increase Sunset Falls' cost even further, from $166.06 / MWh to about $167.72 / MWh.

If SnoPUD avoids responsibility for the aesthetic degradation, the total cost would remain at $166.06 / MWh and ratepayers would not see a direct impact. Instead, there would be an equivalent negative regional economic effect as a result of reductions in the value of property owners in Sunset Falls' vicinity.

3.a SUNSET FALLS COMPARED TO OTHER GENERATION OPTIONS

In the mid-term IRP, SnoPUD makes the case for geothermal plants being their go-to option for additional generation. In the same document, SnoPUD lists several other non-hydro generation options with levelized costs of power ranging from roughly $70 - $90 / MWh, any one of which would be substantially cheaper than Sunset Falls.

The chart below lists the expected cost of generating power from many of the currently available generation alternatives. This chart comes from SnoPUD's PAD, Part 2. Northwest Power and Conservation Council (NWPCC), and Utilities including Pacificorp, Avista, and Idaho Power come to similar conclusions regarding the relative price of the various generation alternatives.



Source: PAD_Part2.pdf

On this chart, SnoPUD shows new hydro as being the cheapest alternative. However, the critical word associated with that result is "favorable site." SnoPUD believes power from a favorable hydro site would come in at about $60 / MWh.

There is a second listing for hydro on the chart titled "New Hydro (Representative)". The price here is a much more realistic $90 / MWh.

However, at $166 / MWh, Sunset Falls would be almost triple the cost of "Favorable" hydro and about twice as expensive as "Representative" hydro.

Further, Sunset Falls, at $166 / MWh, would be the second highest cost plant on SnoPUD's PAD potential resource stack.

On the chart above, the red column shows Sunset Falls base case. The orange area above it shows SnoPUD's high cost scenario.

SnoPUD shows a number of potential new generation options, ranging from thermal, (gas combined cycle combustion turbines – CCCT) to wind and geothermal options, as being available in the $80 – $90 / MWh range.

Sunset Falls would be $50 - $60 / MWh higher than most other viable generation options available to SnoPUD.

If the high side cost estimate is used, Sunset Falls would exceed the generating cost of wind energy by about $100 / MWh, and approach the cost of utility scale photovoltaic (PV), currently the most expensive power source in SnoPUD's portfolio.

Sunset Falls After Debt Retirement

The information presented in the PAD makes it clear that the cost of producing power at Sunset Falls would be more than double the cost of most alternatives. This conclusion begs the question: **What is it about Sunset Falls that makes SnoPUD ignore their own stated list of better alternatives?**

One possible answer is that SnoPUD believes that after the debt associated with Sunset Falls is paid off, producing power there would be substantially cheaper. Referring to Sunset Falls on page 274 of part 2 of the PAD, SnoPUD states:

> "Produce power at costs near current Bonneville Power Administration (BPA) pricing, after initial capital costs are paid off."

Construction debt is one of the major costs of producing hydropower. However, paying off the debt at some future point doesn't mean there will not be recurring costs associated with running the plant.

During the 20 or 30 years it would take to pay down Sunset Falls' debt, much of the project would need repair and rehabilitation. Turbines need maintenance. Buildings need new roofs and fresh paint. Substations need upgrades and repairs. Control gates and valves need repair and replacement. All of this costs money. Expensive plants tend to stay expensive.

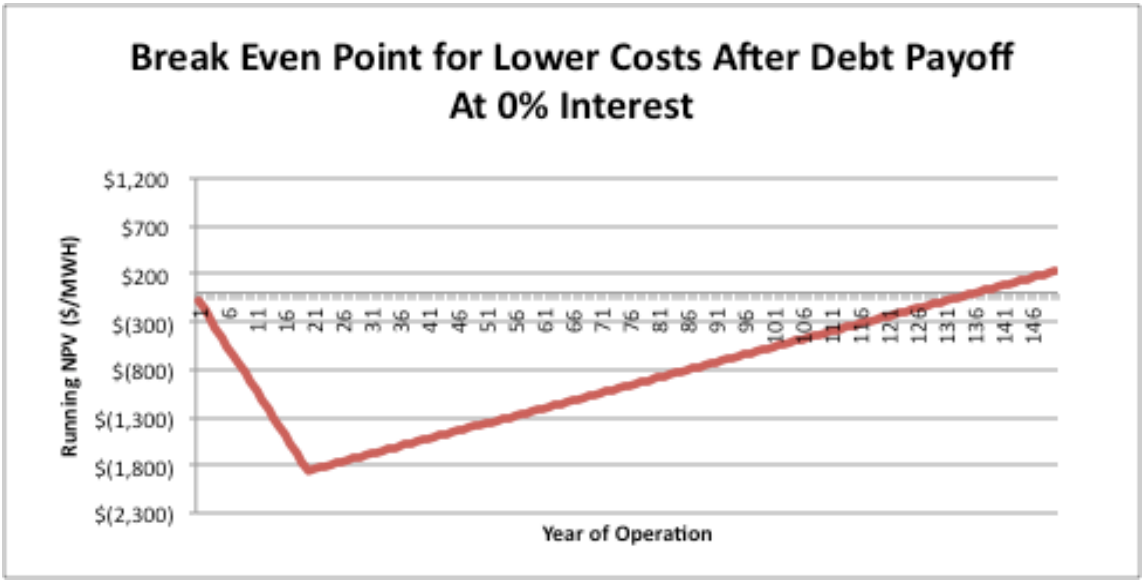
RME looked at Sunset Falls' potential operating costs after debt retirement by comparing it to other hydro plants in the Pacific Northwest. If built, Sunset Falls' power after its debt is retired

may still cost as much as $90 / MWh in current, inflation adjusted, dollars.[17]

At that value, even after debt retirement, Sunset Falls would still be more expensive than most of the alternatives in the PAD potential resource stack.

RME also explored the hypothetical possibility of Sunset Falls' operating cost dropping to $60 / MWh after debt retirement, consistent with the value posted on the chart on pp. 3 above for "Hydro – Favorable Site".

The issue is whether it is worth paying $166 / MWh for Sunset Power for 20 years, instead of $76 / MWh for geothermal, combined cycle, animal waste, etc., in anticipation that the cost of the power would then drop to $60 /MWh for the next 80 years. More to the point, would it be worth paying a $90 /MWh penalty for 20 years in hopes of savings $16 / MWh for the remainder of Sunset Falls' life? This relationship is presented in the following graph.



