

-- Draft --

Slice of the System Evaluation

1) Objective

Evaluate and identify the financial impacts resulting from the Slice of the System proposal (this in essence would be indicated by a change in BPA's power purchase costs or secondary revenues).

2) Underlying assumptions

The Slice of the System proposal provides a purchaser a proportionate share of all FCRPS flexibilities and capabilities at a fixed cost defined by a percentage of BPA's expenses. The cost to a Slice participant would be independent from the participant's use of the system. Therefore it is likely that the Slice participants would use their Slice of the System to maximize their economic value. This operation could be characterized in the following ways, the participant would -

- ◆ store as much as possible when the "market" is weak
- ◆ release storage when the "market" is good
- ◆ maximize generation on Heavy Load Hours (HLH)
- ◆ minimize generation on LLH

The potential economic impact to BPA would come from delivering to the Slice Participant more energy (than what would have been delivered under Subscription) during periods of high value. This is countered by the potential economic benefit when less energy is delivered during times of high value. This economic impact is realized through changes in power purchases or secondary energy sales.

For the analysis the Slice participants are assumed to be Seattle, Tacoma, Douglas, Grant, Chelan, Cowlitz, Snohomish, and Pend Orille. These generating Public utilities are able to use their resources to alter the demand from BPA. The base case (non-Slice case) for the analysis is a load shape on BPA similar to their historical demand.

3) Study overview

The analysis is based on the '98 50-year Rate Case study. The impact from Slice is measured in two stages. 1) The direct revenue impact from switching from a Subscription type sale to Slice. This impact is measure by subtracting the lost subscription revenues from the Slice revenues. Since these impacts are independent of water condition they will be referred to as the "Fixed Revenue Impacts". 2) The indirect revenue impacts that result from lost opportunity sales or increased power purchases. Since the Slice proposal has fixed revenues, any increase in demand over the Subscription demand (net firm load) will result in lost revenues or increased cost for BPA depending on BPA's original surplus or deficit. Since these impacts are variable depending on the water condition they will be referred to as the "Variable Revenue Impacts". The variable impact is estimated by multiplying the change in deliveries (between what would have been delivered under Subscription and what is anticipated to be delivered under Slice) by the incremental market price forecast.

-- Draft --

Slice of the System Evaluation

The Slice demand on BPA is estimated using the following steps:

1. The year is separated into 3 seasons. April through August has little or no flexibility and therefor the Slice demand is simply a percentage of BPA's generation. The two other seasons (Sep-Dec and Jan-Mar) have some flexibility and so the operation of 100% of the FCRPS was altered to reflect the anticipated Slice demand. Since the hydro regulation models and gives priority to the major operational constraints the generation output of the adjusted operation is assumed to be possible. The Slice demand is then calculated to be a percentage of the resulting generation.
2. To determine the "anticipated Slice demand" during the two seasons with flexibility, a table of market price forecasts was used to determine when the current market price was weak (below the perceived market price) or strong (above the perceived market price). The table of market prices is an incremental market price forecast for each Period in each water condition (14 Periods by 50 Water Years). The market price forecast for each period in each water year was used as the "current market price". The "perceived market price" was calculated using the 50-yr average market price of the remaining periods within the particular season. For example the market price for September 1937 (water year) is compared to the 50-Yr average of all market prices for October, November, and December. When the current price (in the particular Period and Water Year) is less than the expected price (50 Yr average), the Slice participants are expected to store as much as possible (run to 0 firm and secondary load). Otherwise draft the system down to where it operated in the Rate Case study (this is assumed to be the lower limit).
3. The FCRPS generating capability on HLH and LLH was determined using a spreadsheet approximation (a full HOSS study was not available for this analysis). The LLH capability was adjusted, if necessary, so that the sum of HLH and LLH generation match the total energy produced for the Period. The LLH generation was not allowed to be less than 3000 MWs to approximate minimum generation requirements.
4. The Slice demand was then calculated for HLH and LLH by multiplying the FCRPS generation on HLH and LLH by the percent of the system to be Sliced (see mapping below). This represents the demand from the Slice participants that BPA will serve.
5. The net change in the Federal System Firm load was computed by subtracting the original load estimate of the Slice participants' Subscription demand (HLH/LLH) from the Slice demand calculated above. The resultant increase or decrease in BPA's load is multiplied by the incremental market price for each period for each water year.

