BPA Proposed Methodology to Calculate Proxy RHWMs for BPA-12 Initial Proposal

Power Rates Development

May 11, 2010

2012 BPA Rate Case Workshop

Presentation Overview

- Proposed Proxy RHWM Process (Introduction)
- Inputs to the Proposed Process:
  - Load Forecasts related to Proxy RHWM Process
  - Tier 1 System Firm Critical Output (T1SFCO)
    - HYDSIM Assumptions
    - Hydro Efficiency
    - T1SFCO Study
- Proposed Proxy RHWM Process (cont.)
- Next Steps for CHWM Implementation

Refresher on CHWMs, RHWMs and Rate Case Inputs

- Under BPA's Tiered Rate Methodology (September 2009):
  - A **High Water Mark** is a rate construct that sets the amount of federal power that a customer is eligible to purchase from BPA at Tier 1 rates, subject to its Net Requirement.
  - **Contract High Water Marks (CHWM)** provide a one-time bench mark that goes into a customer's contract and will not change except in special limited circumstances.
  - The **Rate Period High Water Mark (RHWM)** is calculated prior to each rate case in the RHWM Process. This process "adjusts" the CHWM amount for any changes in the Tier 1 System Firm Critical Output (T1SFCO) to obtain the RHWM.
  - The **RHWM Process** also provides inputs for the rate case, including RHWM Augmentation, RHWM Tier 1 System Capability, Above-RHWM (AHWM) load and forecast power sold under the Load Shaping Charge that are used to calculate billing determinants.

Transition Issue for the BPA-12 Rate Case

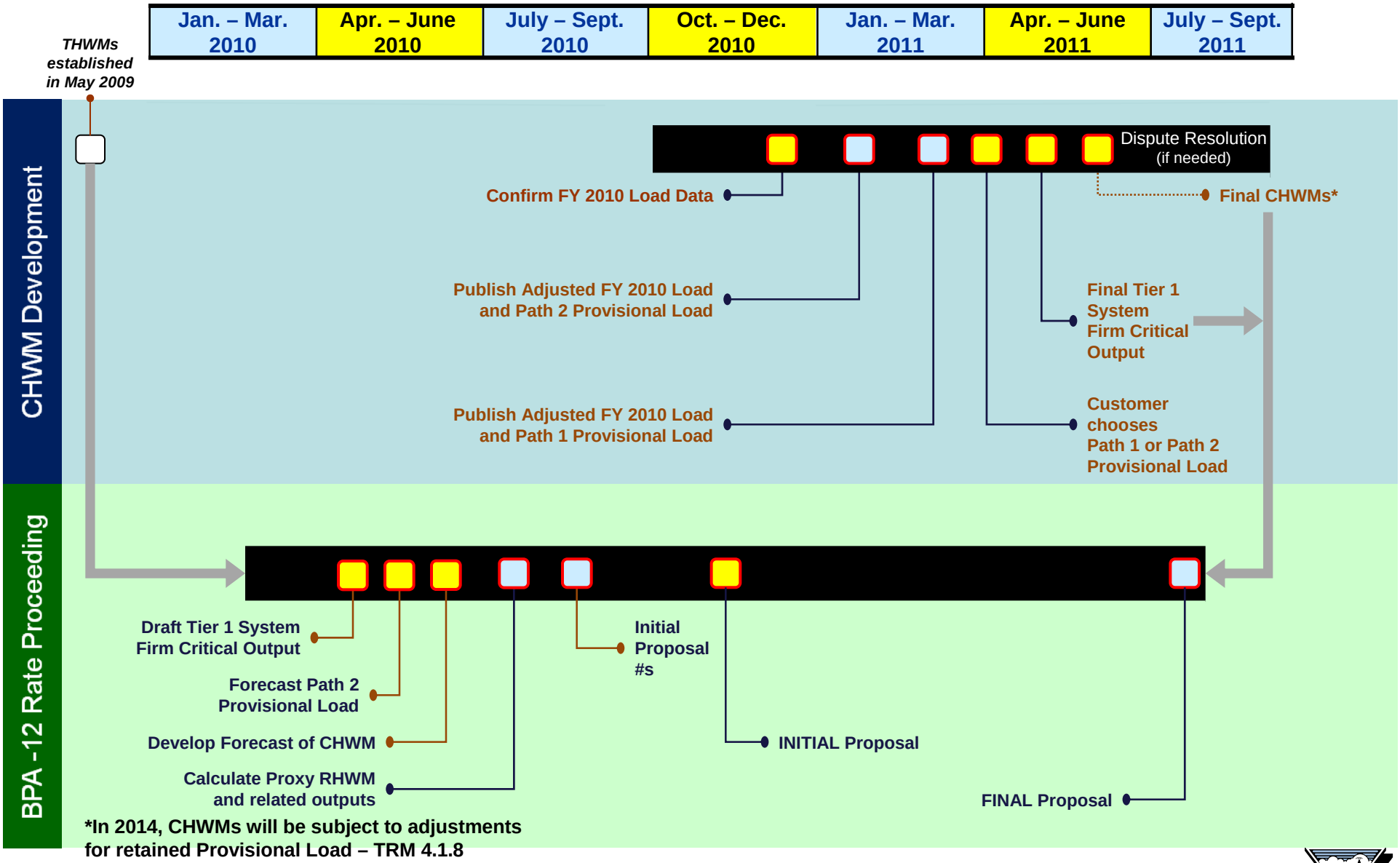
- **CHWM Process Timing**: CHWMs will be calculated in the CHWM Process in mid FY 2011, using each customer's Measured FY 2010 Load. When the TRM was finalized, we knew that CHWMs would not be available in time for two HWM-related milestones:

  1. For Above-RHWM (AHWM) load service elections in Nov 2009. Transition High Water Marks (THWM) based on forecast FY 2010 load data were developed to define customers' AHWM load, so customers could make contractually-required load service elections for AHWM load. The load forecasts were well-vetted with customers.

  2. To provide needed inputs (through the RHWM Process) for the Initial Proposal for BPA-12 rate case.

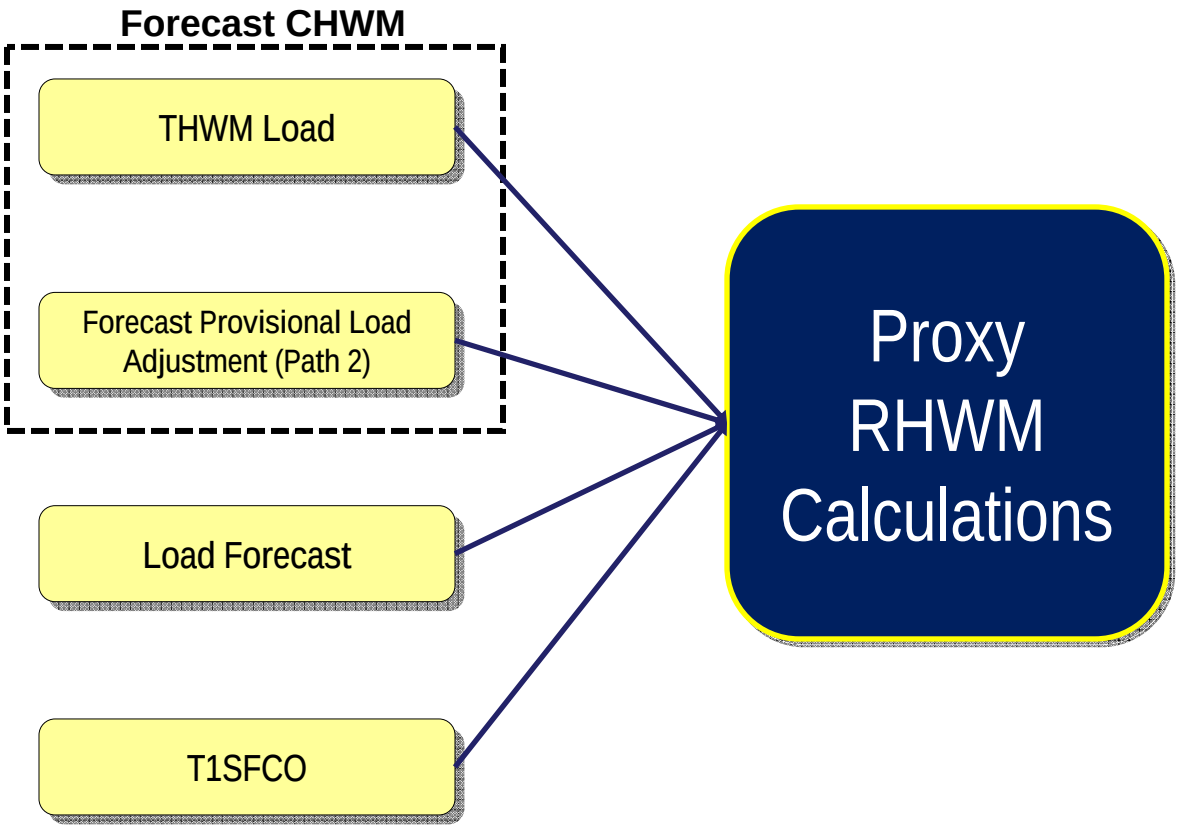
- This presentation proposes a solution for this second transition-period timing issue and is further illustrated in the next slide.

Scheduling and Inputs

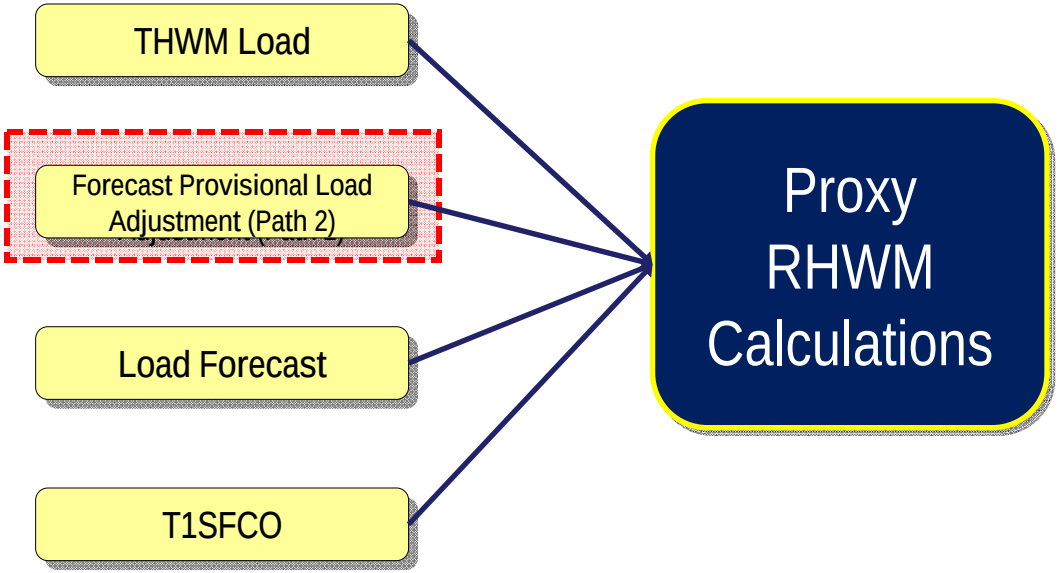


*In 2014, CHWMs will be subject to adjustments for retained Provisional Load – TRM 4.1.8

Inputs for the Proxy RHWM Calculation



Load Forecasts Used in the Proxy RHWM Process



Load Data Sets Used in the Proxy RHWM Process

- Load Forecast for THWM (May 2009; also used for WP-10 initial proposal)
- Adjusted FY 2007-08 Load and forecast Adjusted FY 2010 Load (for Path 2 Provisional Load Adjustment)
- Forecast FY 2010 TRL (used to calculate T1SFCO)

Path 2 Provisional Adjustment

- Following the TRM process to develop Adjusted FY 2007-2008 Load.
  - Customers have reviewed the 2007 & 2008 data to make sure it is correct.
  - Customers have reviewed the 2004-2009 data that will be used for weather normalization.
  - A single customer-reviewed methodology was applied to 2004-2009 data to determine weather coefficients.
  - Difference between normal and actual weather was calculated.
  - Weather coefficients are applied to the weather difference to determine the load difference due to non-normal weather.
- The process is underway. The calculations in the appendix are based on the best available data as of May 11.