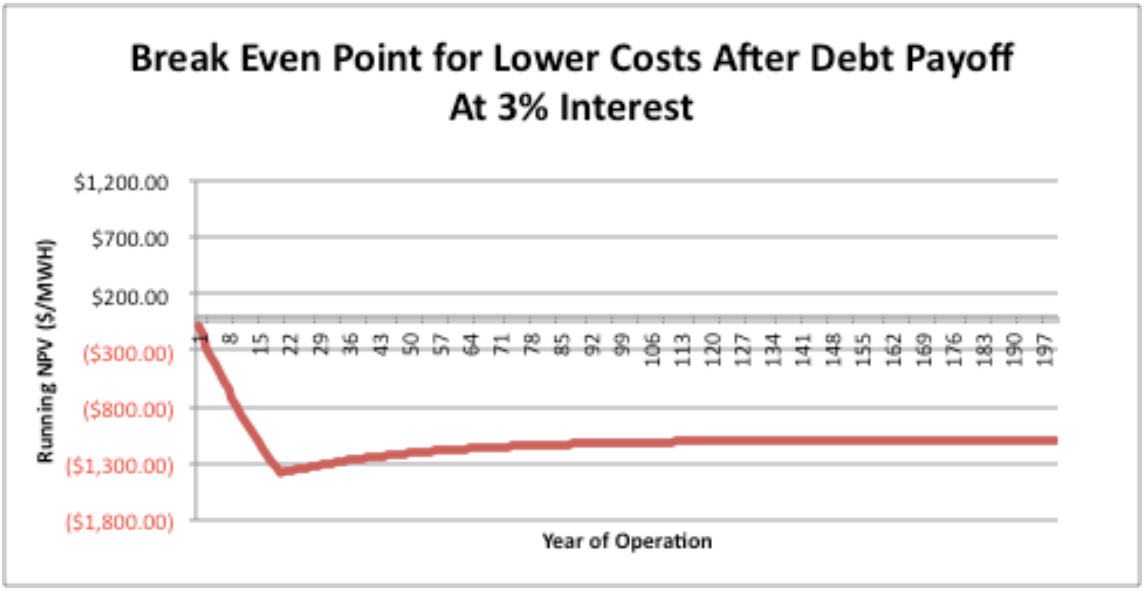
From a mathematical point of view (i.e., zero percent interest rate), the break-even point for Sunset Falls' power relative to a geothermal or equivalent plant occurs in year 133. In other words, assuming the project is still operating more than a century from now, it would take until the year 2149 for SnoPUD ratepayers to see the benefit of building Sunset Falls instead of an

[17] SnoPUD sometimes refers to "Levelized Costs". Levelized cost is a mathematical construct that downplays the high cost of power while the debt is being serviced by factoring in the lower costs of power after the debt is retired. The problem with levelized cost in this instance is that we do not know what the operating cost of the proposed plant will be in 20 or 30 years. If the cost of power from the proposed plant only drops to about $90 / MWh after debt retirement, the levelized cost of power for a 50 life cycle will be about $143 / MWh. If the cost of power drops even more after debt retirement, to about $60 / MWh, the levelized cost of power for a 50 life cycle will be about $133 / MWh. If the cost of power from the proposed plant were to drop all the way to $0 / MWh, something that will not happen, the levelized cost of power for a 50 life cycle will only drop to $114 / MWh.

animal waste or equivalent plant.

Keep in mind that there is a time-cost of money. If we apply a minimal interest rate of 3 percent, the potentially lower generation costs at Sunset Falls in the future are never sufficient to offset the high generation costs during the initial couple of decades of operation when the debt needs to be serviced.

As shown on the following graph, even if we extend the potential life of the Sunset Falls project to infinity, the benefit of hypothetically lower future rates is not enough to offset the high cost of power in the first 20 years relative to the production cost of geothermal, combined cycle, animal waste, wood, or wastewater treatment plant energy recovery.



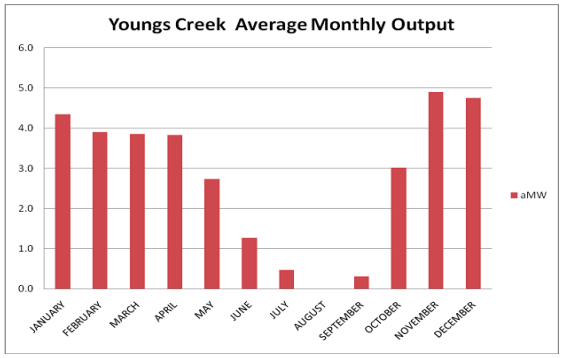
TO CONCLUDE THIS SECTION,

SNOPUD IS INCORRECT WHEN IT STATES THAT SUNSET FALLS' POWER COSTS WILL BE COMPETITIVE WITH OTHER RENEWABLE ALTERNATIVES.

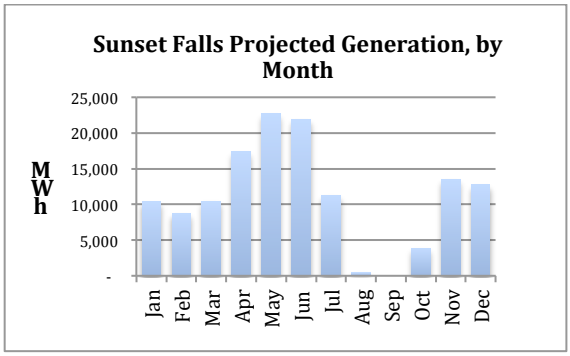
3.b SUNSET FALLS COMPARED TO YOUNGS CREEK

A closer look at another recently developed "low impact" small hydropower project – Snohomish PUD's Youngs Creek project – illustrates how new small hydropower projects fail to deliver on their advertised benefits. The 7.5 MW Youngs Creek, which lost more than $1 million[18] in its most recent year of operations, produces very little energy, in an intermittent fashion, at very high cost.

Youngs Creek has a true winter peak, unlike Sunset Falls that peaks in the spring. Both projects tend to dry up in late summer. And, a substantial proportion of both project's production takes place in mid to late spring when it is least needed. In that manner much of Youngs Creek power qualifies as surplus to be dumped at salvage prices. Please see the following two charts comparing seasonal production for the two projects.



Source: IRP Final, Figure 7-6, pp. 145.



Source: PAD, pp. 78.