Slice of the System Evaluation

The amount any utility can take under Slice of the System is determined through a “mapping” procedure.

1. The utility’s (OY average) firm load was subtracted by its declared firm resources to determine the utility’s “net load”.
2. The utility’s “net load” is divided by BPA’s (OY average) FELCC. The resulting percentage is the maximum percent Slice of the System that the utility could take.

4) Study Results

The study results are summarized pages 4 & 5. Page 4 tabulates the “Fixed Revenue Impacts”. The decreased revenues from loosing a subscription sale (shown on the top half) are netted against the increase in revenues resulting from the Slice sale (shown on the bottom). The line numbers appearing in some of the titles provide a cross reference to the paper “FCRPS Cost Review: Background on Cost Baselines” that was handed out in a prior Slice meeting. Page 5 shows the total effects of the fixed and variable impacts. The top two charts show the load comparison between Subscription net loads and Slice demand for two extreme water conditions. The top left chart looks at the average loads/demands on HLH while the top right is for LLH. The chart on the lower left shows the net financial impact to BPA resulting from Slice. The benefit or (cost) from each water condition was plotted against its corresponding Sep-Mar historical volume at The Dalles. This seemed to have the best correlation of all indicators since the FCRPS flexibilities were only in Sep-Mar. A best fit curve was also superimposed. The results are also tabulated in the lower right showing the average of all 50 water conditions, the maximum value, and the minimum value encountered.

-- Draft --
Slice of the System Evaluation

Fixed Revenue Impacts
(revenues from Slice minus decreased Subscription sales)

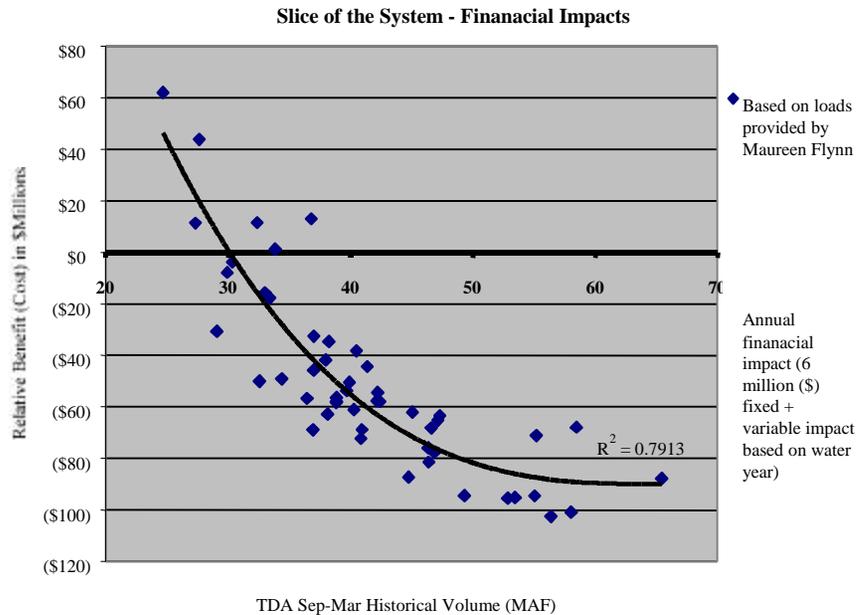
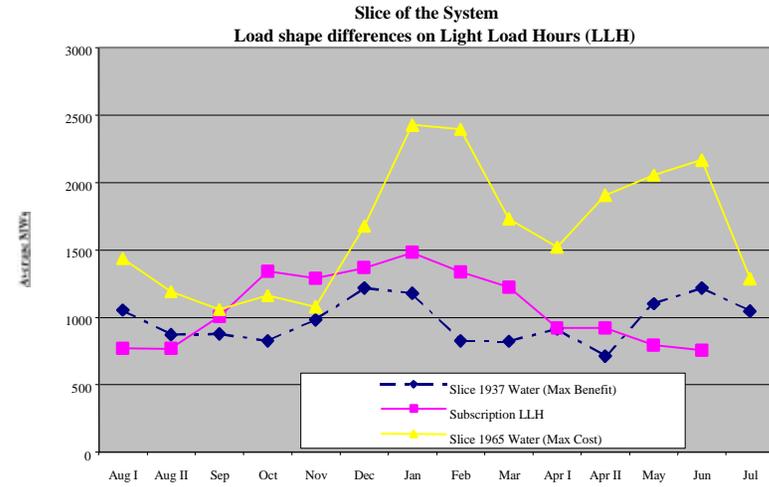
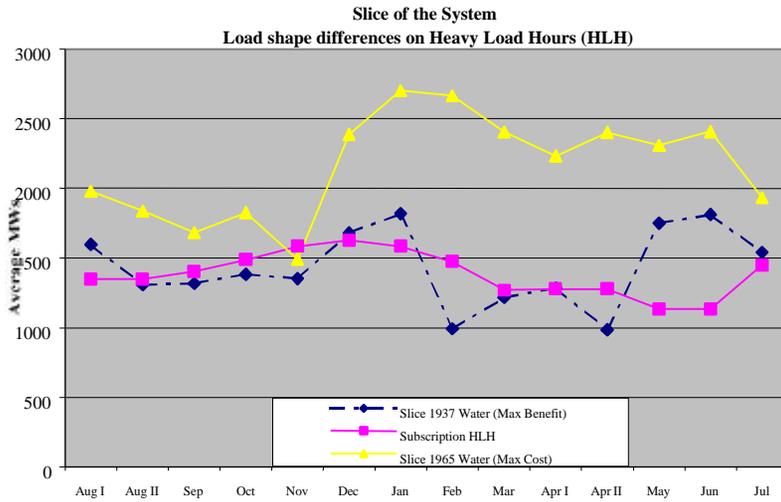
Decreased Subscription Sale