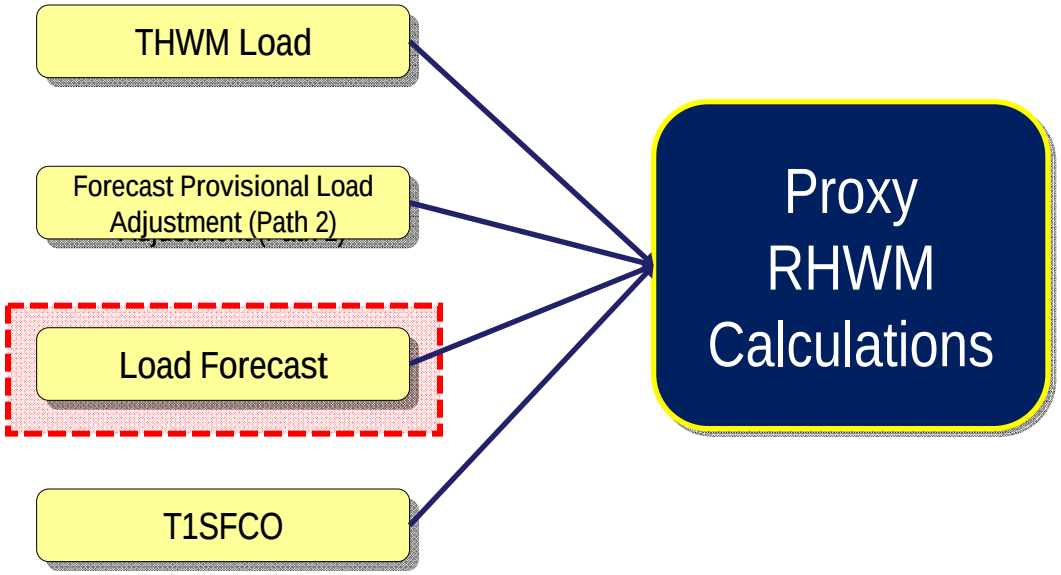
Path 2 Provisional Adjustment (cont.)

- Following the TRM process as outlined.
  - Normal irrigation calculated as the five-year average.
  - Weather adjustment and normal irrigation used.
  - Conservation adjustment applied.
  - NLSL loads removed where applicable.
  - Use average of 2007-2008 adjusted loads used to forecast Path 2 provisional adjustment.
- Values and process will be made available to customers.

Path 1 Provisional Adjustment

- Will use a place holder value of zero.
- Expect few Path 1 Load Adjustments to occur because of threshold requirements:
  - Preliminary process will begin with customers after Adjustment 2007-2008 Load for Path 2 is finalized.
  - Referring to the Scheduling & Inputs chart on page 5, customers will make choice about Path 1 or Path 2 in April 2011.
- Will calculate in the CHWM Process.

MARCH 2010 FORECAST OF TOTAL CUSTOMER LOADS



Regional Economic Situation

- Employment recovers differently. Employment growth happens more quickly in WA & ID:
  - ID & WA return to pre-recession employment levels in early 2012, MT late 2012, OR 2014

Total Employment (thousands)

Calendar Year	2007	2008	2009	2010	2011	2012	2013
ID	654.9	648.7	609.7	606.4	620.2	**641.6**	660.3
MT	444.8	445.7	429.2	426.9	431.4	440.1	**447.7**
OR	1,731.20	1,718.50	1,612.90	1,591.70	1,614.20	1,660.30	1,699.70
WA	2,933.60	2,959.10	2,825.80	2,808.10	2,863.00	**2,941.00**	3,003.70

Total Employment growth rate (%)

Calendar Year	2007	2008	2009	2010	2011	2012	2013
ID	2.6	-0.9	-6.0	-0.6	2.3	3.4	2.9
MT	2.3	0.2	-3.7	-0.5	1.1	2.0	1.7
OR	1.6	-0.7	-6.1	-1.3	1.4	2.9	2.4
WA	2.6	0.9	-4.5	-0.6	2.0	2.7	2.1

Global Insights- Apr 2010 forecast

Regional Economic Situation

- Despite job growth, unemployment remains high longer, impacting consumers and state growth

Unemployment Rate (%)

Calendar Year	2007	2008	2009	2010	2011	2012	2013
ID	3	4.9	8	8.9	8	7.3	6.7
MT	3.5	4.6	6.2	6.6	6.2	5.9	5.5
OR	5.1	6.5	11.0	10.6	10.0	8.6	7.5
WA	4.5	5.4	8.9	9.1	7.9	7.1	6.7

Global Insights- Apr 2010 forecast

Regional Economic Situation

- Population growth rates do not return completely to pre-recession levels for some time.
- Spending on housing does not return quickly.

Population Growth rate (%)

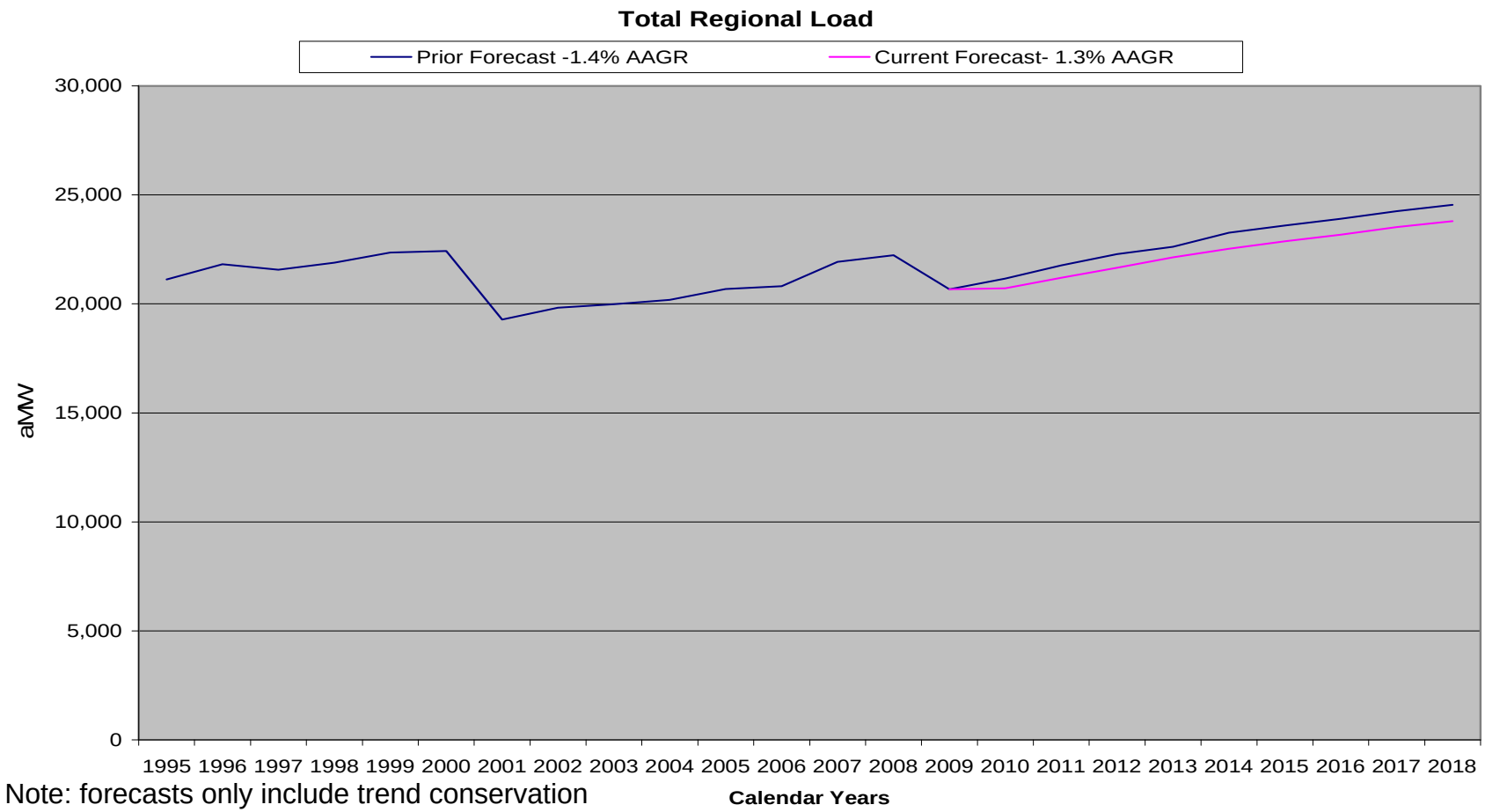
Calendar Year	2007	2008	2009	2010	2011	2012	2013
ID	2.3	1.8	1.3	1.3	1.5	1.6	1.8
MT	1.2	1.1	0.7	0.7	0.8	0.8	0.8
OR	1.5	1.3	1.1	1.1	1.1	1.1	1.1
WA	1.5	1.5	1.5	1.4	1.4	1.3	1.3

Housing Starts

Calendar Year	2007	2008	2009	2010	2011	2012	2013
ID	10981.0	6688.0	4868.0	5874.0	9524.0	12395.0	13396.0
MT	3599.0	2351.0	1519.0	1439.0	2070.0	3053.0	3638.0
OR	19356.0	11350.0	6689.0	10373.0	18762.0	23761.0	25289.0
WA	41487.0	28259.0	15598.0	21155.0	32646.0	39518.0	43089.0

Global Insights- Apr 2010 forecast

Current forecast lower than the forecast prepared March 2009 due to updated recession assumptions and impacts.



Note: forecasts only include trend conservation

Summary of changes from the last forecast for preference customers

- Preference customer total retail load forecasts have shown little change for FY 2010 but a more significant change in later years.
  - Recessionary declines were accurately reflected in last forecast.
  - Slower recovery from the recession lowered growth rates.