Production costs are somewhat similar for the two projects as well, with the costs for Sunset Falls being even higher than the costs for Youngs Creek.

On October 26, 2012, SnoPUD wrote to FERC to apply for an exemption from the Annual Land Use Charges for the Youngs Creek Hydroelectric Project (No. 10359) for the Period October 1, 2012 to September 30, 2013. The crux of SnoPUD's argument in favor of the exemption was that Youngs Creek operated at a significant loss because of its high operating costs. On page 3 of the document to FERC SnoPUD states:

> " . . . .the Electric System[19], for the twelve-month period ended September 30, 2012, sold the power from the Youngs Creek Project to the ultimate consumer[20] without profit. Specifically, the Electric System purchased Youngs Creek Project power during this period

[18] SnoPUD, Application for Exemption from Annual Land Use Charges for the Youngs Creek Hydroelectric Project (No. 10359) for the Period October 1, 2012 to September 30, 2013, Exhibit A, 12 months ending 9/30/2012, (Youngs Creek Cost / kwh minus Power Cost to Customers) times Youngs Creek generation (kWh) = ($0.096 - $0.034) x 16,907,146 = $1,048,243.05.
[19] SnoPUD's Electric Production Division
[20] SnoPUD's distribution division

at $0.096 per Kilowatt hour (kWh), yet the power cost component of the retail sales rate was $0.034 per kWh. Accordingly, during this period the Youngs Creek Project power was sold to the ultimate consumer at a loss."

At $0.096 per kWh, the power produced at Youngs Creek is higher than all but four of the 13 options SnoPUD lists in the Sunset Falls PAD. Youngs Creek is about three times as expensive as the power SnoPUD purchases or produces from all other sources and the rate they charge their customers.

At $0.168 / kWh the power produced at Sunset Falls would cost almost twice as much as Youngs Creek power, and five times as much as the power SnoPUD gets from their other traditional sources.

It is difficult to escape the conclusion that if Youngs Creek is operating at a loss, Sunset's higher costs would result in it operating at even bigger losses.

Youngs Creek Energy - Who Benefits?

If the foregoing discussion of Youngs Creek is not sufficiently critical, it is not even clear that Youngs Creek power is intended for SnoPUD customers. In the February 19, 2013 meeting of the Snohomish County Public Utility District, Senior Manager (of) Power Supply, Anna Miles, announced that the Youngs Creek Hydroelectric Project recently received certification by the California Energy Commission as being eligible for California's Renewables Portfolio Standard. This certification is effective retroactively to July 2012 when the District filed for the certification.

In other words, SnoPUD registered Youngs Creek as a renewable energy project in California as a requirement for selling energy in California. Since Youngs Creek is not LIHI certified (Low Impact Hydropower Institute), SnoPUD may find it difficult to sell its energy as a premium priced product. Surplus power tends to get sold on the open market, or as short-term firm power. This means Youngs Creek power may be sold at prices as low as the mid-$30 to mid-$40 / MWh range. If that happens SnoPUD customers will be subsidizing California customers in the amount of about $60 / MWh for all the surplus Youngs Creek power sold in the Golden State.[21]

In previous meetings and correspondence on the proposed Sunset Falls project, as well as in its 2007 Climate Change Policy (6.9.3), SnoPUD has consistently focused on their preference to generate power "in the District's backyard." This language and documentation clearly paints both Youngs Creek and Sunset Falls as local projects benefiting local ratepayers by helping them

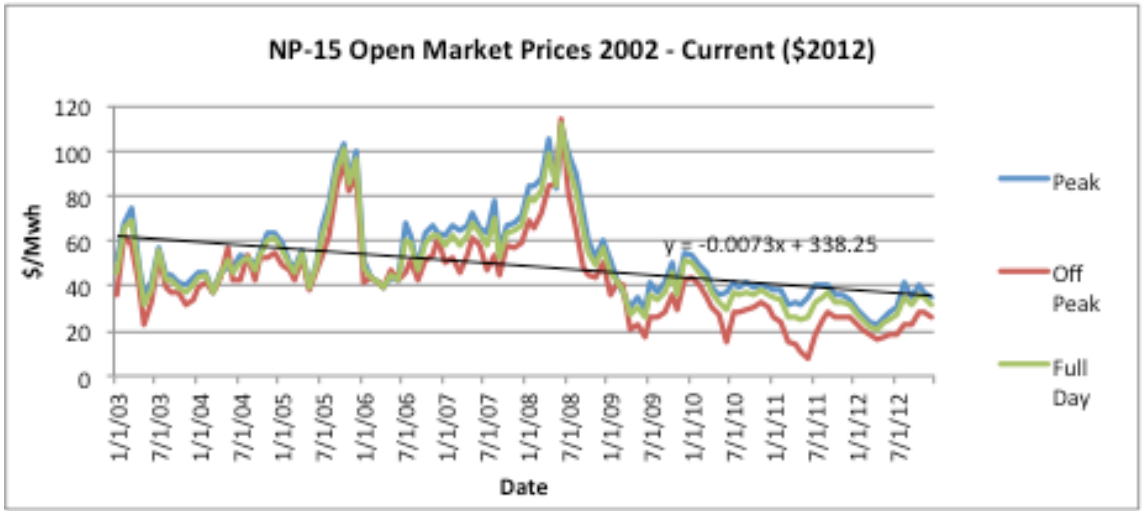
[21] None of this is meant to imply that SnoPUD is, or will be, careless regarding the manner price at which they sell and price surplus power. They undoubtedly endeavor to get the highest return possible. RME's bigger point is that when companies seek power to supply their winter load, they should, if possible, avoid projects that produce the majority of their power in the spring when the market is flooded with cheap energy and prices are low.

control the cost of power, no requirement to wheel power[22], and generating enough renewable power to supply about 10,000 homes.

Given that Sunset Falls' spring production peak would be even higher than that of Youngs Creek, it is reasonable to assume that SnoPUD would be similarly tempted to register Sunset Falls for the purpose of selling power to California as well.

[22] Wheeling refers to the transfer of electrical power through transmission and distribution lines from one utility's service area to another's. The wheeling may be a short-term event from a company with surplus power to a utility in need. Or, wheeling may be a long-term activity moving power from remote generation sites to a utility's service area.