| | | | |
|----------------------------------|----|-------------------|-----------|
| Demand Charge | \$ | 3.00 | per KW-Mo |
| PF Rate | | 18.6 | mills |
| Total Annual PF Load | | 11082360 | MW-Hrs |
| Annual Demand | | 16767403 | KW-Mo |
| PF Revenue | \$ | 206,131,896 | |
| Demand Revenue | \$ | <u>50,302,210</u> | |
| Total Subscription Revenues Lost | \$ | 256,434,106 | |

Increased Revenues from Slice

| | | | |
|--------------------------------------|----|--------------------|--|
| Total Operating Expense (41) | \$ | 1,920,300,000 | |
| - Power Marketing (3) | \$ | - | |
| - ST Power Purchase (6) | \$ | 58,500,000 | |
| - Between Business Line Expense (22) | \$ | <u>236,900,000</u> | |
| BPA Revenue Requirement (Slice) | \$ | 1,624,900,000 | |
| Slice Percentage | | 16.2% | |
| Revenue received from Slice | \$ | 262,874,242 | |
| Net Gain (Loss) of Fixed Revenues | \$ | 6,440,136 | |

-- Draft -- Slice of the System Evaluation



Slice Results over 50 Water Conditions

| | 50 Yr Average | Max Value | Min Value |
|--------------------------------------|------------------|--------------|--------------|
| Subscription Load (ave MWs) | 1265.1 | 1265.1 | 1265.1 |
| Slice Delivery | 1648.0 | 2035.3 | 1257.8 |
| Maximum Slice Demand | 2210.2 | 3024.6 | 986.0 |
| Maximum Subscription Demand | 1626 | 1626 | 1626 |
| Average Slice energy price in Mills | 18.3 | 23.9 | 14.7 |
| BPA's fixed Benefit (Cost) in \$M | 6.4 | 6.4 | 6.4 |
| BPA's variable Benefit (Cost) in \$M | -56.4 | 55.6 | -109.0 |
| BPA's total Benefit (Cost) in \$M | -50.0 | 62.0 | -102.5 |