	Current Forecast 2010 aMW quantities	2010 aMW change	2028 aMW change	Original average annual growth rate	Current average annual growth rate
Load following generating publics	1,765.7	(6)	(170)	1.4%	1.0%
Load following non-generating publics	2,755.7	0	(83)	1.5%	1.4%
Non-load following generating publics	3,420.3	(25)	(388)	1.4%	1.0%
Non-load following non-generating	1,028.7	5	(16)	1.5%	1.4%
Federal Entities (Inc USBR)	311.2	0	(10)	3.2%	2.8%
Total	9,281.6	(26)	(667)	1.5%	1.1%

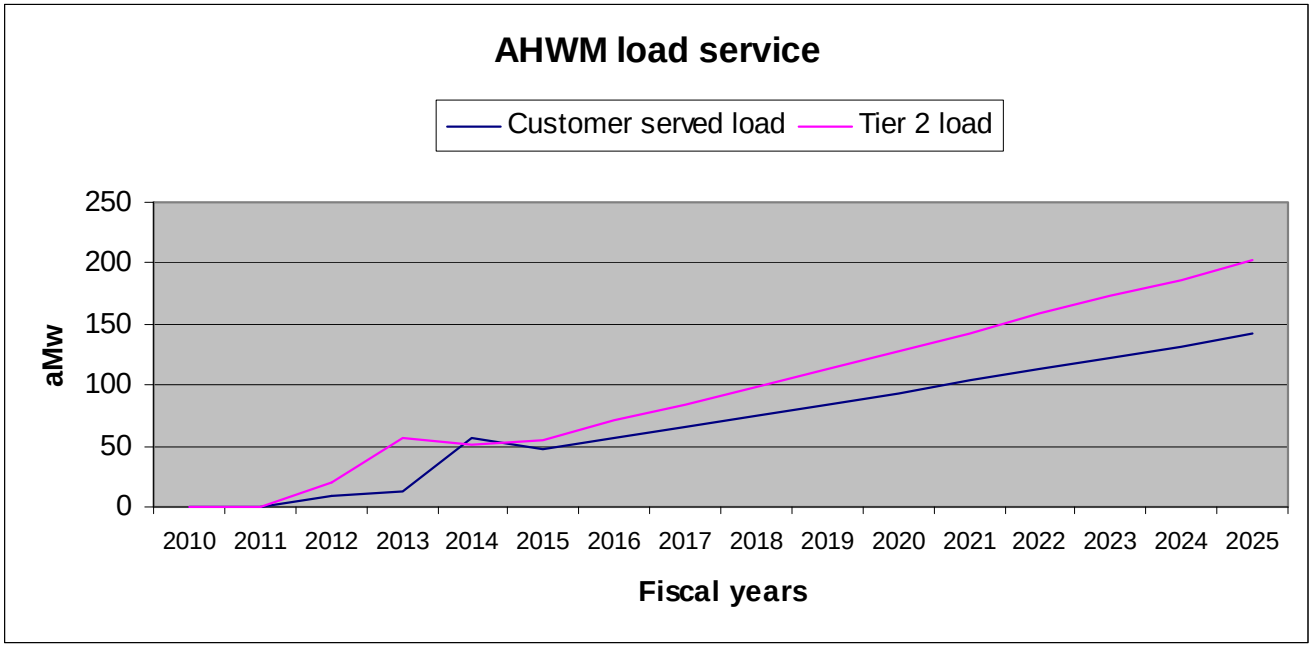
Will we return to normal growth by November 2010?

- Sharp declines in load from financial slowdowns are often followed by rapid return.
  - However, indicators do not show this to be the case.
    - Without consumers leading the way employment growth will not occur.
    - Inventory levels have been rebuilt- no need for additional employment.
    - Retail spending slowly increasing, consumers are saving not spending.
    - Weak global economy does not indicate exports will boost production.

- Updated assumption suggests economy will stay weak through 1st Qtr (Mar) CY 2011, or 2 months longer than assumed last year.
- This will be followed by a fairly slow recovery over several years.

Currently we assume BPA will supply just over half the AHWM quantities

- As load grows we assume that BPA will continue to serve most AHWM load for load following customers; however:
  - Customers' supply will likely occur at more discrete intervals and quantities, not a smooth trend as currently predicted.



For the rate case period new loads are slightly lower than the prior forecast

- For customers with CHWM contracts, total retail loads are about 85 aMW lower in FYs 2012 and 2013, but equal in FY 2010.
  - Number of customers with decreased forecasts is nearly equal to number with increased forecasts.
  - Decrease is the result of slower economic growth expected in the coming years

	FY 2010	FY 2011	FY 2012	FY 2013
Number of customers with increased loads	59	61	57	62
Number of customers with decreased loads	71	68	72	68
Percent with increased loads	45%	47%	44%	48%
Average size of load change for those with increase (aMW)	2.196	2.317	1.932	1.962
Average size of load change for those with decrease (aMW)	-1.835	-2.497	-2.694	-3.092
Amount of change from prior to current forecast (aMW)	-1	-28	-84	-89

Summary of changes from the last forecast for preference customers

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  - Slower recovery from the recession lowered growth rates.

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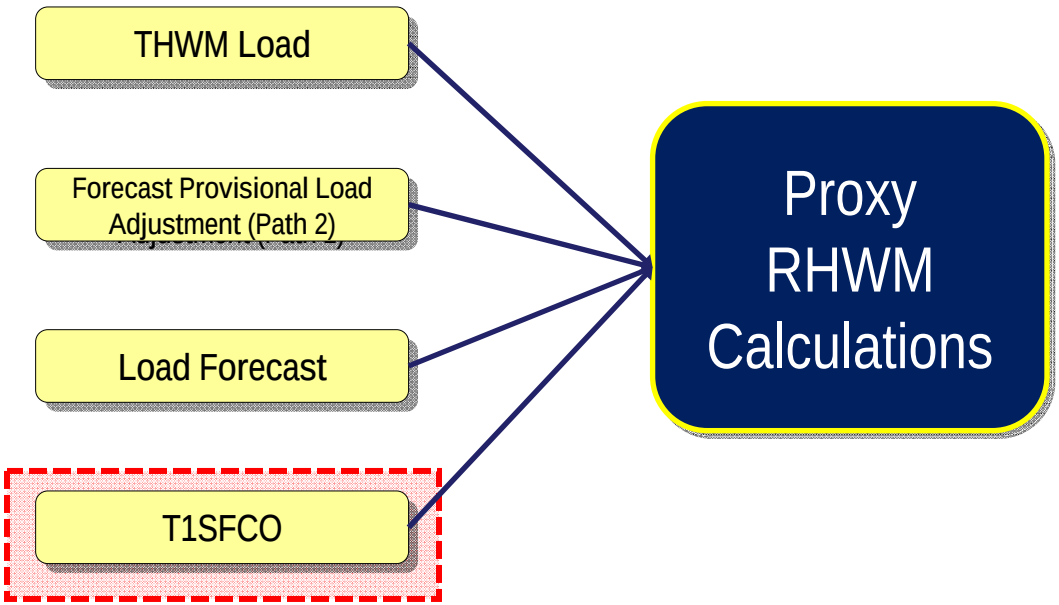
TIER 1 SYSTEM FIRM CRITICAL OUTPUT

- HYDSIM Assumptions
- Hydro Efficiency
- T1SFCO Study

Revised HYDSIM Assumptions in Developing T1SFCO



HYDSIM Assumptions: Updates Since the WP-10 Final Rate Case Study

- Updated to include PNCA data for operating year 2010, the most recent data available in time for this study. The WP-10 studies included PNCA data for operating year 2008. Some of the more significant updates in the data submittals include:
  - Libby September minimum flows for bull trout decreased.
  - Hungry Horse maximum outflow decreased to 9500 cfs.
  - GCL generation (h/k) table increased 1%.
  - GCL pumping data was updated.
  - Mica, Arrow, and Duncan plant data was updated.
- Updates to the Canadian Project Operations
  - New study includes the Canadian Detailed Operating Plan for 2010 (WP10 studies included DOP09), which generally decreased Arrow outflow significantly in April-May and increased Arrow outflow significantly in February-March and June-August. The other months included less significant outflow changes from Arrow.
  - Modeling of the trout spawning operations at Arrow April-June was updated.

HYDSIM Assumptions: Updates Since the WP-10 Final Rate Case Study (cont.)

- Wind Assumptions:
  - The wind assumptions used in this study are very similar to those used in the WP-10 Rate Case, slightly modified based on the best information available as of mid February.
  - Wind affects the project availability factors and residual hydro loads assumed in HYDSIM, which do not have a significant effect in the critical year in HYDSIM.
  - Wind assumptions will be discussed in detail at future workshops and will be updated in future HYDSIM studies when better estimates are available.

HYDSIM Assumptions: Updates Since the WP-10 Final Rate Case Study (cont.)

- Loads:
  - Loads have been updated to LARIS Study 66, which will likely be used for the 2010 White Book.
  - HYDSIM uses the Residual Hydro Load for the region. The Total Retail Load is ~600 MW lower than in WP-10 and the non-hydro resources have increased ~900 MW. As a result, the updated Residual Hydro Loads in HYDSIM are ~1500 MW lower than in WP-10.
    [(-600) – (+900) = -1500]

HYDSIM Assumptions
Updates Since the WP-10 Final Rate Case Study

- Various other modeling improvements to better reflect expected operations:
  - Libby modeling now includes the VarQ flow calculation in May, improved sturgeon pulse modeling, smoothed summer flows, and slightly reshaped fall draft to completely avoid spill in all years.
  - Dworshak's outflow has been reshaped to reduce spill February-June and to smooth July-August flows.
  - Hungry Horse's summer draft has been reshaped to smooth flows better, avoid a double-peak of flows in the summer, and still reach the Montana proposal end-of-September draft elevations.
  - Albeni Falls is held at the winter elevation (2053 ft.) only thru Apr1 instead of through Apr2, allowing Albeni Falls to fill in Apr2.
  - Grand Coulee modeling of the forced draft for drum-gate maintenance has been updated to reflect actual operations better. The 2008 BiOp and W-10 Rate Case studies forced the draft too frequently.

HYDSIM Assumptions
Updates Since the WP-10 Final Rate Case Study (cont.)

- Various other modeling improvements to better reflect expected operations (cont.):
  - Bonneville Corner Collector (~5kcfs):
    - W-10 Rate Case assumed: April 1 - August 31;
      Changed to: March 15 - August 31
  - The Dalles Sluiceway (~3kcfs):
    - W-10 Rate Case assumed: April 1 - November 30;
      Changed to: March 15 - December 15
  - Availability:
    - Updated based on new estimated schedules including average outages from 2001-2009 and assuming large outages at Grand Coulee (March 2013 - September 2022) and Chief Joseph (April 2010 - August 2014).

HYDSIM Assumptions
Updates Since the WP-10 Final Rate Case Study (cont.)

- Various other modeling improvements to better reflect expected operations (cont.):
  - Availability (cont.):
    - Updated to reflect new wind estimates in reserve requirements, which were rough preliminary numbers but were considered the best available information at the time. These wind estimates will be discussed and updated before the Initial Proposal.
  - Bonneville's gas cap has been updated to 120kcfs given the discontinued use of the Camas-Washougal gage for limiting spill.