4 SUNSET FALLS COMPARED TO OPEN MARKET OPTIONS



Open market prices peaked at roughly $115 / MWh in mid-2008. It took roughly one year from the peak for the prices to dip below $40 / MWh. There was a brief, seasonal, partial correction, after which they continued to decline at a slower pace. In inflation adjusted, 2012 dollars, average open market prices at NP15, the metric for Northern California, are now about $33 / MWh. At MidC, the main Pacific Northwest trading hub, prices are about $3 / MWh lower than NP15.

There are regulatory requirements, profit motives, and other reasons behind utilities' desires to construct their own resources. And, there are reasons why the open market for power is often cheaper than average utility prices; such as regulatory requirements and the lack of access by the general public to wholesale markets.

The bigger point is that for the relatively small amounts of power SnoPUD proposes to acquire by developing Sunset Falls, purchasing on the open market can be a very attractive option.

In this case, purchasing open market power is an option that has the long term ability to supply SnoPUD's needs, year round, with no capital outlay, for about $120 / MWh <u>less</u> than Sunset Falls could, and about $30 - $35 less than most of the options listed in SnoPUD's PAD.

If Sunset Falls came in at the high cost estimate of $175 million, the energy it produces would be about $170 / MWh higher than open market prices.[23]

[23] For FERC purposes, inflation is ignored and all prices are stated in current dollars. The reason is that inflation is unknown. To compensate, interest rates are necessarily held at very low rates, typically in the 3% to 5% range.

5 SUNSET FALLS AS A COMPLEMENT TO INTERMITTENT ENERGY SOURCES, SUCH AS WIND AND SOLAR

Hydro as a complement to wind/solar typically refers to storage-reservoir hydro (or pump storage hydro) that can, to a greater or lesser degree, modify its time of generation by anywhere from a few hours, to several days, or even weeks.

Sunset Falls, however, would be a run-of-river project. The term "run-of-river hydro" means that the plant would generate power on a moment-by-moment basis depending on how much water is flowing in the stream. When runoff is high in the late spring, the project would generate its highest levels of output. When stream flows are at their minimums, such as in late summer, the plant might not operate at all.[24]

Sunset Falls would, effectively, have no storage at all. The stilling basin would hold, at most, a few minutes worth of generation. It would be functionally impossible for Sunset Falls to store water in an attempt to defer generation to a later point in time when a wind or solar plant is not operating.

A Few General Observations About the Primary Forms of Northwest Generation.

1. No generation plant by itself is 100 percent reliable. That is true whether one talks thermal, wind, solar, hydro, etc.

2. System reliability only starts to kick in when there are enough plants, strategically located, to provide overlapping layers of generation to backup other generators when one or more are down for any reason.

3. Thermal plants tend to have the highest power factors, the highest potential ratios of "up" time. However, even they need to shut down periodically for repairs and maintenance, thus, again, necessitating the existence of other plants to provide backup.

4. Wind has the advantage over solar in that it blows both day and night. And, it has the advantage over hydro in that it blows in all four seasons of the year.

5. Wind does not always blow at the same speed, or at all. Exactly the same is true of

[24] It may be worth noting that, technically, it is possible for run-of- river projects to compliment wind and solar plants in a negative fashion. By negative it is meant that most generating facilities can operate at less than 100 percent. In other words, if for some reason SnoPUD wanted to shape their supply volumes while also maximizing the amount of solar or wind being utilized, such as some of the take-or-pay PURPA contracts for wind, they could run Sunset Falls at less than full capacity. However, while such an act is possible, in practice it is rarely, if ever, used. The reason it is never done is that utilities take every opportunity to recover the cost of their plants and secure their bottom line. Since the fuel, falling water in this case, is free, it is almost always advantageous for the utility to run the plant and offer the excess power on the open market.

hydro. Hydro is typically touted as a major asset for the northwest but streams, like wind, do not always flow at the same levels, or at all.

6. Solar is criticized for the fact that it gets dark every night. That said, at least in the west, solar generation is a remarkably good fit with seasonal air-conditioning and irrigating loads. And, storage techniques are coming to the fore that addresses the time shifting problem.

7. Hydro is often thought of as reliable but seasonal variations in stream flow can cause hydro capacity to vary by 50 percent or more between peak runoff and dry seasons. And, droughts, whether local or continent wide, can reduce power factors even further, on both a plant-by-plant and a system-wide basis. The resulting power factors for hydro in drought years may drop to the 20 to 30 percent range.[25]

To summarize, the northwest, a region already awash in hydro energy, the bulk of which peaks in the spring, needs more diversification into forms of energy with overlapping seasonal production curves, not another hydro plant like Sunset Falls that will peak at the same time as other northwest hydro plants.

[25] For any utility to claim that a project will provide enough energy for a finite number of homes, the project cannot have down years, down seasons, or even down months. If a project is going to be down on a routine basis, the utility needs to factor in the cost of backup systems.

6 SUNSET FALLS RELIABILITY

Sunset Falls would not be much better than wind or solar when it comes to the firmness of its generation.

Wind and solar plants often have production factors as low as 30%. In other words, the amount of power they produce because the wind or sun is often sub-optimal, which means the plants, on an annual basis, only generate about 30% of their potential.

A few hydro projects have capacity factors in excess of 85%. Sunset Falls however, would not be so lucky. The fact that it would shut down due to low water flows for much of late summer knocks the project below about 60 percent from the outset. Sub-optimal flows for all but about two of the remaining months would have a further negative effect. Finally, the vagaries of the weather mean that, in all but the biggest runoff months, there is always a chance that Sunset Falls would not operate.

SnoPUD estimates that Sunset Falls would have a long-term average capacity factor of only 50%. Worse, in bad years, the plant would operate at as little as 31% of its capacity.

The following table lists the number of years out of the last one hundred that Sunset Falls would have produced zero power in each of the various months if the cutoff point were 900 cfs. Note that the only months it would always run are April, May, and June, similar to the production timing of main stem hydro plants on the Columbia, etc. Also note that during SnoPUD's peak load period of November through February, the period where the PUD claims Sunset is a good fit, the project would miss all of February ten times in one hundred. January is almost as bad at eight missed years out of one hundred.

Number Of Years Out Of 100
That Sunset Falls Will Produce Zero Power for Entire Months

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Down Years	8	10	2	0	0	0	13	79	75	30	6	2
Percent Not Operating	7%	9%	2%	0%	0%	0%	12%	71%	68%	27%	5%	2%

Note – Down years do not equal percentages because of a lack of data in some years.

One final note. Plants with highly variable production such as Sunset Falls cannot be considered to be firm power. Plants such as these need backup production alternatives.