Blue = assumptions in WP-10 studies

Black = updates for T1FSCO studies

HYDSIM Spill Assumptions

	Spill	Days	Hours
LGranite	18 kcfs	* Jun 5 - Aug 8 →**7**	All hours
LGoose	30% of total flow	* Jun 5 - Aug 11 →**12**	All hours
LMonumental	17 kcfs	* Jun 5 - Aug 13 →**15**	All hours
IceHarbor	35% of total flow 35% of total flow →**30%**	Apr 7 - Jun 15 Jun 16 - Aug 15 →**16**	All hours
McNary	40% of total flow 50% of total flow	April 10 - Jun 15 Jun 16 - Aug 31	All hours
JohnDay	30% of total flow 30% vs. 40% of total flow →**30%** 30% of total flow	Apr 10 - 19 Apr 20 - Jul 20 Jul 21 - Aug 31	All hours
TheDalles	40% of total flow	Apr 10 - Aug 31	All hours
Bonneville	100 kcfs → **no longer limited by 96kcfs average spring gas cap** 85 kcfs day / gas cap night → **test 95 kcfs all hours –vs.– 85 kcfs day & 121 kcfs night** 75 kcfs day / gas cap night	Apr 10 - Jun 15 Jun 16 - Jul 31 Aug 1 - Aug 31	All hours Day/night spill hours vary

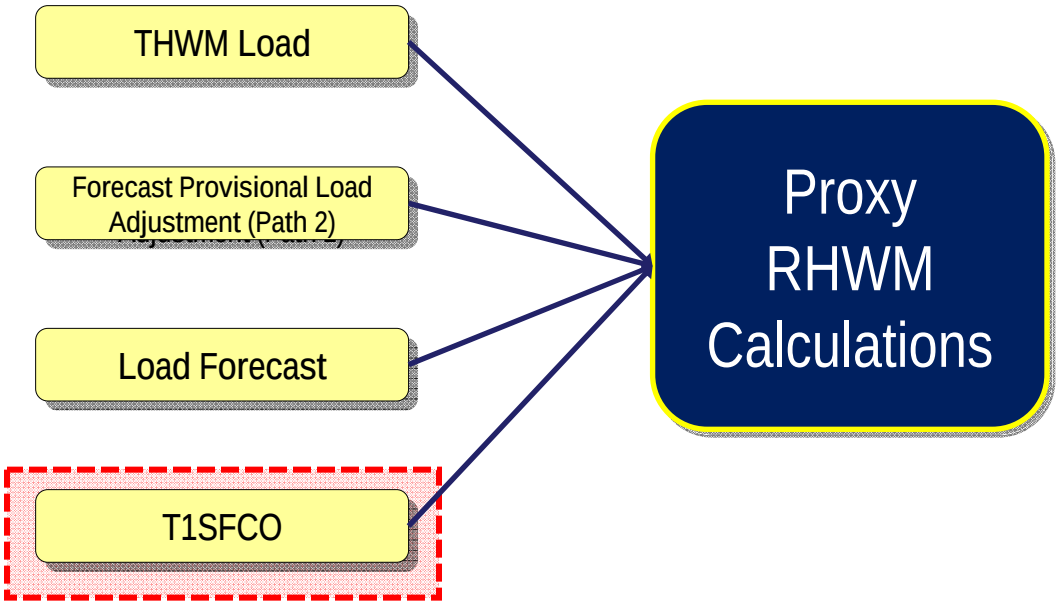
* Note: The critical year includes the spring max-transport operation (i.e. no spill at Snake River transport projects) based on the BiOp criteria. The Initial Proposal will include spring spill at the Snake River transport projects in most years.

Resulting FY2012 HYDSIM
Estimated Federal Generation Differences (MW)

Critical 1937	OCT	NOV	DEC	JAN	FEB	MAR	APR1	APR2	MAY	JUN	JUL	AUG1	AUG2	SEP	Annual Average
Tier1/PreWP12	5421	7120	6907	7019	6190	5658	4750	4382	8258	6642	5885	7133	5650	6149	**6352**
WP10 RateCase12	5918	7121	6913	7015	6181	5657	4237	4611	7681	6349	6522	7077	5886	5776	**6341**
Difference	-497	-1	-6	4	9	1	513	-229	577	293	-637	56	-236	373	**11**

- October – decreased primarily due to decreased outflow from Arrow and decreased outflow from Kerr
- November – almost no change
- December – very minor change
- January – very minor change
- February – very minor change
- March – almost no change
- April – Apr1 increased primarily due to increased outflows from Kerr; Apr2 decreases primarily due to reduced outflows from Albeni Falls (caused by the refill of Albeni Falls and reduced inflow from Kerr) and offset partially by reduced spill at John Day
- May – increased due to reduced John Day spill and increased Libby outflow
- June – increased due to reduced John Day and Ice Harbor spill and increased Libby outflow
- July – decreased primarily because Libby, Arrow, and Hungry Horse outflows decreased, offset slightly by Ice Harbor's spill reduction
- August – decreased primarily because Libby and Hungry Horse outflows decreased, offset by Ice Harbor's spill reduction and Arrow flow increases in Aug1
- September – increased primarily because Arrow, Libby, Hungry Horse, and Kerr outflows increased slightly

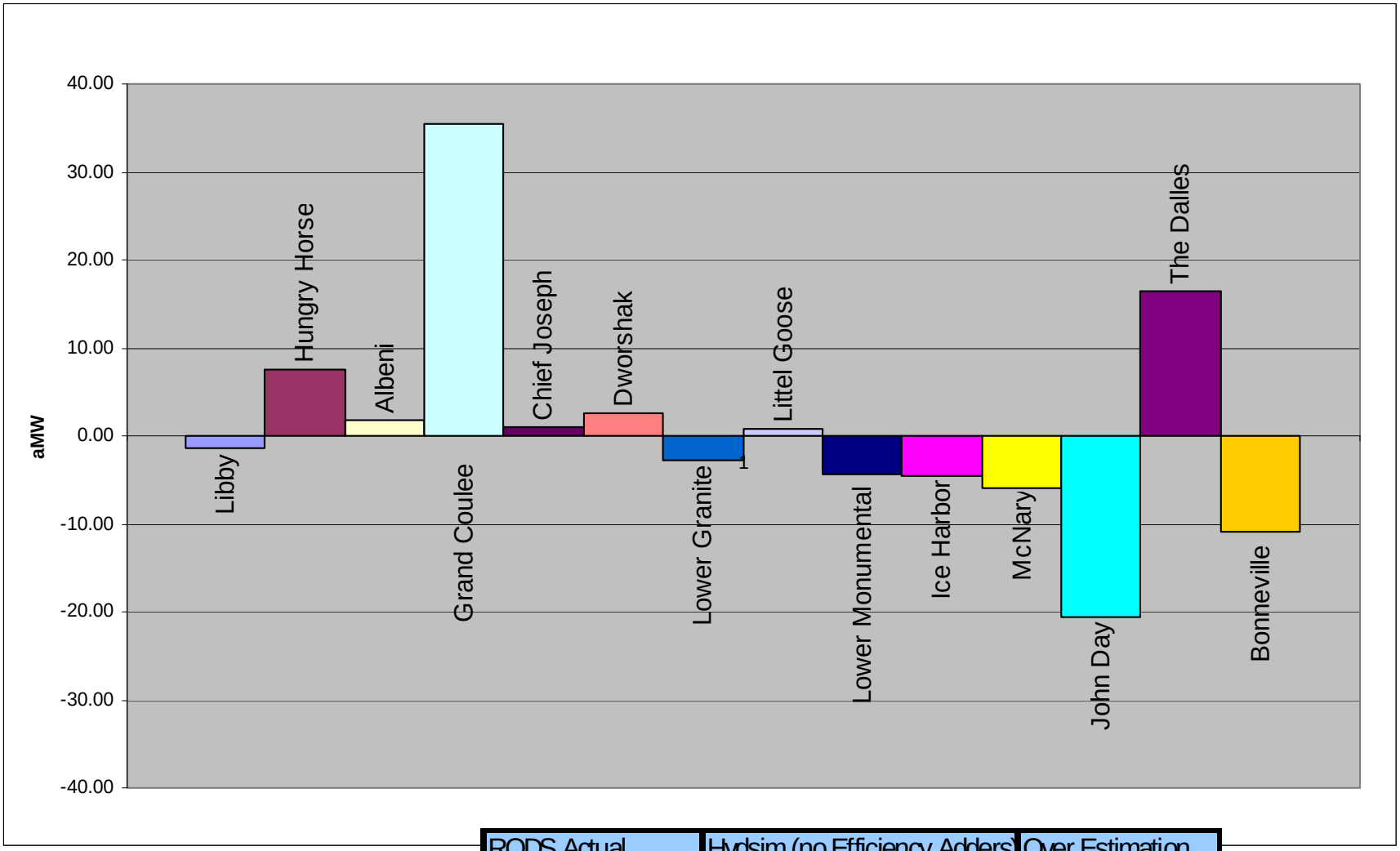
Hydro Efficiency



Hydro Efficiency Generation Adders for the 2012 Rate Case

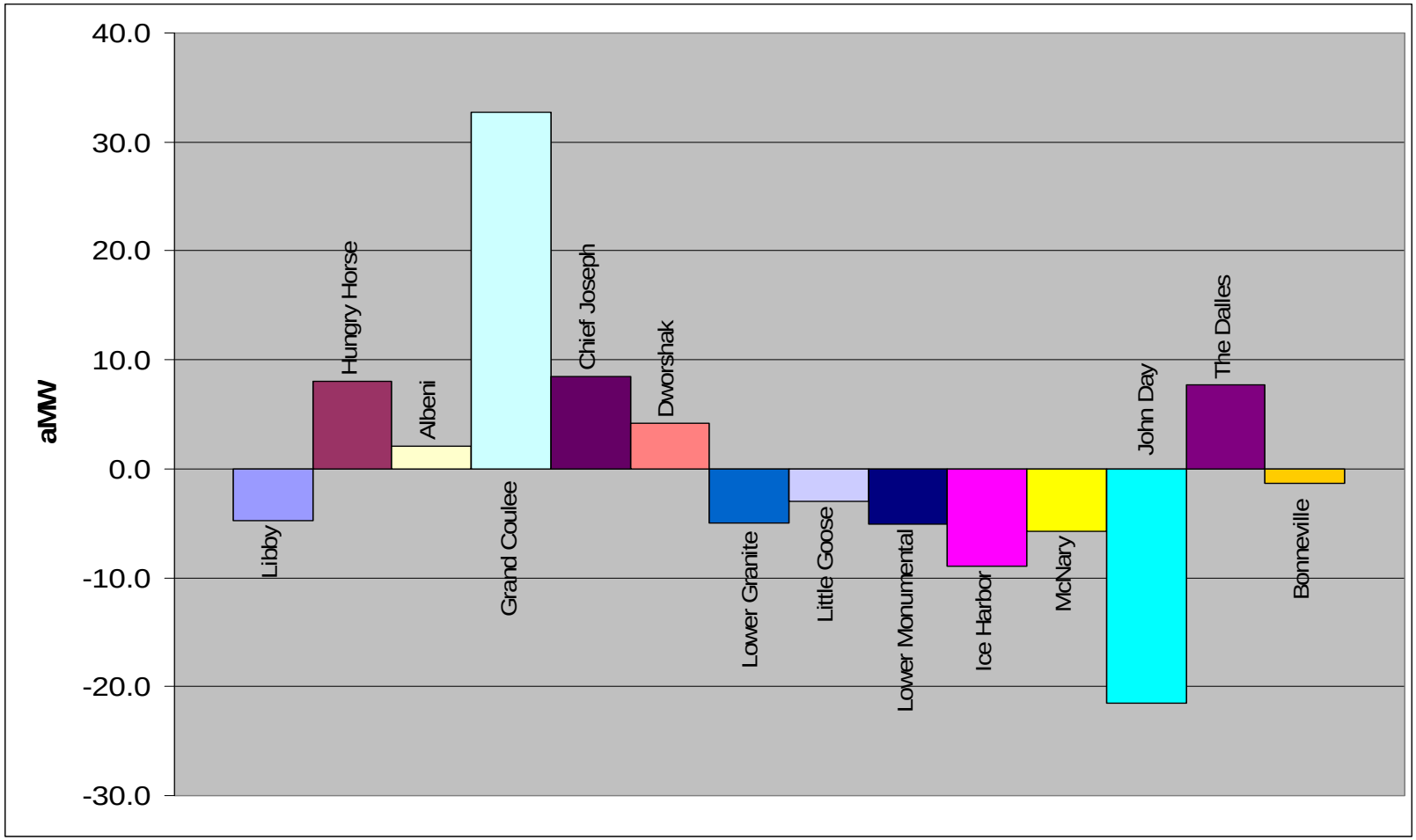
- Beginning in the late 1990s, BPA started adding small amounts of generation adders to its planning studies to reflect hydro efficiency improvements
- The Grand Coulee turbine runners were a substantial portion of the hydro efficiency improvements that have been incorporated into prior planning studies as generation adders
- Recently, BPA incorporated the efficiency gains of the new Grand Coulee runners (other improvements not incorporated) into the HYDSIM model
- To test the accuracy of this approach, BPA tested the new HYDSIM model results with actuals for both 2008 and 2009
- The HYDSIM estimated total Federal generation is reasonably close to actual generation without additional efficiency improvement generation adders
- Because of this, incorporating generation adders for additional efficiency improvements would result in overstating the amount of generation that the Federal system produces