For Sunset Falls to reliably supply power to 10,275 homes, as SnoPUD repeatedly claims, it needs to be backed up by either a thermal plant, or a purchase power agreement, a load shedding program, or some other alternative, for times when Sunset Falls is not producing.

Reserves of that nature cost money, and they are costs that SnoPUD has not included in the current set of estimates.

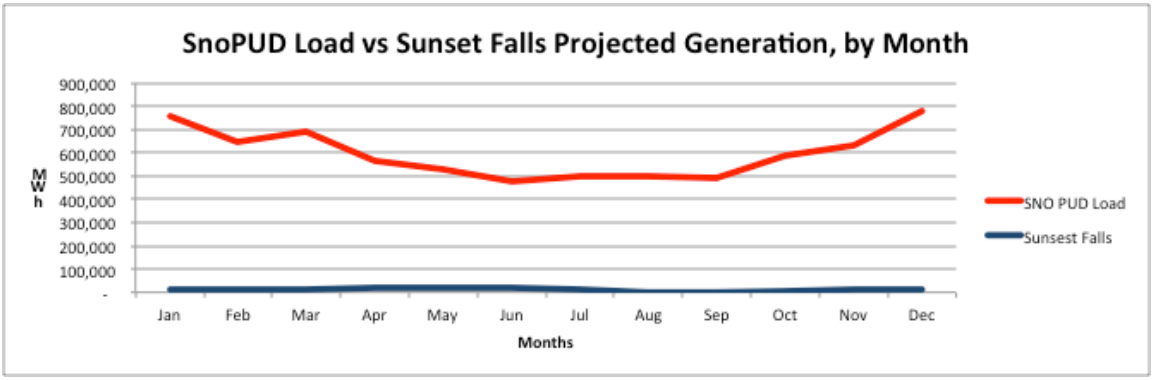
7 SUNSET FALLS' GENERATION vs. SNOPUD LOAD CURVE

Sunset Falls' generation curve is not a good fit to SnoPUD's load curve.

- First, the Skykomish peaks in late spring, same as most rivers in the Pacific Northwest. SnoPUD's load peaks in December and January.
- Second, in late summer, the Skykomish dries up to the point that generation is impossible. Since SnoPUD's load curve shows no corresponding reduction to zero, it is incorrect to say the two curves "fit".
- Third, while the Skykomish does have a winter sub-peak that coincides with SnoPUD's winter load peak, Sunset Falls ability to help cover SnoPUD's winter load would be less than half of its ability to cover SnoPUD's spring energy requirements.

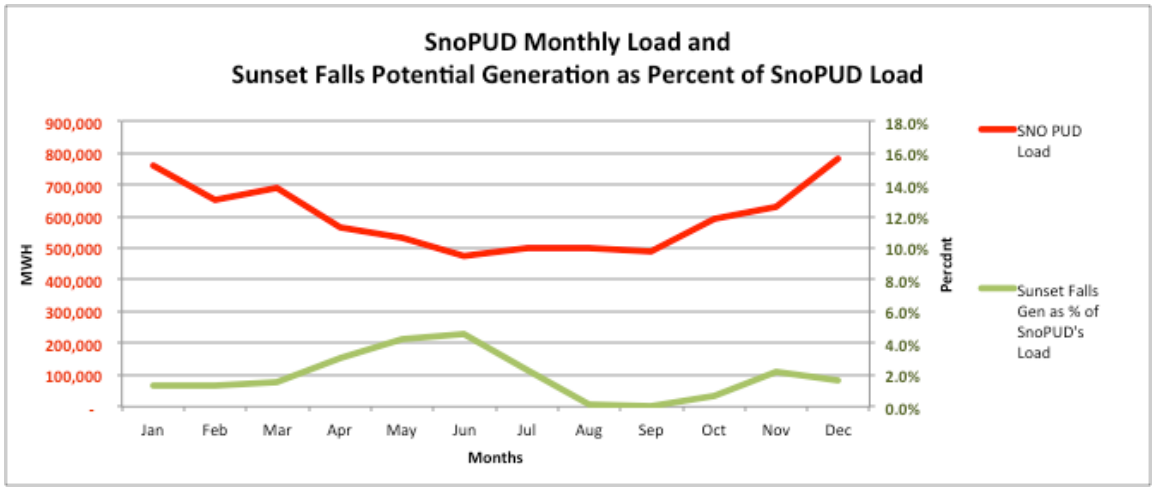
Sunset Falls is a very small piece of SnoPUD's generation picture. The following graph shows SnoPUD's monthly load in MWhs. At the bottom of the graph, hugging the bottom axis is Sunset Falls' projected generation, also in MWh.

Clearly, Sunset Falls does very little to contribute to SnoPUD's power requirements.



Source: SnoPUD PAD and RME.

The chart below again shows SnoPUD's load curve, but in this case shows Sunset Falls' potential generation as a percent of SnoPUD's load, by month.



Source: SnoPUD PAD and RME.

Sunset Falls' projected contribution to total SnoPUD load never exceeds 5 percent, and most of the year is less than 2 percent. For two months, it bottoms out at zero percent.

Sunset Falls would be able to generate about 5 percent of load when SnoPUD's load curve bottoms out in late spring, the time when SnoPUD needs it least.

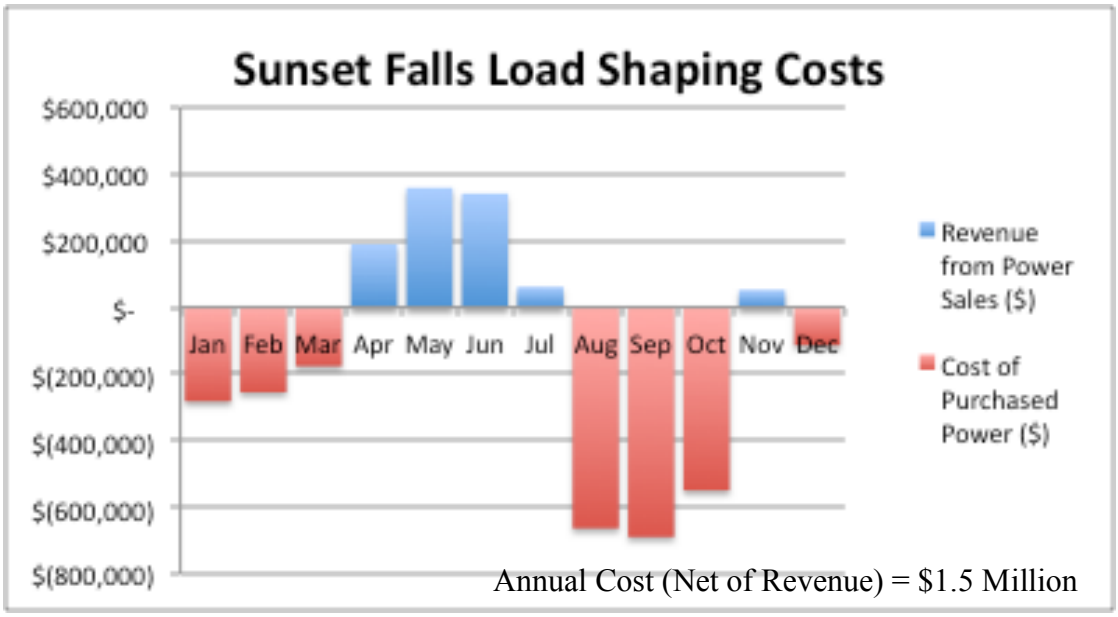
In winter, at the peak of SnoPUD's load, when SnoPUD needs additional generation most, Sunset Falls would only be able to supply about 2 percent of load.

Again, Sunset Falls is simply too small to have much impact, but its biggest impact is in June, when SnoPUD needs it least and surplus power for purchase from other sources is both plentiful and cheap.

8 LOAD SHAPING COSTS – SUNSET FALLS

SnoPUD makes repeated references to Sunset Falls' generation as being sufficient to power 10,275 homes. It is true that 10,275 homes in SnoPUD's system use about the same amount of power in an average year as Sunset Falls could produce.

However, as discussed in the previous section, Sunset Falls' generation is not a good fit to SnoPUD's load curve. This has financial and managerial consequences.



In late spring and early summer, Sunset Falls' generation would be peaking at a time when SnoPUD's load is at its lowest point of the year. This means Sunset Falls would be producing power well in excess of the amount those 10,275 homes need. This would be surplus power and SnoPUD would have to sell it to some other market in an effort to recoup some of the project's cost. This is a routine procedure. The problem is that there is a lot of surplus hydro being dumped on the market each spring, causing market prices to plummet. Sunset Falls' surplus power could be sold, but the price would be low.

In the fall, when SnoPUD's load builds toward its winter peak, Sunset Falls would be off line for two to three months. With little or no power coming out of Sunset Falls to service those 10,275 homes, SnoPUD would have to purchase power from some other source. Again, this is routine but the cost of the power would be at yearly highs. Most hydro facilities in the west experience low stream flows this time of year, and air conditioning and irrigating loads in other markets are high. The combination of these events drives market prices to their highest point of the year.

SnoPUD would also have to purchase power from December through March when Sunset Falls' production is insufficient to meet these 10,275 home's needs.

RME looked at the cost of shaping Sunset Falls' power in a manner that would make it possible to reliably service 10,275 homes. Using SnoPUD's methodology for evaluating projects such as Sunset Falls, as presented in the Mid-Term Assessment of the 2010 Integrated Resource Plan, RME valued Sunset's surplus power at open market prices, and the cost of purchased power at the cost of deferring a base load geothermal plant.[26]

For open market rates RME used the 2009 through current averages, by month, for NP15. Note these prices have been trending downward, so the average used here is a little higher than the most current prices. Also, NP15 is historically about 3 $/MWh higher than Mid-C, the market where Sunset Falls power would have to be marketed. In other words, there is a $3 - $4 / MWh cushion in SnoPUD's favor built into the selling prices used by RME.

For a geothermal power cost source RME used SnoPUD's estimates for the costs of geothermal as presented in their Mid-Term IRP. Calculations based on SnoPUD's information produced a power cost of about $76 /MWh.

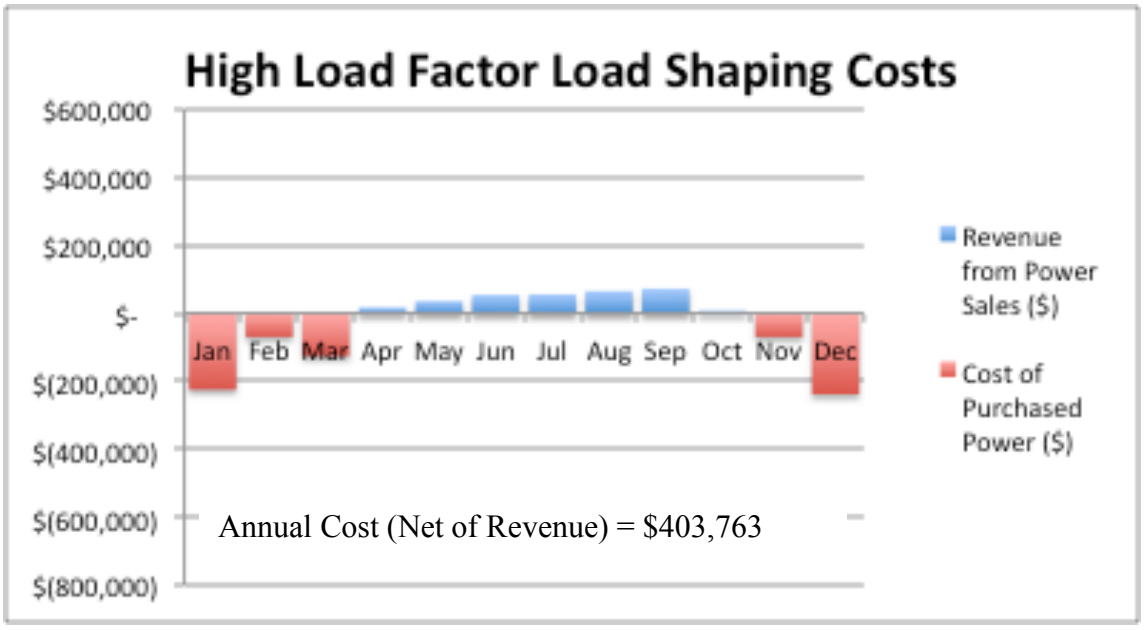
The revenues and costs associated with this methodology are presented in the chart at the top of the previous page. Summed over the course of a year, on average, the total cost of shaping Sunset Fall's proposed generation in a manner that would truly make it a viable resource for 10,275 homes would be $1,513,873.