HYDSIM Estimated Regulated Federal Hydro Generation vs. Actual Generation for FY2009



	RODS Actual	Hydsim (no Efficiency Adders)	Over Estimation
Total Generation (aMW)	7492	7505	13

HYDSIM Estimated Regulated Federal Hydro Generation vs. Actual Generation for FY2008



	RODS Actual	Hydsim (no Efficiency Adders)	Over Estimation
Total Generation (aMW)	7778	7785	7

Types of Hydro Efficiency Improvements

In previous rate cases, BPA had incorporated generation adders in its planning studies to account for the following efficiency improvements:

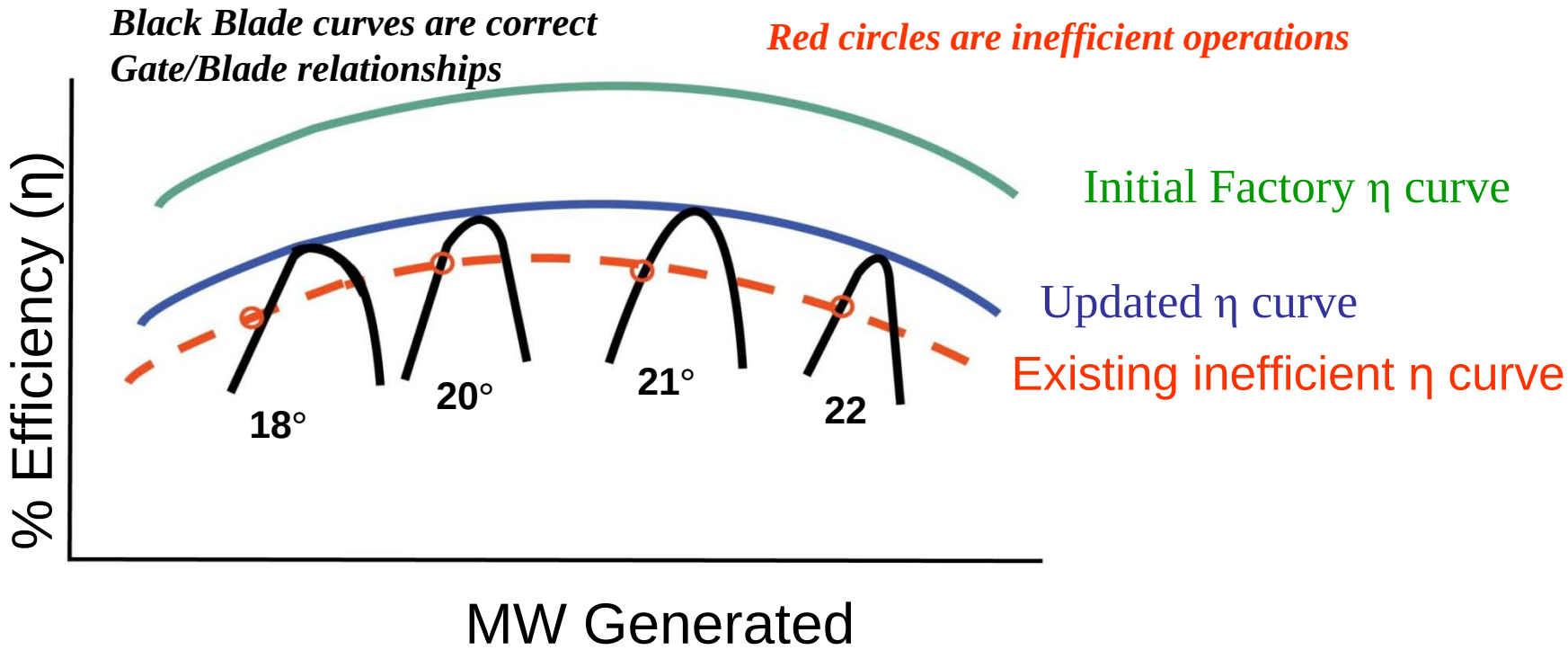
- ***Index testing*** – efforts to maximize the operating performance of a unit given its current condition and update the generation/flow relationship
- ***Head sensing* by unit**– correct errors in project forebay and tailwater measurements
- ***Runner Replacements –*** *More efficient turbine runners installed at the first and second Grand Coulee Powerhouse*
- ***Optimization Software (Near Real Time Optimization)***
  - Economic Dispatch – operating running units at peak efficiency
  - Unit Commitment – how many units to run for a given power output

Modeling Index Testing and Head Sensing

- These improvements were included as generation adders in prior rate cases
- Both Index Testing and Head Sensing should not have been included as efficiency adders
  - While they improve the efficiency of the unit in its present condition by recalibrating blade angles and accurately measuring head, they do not return the unit to, or exceed its factory condition

Kaplan Turbine Index Test

For every operating point there is a specific and unique gate and blade relationship. The gates open & close to generate the required MW; the blades move so the water used is minimized. Where the red dots intersects the black curve is the operating efficiency of the unit before the correct gate/blade (black curve) are known through index testing.

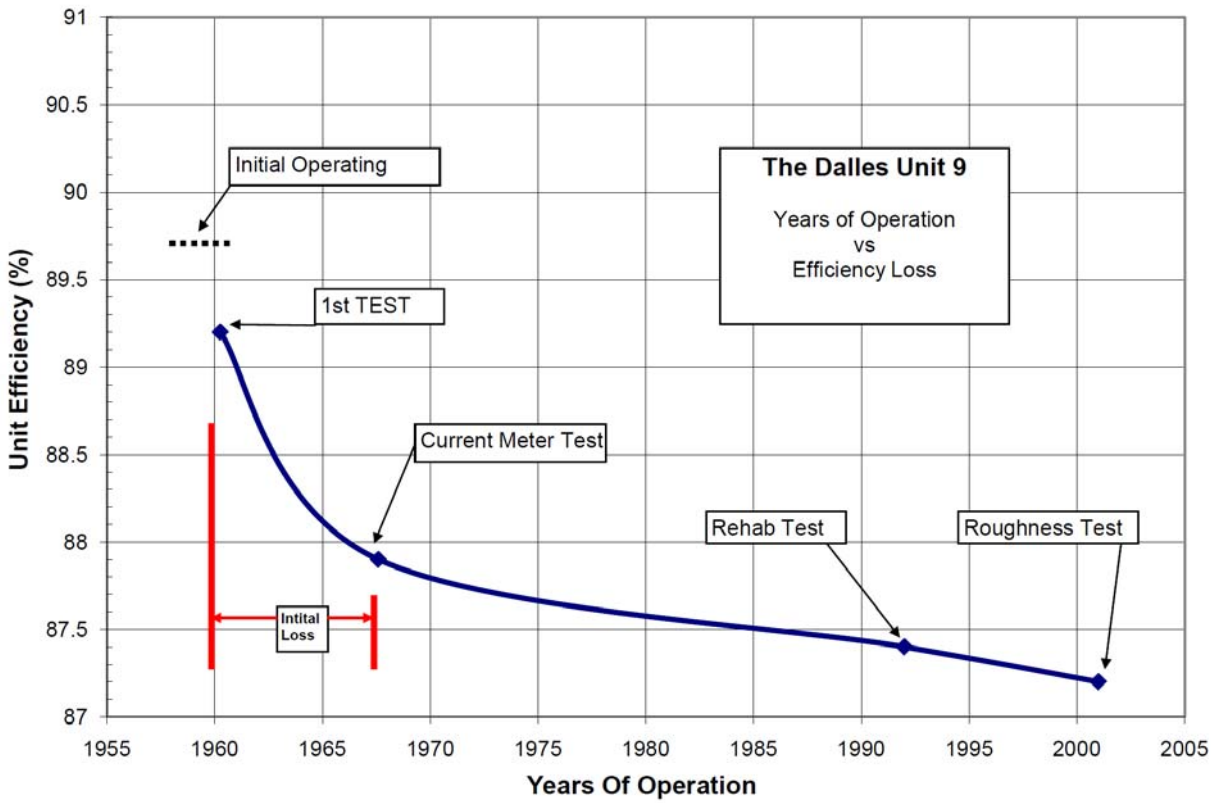


- ***Aging and other causes take performance from green curve to red curve.***
- ***Index testing raises performance from red curve to blue curve.***
- ***This is like adjusting the timing on a car engine (as opposed to doing maintenance on the engine itself).***

Optimization Software

- Optimization software efficiency benefits have been realized at the projects
- However, once again age-related degradation and operational inefficiencies (running units to follow load and providing reserves) are offsetting the amount of generation gained from efficiency improvements

The Dalles Unit 9* –Decrease in efficiency over time



**Source: Army Corps of Engineers*

Conclusions

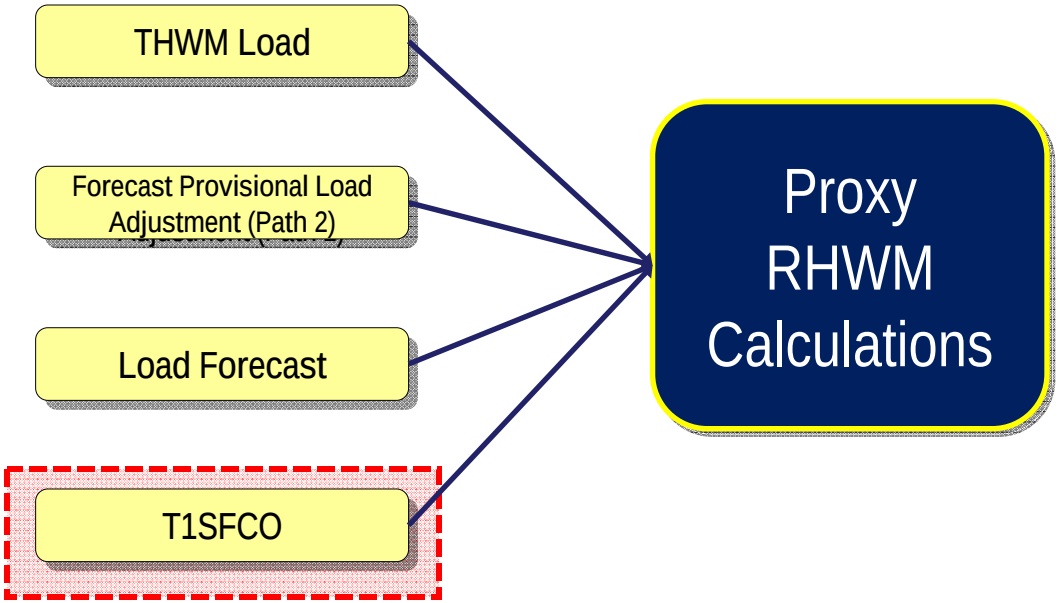
- Continue recalibration of HYDSIM to actual data
- Do not include hydro efficiency adders in the 2012 Rate Case or other planning studies
- Impact on T1SFCO is approximately 96 aMW for FY 2010

Impact of 96 aMW System Reduction on Contract High Water Marks

- Increases potential for augmentation and a higher Augmentation Limit.
- With less headroom, customers will face earlier exposure to the expense of serving Above-RHWM amounts.
- Timing of T1SFCO changes – Customers expecting load growth would want the system reduction reflected in the CHWM Process if the reduction would increase the Augmentation Limit.
  - However, need for augmentation currently appears small (some system headroom and future incremental conservation reduce effect of augmenting for provisional load adjustments).

Reminder: All numbers are just forecasts and subject to change (Loads, additional system changes, provisional CHWM adjustments)

T1SFCO Study



T1SFCO
Updates Since the THWM (Study 55) WP-10 Initial Rate Case Study Presented 3/2/2008

- Since the WP-10 analysis the regulated hydro and a few other generation forecasts were updated:
  - To better reflect real-time operations, the hydro regulation study and treatment of the hydro improvements generation forecasts were updated. This includes:
    - Hydro regulation study updates described in HYDSIM Assumptions
    - Acquisition of the Idaho Falls Power Bulb Turbine plants through September 30, 2021

T1SFCO
Updates Since the THWM (Study 55) WP-10 Initial Rate Case Study Presented 3/2/2008 (cont.)

- Beginning in the late 1990s, BPA started adding small amounts of generation adders in its planning studies to reflect hydro improvements—including the Grand Coulee turbine runner replacements. BPA is updating the accounting of hydro improvements to reflect:
  - Grand Coulee runner replacements are now modeled in HYDSIM and therefore no longer needed as a generation adder
  - With GCL runner replacements in HYDSIM, the current HYDSIM generation forecast for the Federal system compares well with actual system generation for FY 2008 and 2009 without any generation adders. The inclusion of generation adders overstates the Federal system regulated hydro generation and therefore were subsequently removed from all planning studies.
- Georgia-Pacific Paper generation forecast
- Federal Transmission losses—which are a function of Federal system generation—decreased due to lower generation estimates

T1SFCO
Summary for FY 2012 and 2013
(Study 66)

T1SFCO Projections (Study 66) Energy in aMW	2012	2013	Average
Table 3.1: Total Federal System Hydro Generation	*6,799*	*6,800*	*6,799*
Table 3.2: Total Designated Non-Federally Owned Resources	*1,109*	*949*	*1,029*
Table 3.3: Total Designated BPA Contract Purchases	*387*	*385*	*386*
Table 3.4: Total Designated System Obligations	*(1244)*	*(1221)*	*(1233)*
Federal Tier 1 System Firm Critical Output	*7,050*	*6,912*	*6,981*

Study66-T1SFCO CalculationD04202010.xls

T1SFCO
Difference Study 66 Less THWM-Study 55 (WP-10 Initial Proposal)
Average of FY 2012 and 2013 Energy

Study 66 - THWM (Study 55) Energy in aMW	Study 66	THWM (Study 55)	Difference
Table 3.1: Total Federal System Hydro Generation	**6,799**	**6,916**	**(117)**
a) HYDSIM Regulated Hydro Generation			*35*
b) Remove hydro efficiency generation adders			*(166)*
c) Idaho Falls Power Bulb Turbines			*14*
Table 3.2: Total Designated Non-Federally Owned Resources	**1,029**	**1,034**	**(5)**
a) Georgia-Pacific Paper (Wauna)			*(4)*
b) Miscellaneous			*(1)*
Table 3.3: Total Designated BPA Contract Purchases	**386**	**320**	**66**
a) PAC Southern Idaho Return (Net with Return in Table 3.4c)			*66*
Table 3.4: Total Designated System Obligations	**(1,233)**	**(1,180)**	**(53)**
a) USBR Obligations (Study 66 obligations are lower)			*4*
b) CER deliveries to Canada (Study 66 CER is higher)			*(5)*
c) Southern Idaho Deliveries (Net with Return in Table 3.3a Study 66 is higher)			*(66)*
d) Federal Power Transmission (Losses Function of Resources Study 66 is lower)			*14*
Difference Federal Tier 1 System Firm Critical Output	**6,981**	**7,090**	**(109)**

Study66-T1SFCO CalculationD04202010.xls

Comparison of Hydro Efficiency Generation Adders For FY 2010 and FY 2012

Beginning in the late 1990s, BPA started adding small amounts of generation adders in its planning studies to reflect hydro improvements—including the Grand Coulee turbine runner replacements. Below is a comparison of the account of FY 2010 and FY 2012 hydro efficiency generation adders

- FY 2010 impact of removing hydro efficiency generation adder
  - Total generation adder 121.2 aMW under 1937 critical water conditions for FY 2010
  - GCL runner replacements of 24.8 aMW are now included in HYDSIM generation model
  - To be comparable to HYDSIM studies that model GCL runner replacements, the generation adder associated with GCL runner replacements is removed from the total hydro efficiency generation adder
    - Net generation removed from hydro forecast: 121.2-24.8 = 96.4 aMW

Comparison of Hydro Efficiency Generation Adders For FY 2010 and FY 2012 (cont.)

- FY 2012 impact of removing hydro efficiency generation adder
  - Total generation adder 160.7 aMW under 1937 critical water conditions for FY 2012
  - GCL runner replacements of 29.8 aMW are now included in HYDSIM generation model
  - To be comparable to HYDSIM studies that model GCL runner replacements, the generation adder associated with GCL runner replacements is removed from the total hydro efficiency generation adder
    - Net generation removed from hydro forecast: 160.7-29.8 = 130.9 aMW

Comparison of Hydro Efficiency Generation Adders For FY 2010 and FY 2012 (cont.)

- FY 2010-2012 hydro efficiency generation adder differences
  - Major difference between FY 2010 and FY 2012 hydro efficiency generation adders is hydro optimization
  - There is considerable uncertainty around the gains that may realized by future optimization programs due to changes in actual operations that incorporate load following, reserves, and the integration of variable shaped resources
  - Due to the HYDSIM generation verification process and uncertainty in optimization programs *(previously presented),* BPA will not incorporate hydro generation adders associated with efficiency improvements or optimization programs in HYDSIM forecasts until verified through benchmarking. After benchmarking, BPA will incorporate generation increases into planning processes

Study 66 - T1SFCO
Table 3.1 For FY 2012 and 2013

Table 3.1: Federal System Hydro Generation (Study 66)

T1SFCO Projections (Study 66) - Energy in aMW	2012	2013	Average
Regulated Hydro			
1. Albeni Falls	27	27	27
2. Bonneville Hydro	404	403	403
3. Chief Joseph Hydro	1,074	1,074	1,074
4. Dworshak Hydro	143	143	143
5. Grand Coulee Hydro	1,859	1,859	1,859
6. Hungry Horse	89	89	89
7. Ice Harbor Hydro	166	166	166
8. John Day Hydro	801	801	801
9. Libby	177	177	177
10. Little Goose Hydro	190	190	190
11. Lower Granite Hydro	188	189	188
12. Lower Monumental Hydro	188	189	188
13. Mc Nary Hydro	491	491	491
14. The Dalles Hydro	602	602	602
Independent Hydro			
15. Anderson Ranch	15	15	15
16. Big Cliff	10	10	10
17. Black Canyon	8	8	8
18. Boise River Diversion	1	1	1
19. Bonneville Fishway	21	21	21
20. Chandler	9	9	9
21. Cougar	17	17	17
22. Cowlitz Falls	26	26	26
23. Detroit	42	42	42
24. Dexter	9	9	9
25. Foster	13	13	13
26. Green Peter	28	28	28
27. Green Springs - USBR	6	6	6
28. Hills Creek	18	18	18
29. Idaho Falls - City Plant	4	4	4
30. Idaho Falls - Lower Plant	5	5	5
31. Idaho Falls - Upper Plant	5	5	5
32. Lookout Point	36	36	36
33. Lost Creek	29	29	29
34. Minidoka	16	16	16
35. Palisades	74	74	74
36. Roza	8	8	8
37. Total Federal System Hydro Generation	***6,799***	***6,800***	***6,799***

Predecisional. For Discussion Purposes Only.