[26] "For the years when the District has sufficient supply-side resources, avoided power costs were set equal To wholesale energy market prices. For the years when the District requires new power supplies to meet its load growth, avoided power costs were calculated using the value of deferring development of a base load geothermal power plant." SnoPUD, Mid-Term Assessment of the 2010 Integrated Resource Plan, pp. 8.

9 LOAD SHAPING COSTS – NON-HYDRO, HIGH LOAD FACTOR PLANTS

Given that SnoPUD makes repeated claims about the timing of water flows, and the manner in which it conforms, in a beneficial way, to SnoPUD's load curve, it is reasonable to investigate the magnitude of Sunset Falls' benefit relative to other generating alternatives with high load factors. The result, it turns out, is not very good.

To test this alternative, RME compared the generation of geothermal, combined cycle, animal waste, wood, and waste water treatment plant energy recovery plants, or some combination of each, that produce exactly that same amount of power in a year as Sunset Falls is projected to produce. The only difference would be that, instead of producing in a manner that mirrors the flows in the Skykomish, these plants would produce roughly equal amounts of power every month of the year.[27]



Similar to the Sunset Falls case, these plants would have to purchase supplemental power in the winter months. And, while the amount of supplemental power needed in December would be higher than for Sunset Falls, it would be much lower for the months of January, February, and March.

In late spring and summer, when Sunset Falls would be producing well in excess of demand, and dumping the surplus on the open market, these alternative plants would also be selling surplus

[27] The chart and its supporting data are not dependent on the type of plant. Rather, it is dependent on the uniformity of production on a monthly basis over the course of a year.

power on the open market. However, the amount of surplus sales would be greatly reduced. For instance, in June, when Sunset Falls would be dumping as much as 13,000 MWh of energy on the open market, these alternatives would only be wasting about 2,000 MWh on such sales.

Finally, in August, September, and October when the Skykomish is barely flowing, forcing SnoPUD to augment Sunset Falls' generation with 7,000 to 9,000 MWh of purchase power each month, high load factor plants would be within 2,000 MWh, +/-, of break even.

The only month, in which theses alternative plants would need more supplemental purchased power than Sunset Falls, would be in December. In no instance would they waste more power on the open market than would Sunset Falls.

In short, it would cost about $1,513,873 to shape Sunset Falls' generation each year to make it suitable to support 10,275 homes. Shaping the same amount of power from a plant with a 90 percent load factor would only cost about $403,763, a savings of about $1.1 million every year.

10 ECONOMIC BENEFIT

SnoPUD does not dedicate extensive copy to the subject of Sunset Falls' economic benefits in the Pre-Application Document (PAD) it prepared for the FERC licensing process. What.it does provide is overstated and misleading. The two following sections form the bulk of SnoPUD's statements on this issue.

> "6.9.3.6. Project Contribution
>
> > Be in the District's backyard, providing jobs to local individuals and would not require wheeling of power or long transmission lines
> >
> > Help provide economic development and jobs within our own community[28]
>
> 6.9.5. Project Effects
>
> > 6.9.5.1. Economy
> >
> > The socioeconomic impacts of the Project in the Project Vicinity are beneficial; there are no substantive detrimental socioeconomic impacts associated with the proposed Project. Short-term beneficial impacts to the socio-economic conditions in the Project Vicinity will include employment and corresponding spending of approximately 480 full-time workers (onsite or distributed through the supply chain) for approximately thirty months. Sales tax generated from Project construction would be on the order of $11.6 Million for local governments. Long-term beneficial impacts include converting a small portion of the Project Boundary from forestry land use to wildlife habitat management lands which will benefit the terrestrial and aquatic species of the area.[29]"

First, the increase in jobs in the local area would be limited to the 30 months during project construction. Of the estimated $133,000,000 construction cost, roughly half of the total would go to firms out of the region who manufacture the major components such as turbines, generators, wire, transformers, circuit breakers, etc. Of the half that is spent on local activities, some portion would necessarily go to members of specialized trades, such as hard rock miners. While these people would spend a portion of their wages locally, they would also take a substantial portion with them back to their homes and families in other locations. In short, while it is true that there would be a positive short-term economic impact to the Index area during the

[28] PAD, pp. 274
[29] PAD, pp. 277

construction phase, the impact would be a fraction of the $133 million suggested by SnoPUD.[30]

Keeping in mind that short-term economic benefit to the Index and SnoPUD areas would only be a fraction of the total cost of the project, SnoPUD ratepayers would necessarily be liable for the full cost of the project. In this manner, the project would result in a net transfer of wealth out of the SnoPUD region.

Second, economic benefits to the Index area associated with the ongoing operation of the plant beyond the construction phase are effectively zero. As noted in the PAD:

> "5.2.11.5. Supervisory Control and Data Acquisition (SCADA)
>
> A computerized control system will be installed to permit automatic station operation. When the powerhouse is operating automatically, the computer will start and stop the turbine(s), synchronize the generator, and control the wicket-gates. The computer will also log data and act as a **remote** terminal of a SCADA system. Manual and semi-automatic operation of the station will also be possible."
> (Emphasis added, RME)

In other words, the plant's operation would be computerized. Those portions of ongoing operations that are not computerized would be handled from a remote location. There would be no office and no ongoing jobs in the Index area directly associated with maintaining and operating this project.

Third, when SnoPUD says that the Sunset Falls project "…would not require wheeling of power or long transmission lines," they ignore the fact that they would almost certainly be selling surplus power in the spring [31] and purchasing power when Sunset Falls is down in the late summer, processes which necessarily require power wheeling.

Fourth, SnoPUD glosses over two negative impacts of the project. The power from the project would be between 3 and 4 times the cost of power they currently provide to their ratepayers. In that manner SnoPUD would be taking a direct step towards increasing the cost of energy to their customers well in excess of what would occur if they pursued lower cost alternatives. As for the homeowners in the vicinity of the proposed project, SnoPUD would be degrading the waterfall that is part of the reason these people chose to live in that area. The result is that if the Sunset Falls Project were constructed, SnoPUD would diminish the value of these people's property as well as their quality of life.

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[30] SnoPUD does not claim the whole amount will occur locally. At the same time, they do little to discourage others from arriving at that conclusion. RME prefers to put a sharper pencil to such issues to make sure people have a clearer picture of potential project results.