Study 66 - T1SFCO
Tables 3.2 and 3.3 For FY 2012 and 2013

Table 3.2: Designated Non-Federally Owned Resources (Study 66)

T1SFCO Projections (Study 66) - Energy in aMW	2012	2013	Average
1. Ashland Solar Project	0	0	0
2. Columbia Generating Station	1,030	878	954
3. Condon Wind Project	11	11	11
4. Dworshak/Clearwater Small Hydropower	3	3	3
5. Elwha Hydro	2	0	1
6. Foote Creek 1	5	5	5
7. Foote Creek 2	0	0	0
8. Foote Creek 4	4	4	4
9. Fourmile Hill Geothermal (Not included)	0	0	0
10. Georgia-Pacific Paper (Wauna)	19	19	19
11. Glines Canyon Hydro	5	0	2
12. Klondike I	8	8	8
13. Stateline Wind Project	22	22	22
14. White Bluffs Solar	0	0	0
15. Total Designated Non-Federally Owned Resources	***1,109***	***949***	***1,029***

Table 3.3: Designated BPA Contract Purchases (Study 66)

Contract Purchases (Study 66) - Energy in aMW	Contract #	2012	2013	Average
1. Priest Rapids CER for Canada	97PB-10099	30	29	30
2. Rock Island #1 CER for Canada	97PB-10102	11	11	11
3. Rock Island #2 CER for Canada	97PB-10102	7	7	7
4. Rock Reach CER for Canada	97PB-10103	38	38	38
5. Wanapum CER for Canada	97PB-10100	29	28	29
6. Wells CER for Canada	97PB-10101	25	24	24
7. BCHP to BPA PwrS	99PB-22685	1	1	1
8. PASA to BPA Pk Repl	94BP-93658	1	1	1
9. PASA to BPA S/N/X	94BP-93658	0	0	0
10. PASA to BPA Xchg Nrg	94BP-93658	2	2	2
11. PPL to BPA Soldaho	89BP-92524	160	160	160
12. RVSD to BPA Pk Repl	94BP-93958	5	5	5
13. RVSD to BPA Seas Xchg	94BP-93958	4	4	4
14. RVSD to BPA Xchg Nrg	94BP-93958	7	7	7
15. SPP to BPA Harney Wells	88BP-92436	60	60	60
16. PPL to BPA SNX (Spring Return)	94BP-94332	0	0	0
17. PPL to BPA SPX (Summer Return)	94BP-94332	6	6	6
18. Total Designated BPA Contract Purchases		***387***	***385***	***386***

Study 66 - T1SFCO
Tables 3.4 and 3.5 For FY 2012 and 2013

Table 3.4: Designated BPA System Obligations (Study 66)

	System Obligations (Study 66) - Energy in aMW	Contract #	2012	2013	Average
1.	BPA to BRCJ 2012PSC	14-03-49151	9	9	9
2.	BPA to BRCR 2012PSC	14-03-73152	1	1	1
3.	BPA to BREG 2012PSC	14-03-49151	1	1	1
4.	BPA to BRGC 2012PSC	14-03-001-12160	121	121	121
5.	BPA to BROP 2012PSC	14-03-79239	3	3	3
6.	BPA to BRSI 2012PSC	14-03-49151	0	0	0
7.	BPA to BRSID 2012PSC	14-03-99106	20	20	20
8.	BPA to BRSV 2012PSC	14-03-63656	1	1	1
9.	BPA to BRTD 2012PSC	14-03-32210	2	2	2
10.	BPA to BRTV 2012PSC	14-03-49151	1	1	1
11.	BPA to BRYK 2012PSC	00PB-12132	2	2	2
12.	BPA To BCHA Can Ent	99EO-40003	522	505	514
13.	BPA to BHEC 2012PSC	97PB-10051	5	5	5
14.	BPA to PASA C/N/X	94BP-93658	1	1	1
15.	BPA to PASA S/N/X	94BP-93658	0	0	0
16.	BPA to RVSD C/N/X	94BP-93958	5	5	5
17.	BPA to RVSD Seas Xchg	94BP-93958	4	4	4
18.	BPA to SPP Pwr S	88BP-92436	60	60	60
19.	Federal Intertie Losses	Unknown	1	1	1
20.	BPA to AVWP WP3 S	85BP-92186	42	42	42
21.	BPA to PPL SNX (Spring Delivery)	94BP-94332	0	0	0
22.	BPA to PPL SPX (Summer Delivery)	94BP-94332	6	6	6
23.	BPA to PPL SolD	89BP-92524	160	160	160
24.	BPA to PSE WP3 S	85BP-92185	42	42	42
25.	Federal Power Trans. Losses **(Calculated: 2.82% of totals in Tables 3.1, 3.2, 3.3, & 3.5)**	n/a	234	230	232
26.	***Total Designated System Obligations***		***1,244***	***1,221***	***1,233***

THWM (Study 55) - T1SFCO
Table 3.1 For FY 2012 and 2013

Table 3.1: Federal System Hydro Generation (THWM - Study 55)

Hydro Generation (THWM-Study 55) - Energy in aMW	2012	2013	Average
Regulated Hydro			
Albeni Falls	26	26	26
Bonneville Hydro	408	408	408
Chief Joseph Hydro	1,099	1,109	1,104
Dworshak Hydro	148	148	148
Grand Coulee Hydro	1,898	1,898	1,898
Hungry Horse	89	89	89
Ice Harbor Hydro	174	174	174
John Day Hydro	805	805	805
Libby	185	185	185
Little Goose Hydro	201	201	201
Lower Granite Hydro	196	196	196
Lower Monumental Hydro	195	195	195
Mc Nary Hydro	490	490	490
The Dalles Hydro	612	612	612
Independent Hydro			
Anderson Ranch	15	15	15
Big Cliff	10	10	10
Black Canyon	8	8	8
Boise River Diversion	1	1	1
Bonneville Fishway	21	21	21
Chandler	9	9	9
Cougar	17	17	17
Cowlitz Falls	26	26	26
Detroit	42	42	42
Dexter	9	9	9
Foster	13	13	13
Green Peter	28	28	28
Green Springs - USBR	6	6	6
Hills Creek	18	18	18
Idaho Falls - City Plant	0	0	0
Idaho Falls - Lower Plant	0	0	0
Idaho Falls - Upper Plant	0	0	0
Lookout Point	36	36	36
Lost Creek	29	29	29
Minidoka	16	16	16
Packwood	0	0	0
Palisades	74	74	74
Roza	8	8	8
Total Federal System Hydro Generation	***6,911***	***6,921***	***6,916***

THWM (Study 55) - T1SFCO
Tables 3.2 and 3.3 For FY 2012 and 2013

Table 3.2: Designated Non-Federally Owned Resources (THWM - Study 55)

Non-Federal Resources (THWM-Study 55) - Energy in aMW	2012	2013	Average
Ashland Solar Project	0	0	0
Columbia Generating Station	1,030	878	954
Condon Wind Project	10	10	10
Dworshak/Clearwater Small Hydropower	3	3	3
Elwha Hydro	2	0	1
Foote Creek 1	6	6	6
Foote Creek 2	1	1	1
Foote Creek 4	6	6	6
Fourmile Hill Geothermal (Not included)	0	0	0
Georgia-Pacific Paper (Wauna)	23	23	23
Glines Canyon Hydro	5	0	2
Klondike I	7	7	7
Stateline Wind Project	22	22	22
White Bluffs Solar	0	0	0
Total Designated Non-Federally Owned Resources	***1,114***	***954***	***1,034***

Table 3.3: Designated BPA Contract Purchases (THWM - Study 55)

Contract Purchases (THWM-Study 55) - Energy in aMW	2012	2013	Average
Priest Rapids CER for Canada	30	30	30
Rock Island #1 CER for Canada	11	11	11
Rock Island #2 CER for Canada	7	7	7
Rock Reach CER for Canada	38	37	37
Wanapum CER for Canada	29	28	28
Wells CER for Canada	24	24	24
BCHP to BPA PwrS	1	1	1
PASA to BPA Pk Repl	1	1	1
PASA to BPA S/N/X	0	0	0
PASA to BPA Xchg Nrg	2	2	2
PPL to BPA So Idaho	94	94	94
RVSD to BPA Xchg Nrg	0	0	0
RVSD to BPA Pk Repl	0	0	0
RVSD to BPA Pk Repl	5	5	5
RVSD to BPA Pk Repl	0	0	0
RVSD to BPA Seas Xchg	4	4	4
RVSD to BPA Xchg Nrg	7	7	7
SPP to BPA Harney Wells	60	60	60
PPL to BPA SNX (Spring Return)	0	0	0
PPL to BPA SPX (Summer Return)	6	6	6
Total Designated BPA Contract Purchases	***319***	***318***	***319***

THWM (Study 55) - T1SFCO
Tables 3.4 and 3.5 For FY 2012 and 2013

Table 3.4: Designated BPA System Obligations (THWM - Study 55)

System Obligations (THWM-Study 55) - Energy in aMW	2012	2013	Average
BPA to BRCJ 02PSC	5	5	5
BPA to BRCJ 02PSC	9	9	9
BPA to BRCR 02PSC	1	1	1
BPA to BREG 02PSC	0	0	0
BPA to BRGC 02PSC	121	121	121
BPA to BROP 02PSC	3	3	3
BPA to BRSI 02PSC	0	0	0
BPA to BRSID 02PSC	20	20	20
BPA to BRSV 02PSC	1	1	1
BPA to BRTD 02PSC	2	2	2
BPA to BRTV 02PSC	1	1	1
BPA to BRYK 02PSC	2	2	2
BPA To BHEC	5	5	5
BPA to BCHA Can Ent	515	503	509
BPA to PASA C/N/X	1	1	1
BPA to PASA S/N/X	0	0	0
BPA to RVSD C/N/X	5	5	5
BPA to RVSD C/N/X	0	0	0
BPA to RVSD Cap S	0	0	0
BPA to RVSD Seas Xchg	4	4	4
BPA to SPP Pwr S	60	60	60
Federal Intertie Losses	0	0	0
BPA to AVWP WP3 S	42	42	42
BPA to PPL SNX (Spring Delivery)	0	0	0
BPA to PPL SPX (Summer Delivery)	6	6	6
BPA to PPL SoID	94	94	94
BPA to PSE WP3 S	42	42	42
Federal Power Trans. Losses	246	247	246
Total Designated System Obligations	***1,185***	***1,175***	***1,180***

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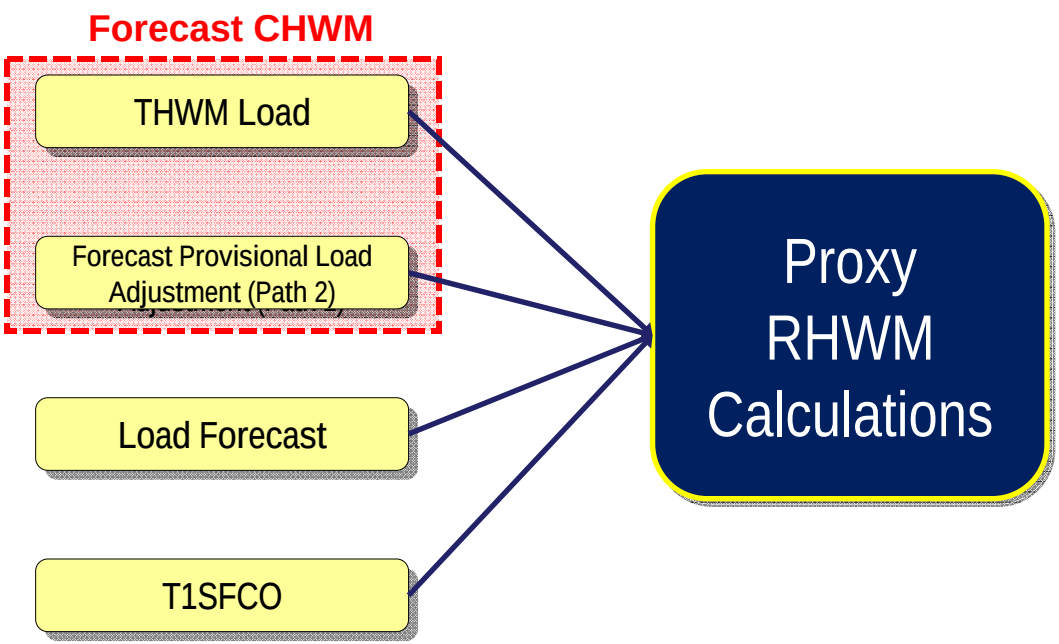
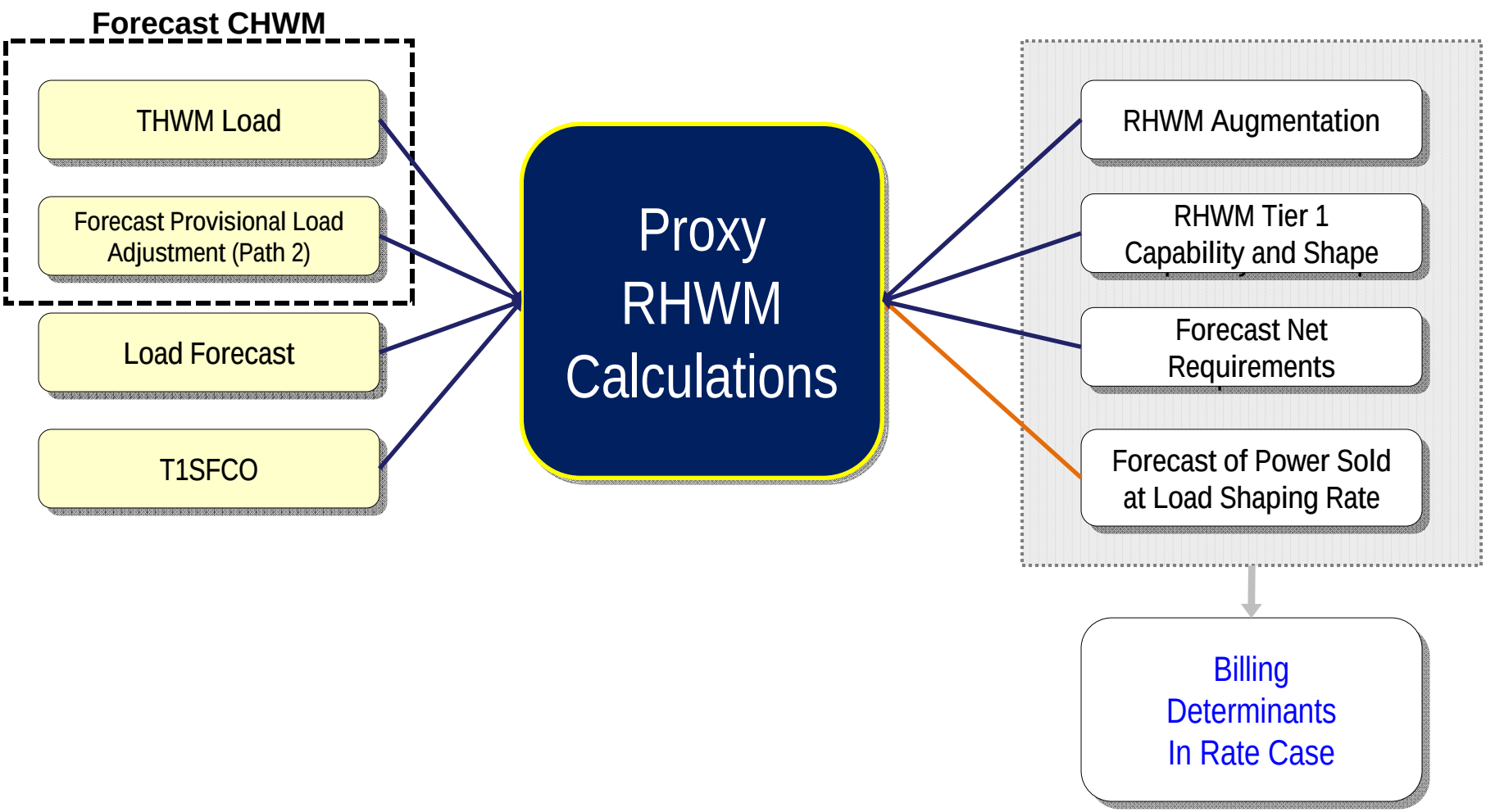
Proxy RHWM Process



Proxy RHWM Process
Inputs / Outputs of Proposed Proxy RHWM Process



Proposed Proxy RHWM Calculation

- Create a forecast CHWM that can be used to calculate a RHWM (Proxy RHWM) to be used in the BPA-12 rate case initial proposal.
  - The estimates in the initial proposal will be replaced in the final proposal with actual CHWMs. The CHWM Process will occur in Spring 2011.
  - Use the existing THWM load as the starting point for the forecast of the CHWM. The THWM used a March 2009 forecast of FY 2010 loads.
  - The existing THWM was fully vetted with customers. BPA believes using any other HWM estimate would add confusion and customer and BPA workload. Using THWM to forecast CHWMs does not impact the total cost/rate levels in the rate case.

Proposed Proxy RHWM Calculation (cont.)

- The process we propose to use will mirror the RHWM Process, as described in the TRM, using the forecast CHWM as an input. The TRM-described process will apply to all future rate periods (beginning with WP-14) after CHWMs are determined in FY2011.

- The use of the THWM load to forecast Proxy RHWMs for the initial proposal, instead of the most recent load forecast, will affect how the total Tier 1 costs would be recovered among PF customers. It will not affect the total costs and revenues that will be calculated in the rate case.

- The most recent load forecasts will be used for all other calculations in the initial proposal. This is necessary to ensure the best estimates of total load obligations, secondary sales, augmentation purchases, load shaping charges, etc. This provides a best estimate for rates sufficient to recover costs.

Proposed Proxy RHWM Calculation (cont.)

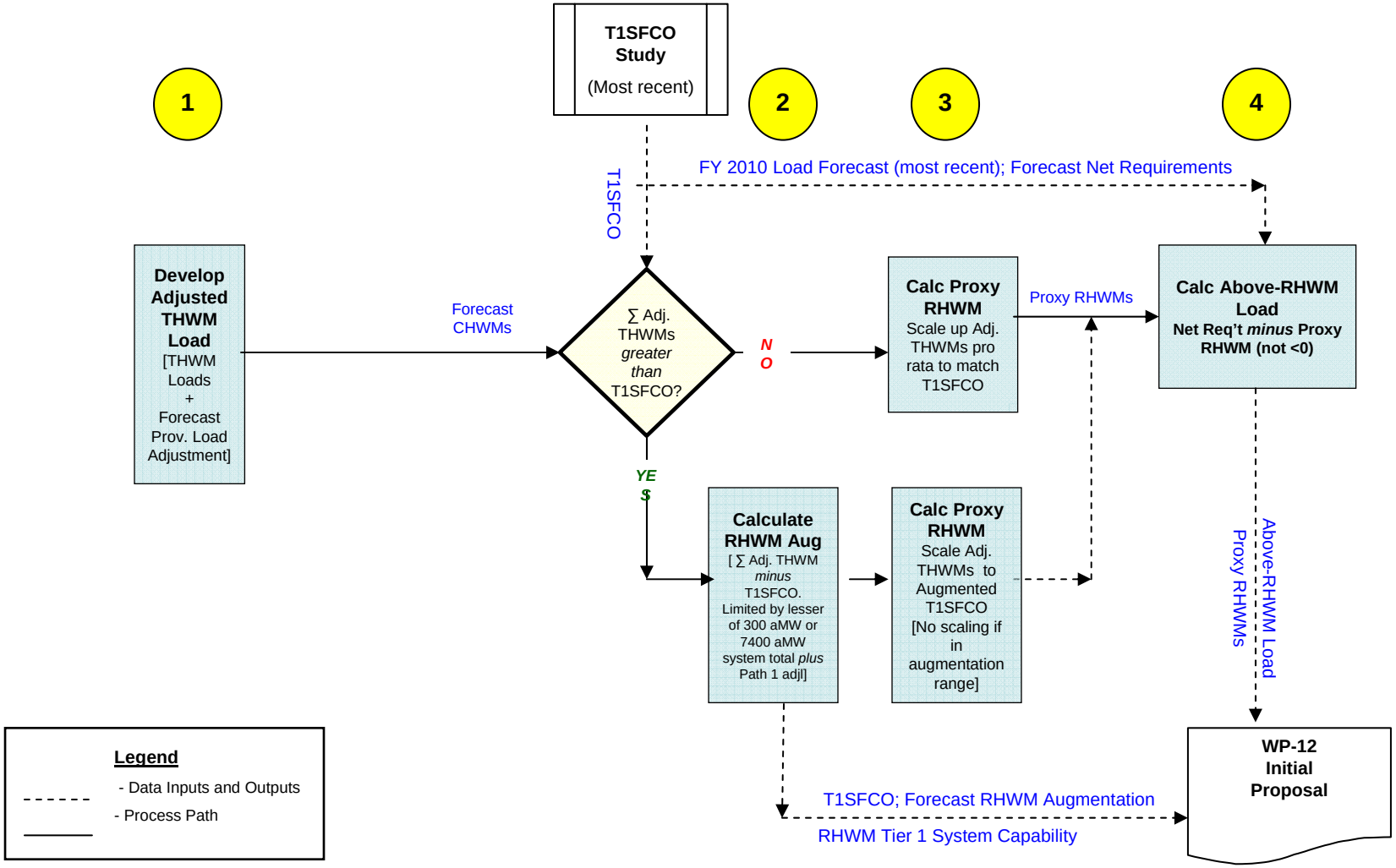
- Provisional Load adjustments may affect the amount of RHWM Augmentation. BPA has sufficient data to estimate the Provisional Load adjustment for general load loss (Path 2). We do not have sufficient data to estimate Provisional Load loss related to specific loads (Path 1).
- The RHWM Augmentation will be calculated using an assumed augmentation limit of 300 aMW. In future rate cases, after actual CHWMs are known, the actual calculated Augmentation Limit will be used.
- The following pages describe this proposed Proxy RHWM calculation.

Proposed Proxy RHWM Process

(Refer to process map on next slide)

- Description:
  - The proposed process broadly consists of two parts using forecast load data and the most recent T1SFCO study:
    - **<u>The first part (Step 1)</u>** derives a forecast of CHWMs. This forecast CHWM is based on the load used for THWMs and modified for Provisional Load adjustments. These forecast CHWMs are the inputs for second part of the process.
    - **<u>The second part (Steps 2-4)</u>** essentially mirrors the RHWM Process as described in the TRM. It calculates (proxy) RHWMs by adjusting forecast CHWMs to the T1SFCO. Outputs of this process include RHWM Augmentation, RHWM Tier 1 System Capability, and AHWM load.

Proposed BPA-12 Proxy RHWM Process Map



Next Steps

- Follow up workshop on May 26, if needed.
- Release of RAM module that calculates RHWMs with technical team to demonstrate. Targeting June 16 release.
- Continue CHWM Process implementation. Near-term activities are primarily related to developing load data for Measured FY 2010 Load and Provisional load adjustments:
  - Complete review of Customers' Adjusted FY 2007-08 Load for Path 2 Load adjustment and issue final data prior to 9/30/10. Targeting June release.
  - Mid-year review of Measured FY 2010 Load with customers. Targeting June.
  - Engage customers to assist with identifying and collecting data for Path 1 Provisional Load adjustment for specific load loss. June 2010 – January 2011.