[31] Or, alternately, defer purchases from BPA, who would then be forced to turn around and sell the equivalent amount of power, which amounts to the same thing from an economic perspective.

11 APPENDIX A – PRODUCTION COST DETAIL

Sunset Falls Production Cost and Assumption Detail

RME Line Number	Summary Sheet		Base Case	Rounded Range Of Total Project Cost (High +30%)	(Low -20%)
1		Annual MWh Sales	120,000	120,000	120,000
2					
3	Acct No.	Description / Amount	($)		
4	330	Land and Land Rights	$8,361,000		
5	331	Structures and Improvements	$8,909,000		
6	332	Reservoirs, Dams, and Waterways	$33,600,000		
7	333	Turbines and Generators	$20,333,000		
8	334	Accessory Electrical Equipment	$570,000		
9	335	Misc. Mechanical Equipment	$1,556,000		
10	336	Roads and Bridges	$2,040,000		
11	353	Substation Equipment	$235,000		
12	355	Transmission Lines	$13,155,000		
13		Estimated Costs Subtotal	$88,759,000		
14					
15		WSST @ 8.6%	$7,633,274		
16		Subtotal	$96,392,274		
17					
18		Contingency Allowance (+20%)	$19,278,455		
19		Total Estimated Direct Cost	$115,670,729		
20					
21		Owner costs & Engineering (10%)	$11,567,073		
22		Owner Administration (5%)	$5,783,536		
23		TOTAL COST	$133,021,338	$175,000,000	$110,000,000
24					
25		Pre Const Debt Service (30 Months)	$8,358,228	$10,995,905	$6,911,712
26		INSTALLED COST	$141,379,566	$185,995,905	$116,911,712
27					
28		Years	20	20	20
29		Interest Rate	5.0%	5.0%	5.0%
30		RAW ANNUAL REVENUE RQMT.	$11,344,662	$14,924,793	$9,381,298
31		$ / MWh	$94.54	$124.37	$78.18
32					

33	M&O @ 5%	$7,068,978	$9,299,795	$5,845,586
34	**ANNUAL REVENUE RQMT. INCLUDING M&O**	**$18,413,641**	**$24,224,588**	**$15,226,884**
35	**$ / MWh**	**$153.45**	**$201.87**	**$126.89**
36				
37	Load Shaping Costs	$1,513,873	$1,513,873	$1,513,873
38	**ANNUAL REVENUE RQMT. INCLUDING M&O AND LOAD SHAPING COSTS**	**$19,927,513**	**$25,738,460**	**$16,740,756**
39	**$ / MWh**	**$166.06**	**$214.49**	**$139.51**
40				
41	Aesthetics Value	$2,472,300	$2,472,300	$2,472,300
42	Aesthetics Mitigation (Annualized)	$198,384	$198,384	$198,384
43	**ANNUAL REVENUE RQMT. INCLUDING M&O, LOAD SHAPING AND AESTHETICS COSTS**	**$20,125,897**	**$25,936,844**	**$16,939,140**
44	**$ / MWh**	**$167.72**	**$216.14**	**$141.16**

Notes

Line No.	
1	PAD, Part 2, pp. 18.
3-23	PAD, Table 6.9-13.
21	Line 25 below details the interest expense on construction costs incurred prior to project startup. It is possible that some of those same costs are also included in line 21. This seems unlikely. Such costs are usually listed more transparently. However, RME is, and the reader needs to be, aware of this possibility.
25	The interest (@ 5% per Annum) on line 23 assuming accrues evenly over the 30-month construction period.
26	Equals line 25 divided by line 1.
28	Project bonding period in years.
29	Project bond rate
30	Line 26 amortized over 20 years at 5% interest.
31	Equals line 30 divided by line 1.
33	RME survey of FERC Form 1s. The median M&O of 43 northwest hydro facilities.is 5.87 percent of installed cost. RME used a lower 5% to give SnoPUD the benefit of the doubt for Sunset Falls
34	Line 34 plus line 30.
35	Equals line 34 divided by line 1.
37	Most of Sunset Falls" energy production would be in the spring when the needs of 10,275 customers are low. In the late summer and early fall, when demand is higher, Sunset Falls will be offline completely. Using SnoPUD's methodology for evaluating projects such as Sunset Falls, as presented in the Mid-Term Assessment of the 2010 Integrated Resource Plan, RME estimated that the cost of shaping Sunset Falls' energy production would be $1,513,873. For more detail see section 8, LOAD SHAPING COSTS – SUNSET FALLS.
38	Line 37 plus line 34.
39	Equals line 38 divided by line 1.
41	See pp. 5 for a description of the determination of

aesthetics losses.

42 Line 41 amortized over 20 years at 5% interest.

43 Equals line 42 divided by line 1.

12 APPENDIX B – PROJECT COST COMPARISON

Youngs Creek and Sunset Falls Cost Comparison

			PROJECT		
Category	**Unit of Measure**	**Notes**	**Youngs Creek**	**Sunset Falls PAD**	**Sunset Falls RME**
Generation	MWh / Yr.	1	16,907	123,900	123,900
SnoPUD Power Cost (Billed to Customers)	$/MWh	2	$34	$34	$34
SnoPUD Revenue	$ / Yr.	3	$574,843	$4,212,600	$4,212,600
Generation Cost	$/MWh	4	$96.000	$72.500	$166.063
Generation Cost per Project	$ / Yr.	5	$1,623,086	$8,982,750	$20,575,157
Profit (Loss)	**$ / Yr.**	**6**	**$(1,048,243)**	**$(4,770,150)**	**$(16,362,557)**
Profit / (Loss)	**$/MWh**	**7**	**$(62.000)**	**$(38.500)**	**$(132.063)**

Notes

1, Sources: SnoPUD letter to FERC regarding Youngs Creek operating losses, 10/31/12; SnoPUD Sunset Falls, PAD.

2, Sources: SnoPUD letter to FERC regarding Youngs Creek operating losses, 10/31/12

3, SnoPUD Revenue = MWh x Power Cost = Note 1 x Note 2.

4, Generation Cost Sources, in order: SnoPUD letter to FERC regarding Youngs Creek operating losses, 10/31/12; SnoPUD Sunset Falls, PAD; RME estimate.

5, SnoPUD Generation Cost per Project = MWh x Power Cost = Note 1 x Note 4.

6, Profit (Loss) = Note 3 - Note 5.

7, Profit (Loss) (per MWh) = Note 6 / Note 1.