Mitigating DSO Schedule Cuts

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DSO 216 Works as Anticipated

- Reasonably limits:
  - Burden on hydro system to supply balancing reserves.
  - Cost of providing wind integration services to wind schedulers.
  - BPA exposure to wind/load induced reliability events.
- Issue:
  - Effects of schedule cuts are asymmetric with generation limits, and actions to reduce occurrences are warranted.

Ideas for Reducing Schedule Cuts

- Expansion of Intra-hour pilot project to include schedule reductions.
- BPA PBL offer availability-contingent incremental generating capability.
- Deployment of systems necessary for wind schedulers, BAs, and merchant functions to engage in intra-hour trades.

Intra-Hour Schedule Reductions

- Expand intra-hour scheduling pilot to allow schedule reductions.
- Would allow receiving BAs to provide more of the wind balancing capability on a voluntary basis while avoiding involuntary schedule cuts.
  - Helps all wind schedulers by reducing likelihood of schedule cuts.
- Seems like a small step to make to add voluntary schedule reductions to involuntary schedule cuts.

Availability-Contingent Reserves

- Allow PBL to cover DSO 216 schedule cuts when resources are available to do so.
  - No obligation on BPA to set reserves aside to offer this service.
- Seems to make little sense to, for example, cut schedules in the middle of the night when there may be literally thousands of megawatts of incremental generating capability.
- Win-wind, reduces frequency of schedule cuts for wind schedulers, while opening a new source of revenues for BPA.

Intra-Hour Markets and Trading Platforms

- Broadened access across generators, wind schedulers, merchant functions, and balancing areas should allow wind schedulers, or BPA on behalf of wind schedulers to supplement reserves held in order to avoid schedule cuts.
- Joint Initiative activities under Dynamic Scheduling Systems (DSS) and Intra-Hour Transaction Accelerator Platform implementation need to be expedited.

Possible Rate Case Implications

- May affect level of incremental generating reserve levels.
  - May need higher level without mitigating actions, less with them.
- Is a new rate necessary in order for BPA to offer availability-contingent incremental generating capability?
- Others?

Ideas for Wind Integration Charge Alternative Billing Determinants

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Current Rate Case

- Three charges:
  - Regulating Reserves-- $0.05/kW
  - Following Reserves-- $0.26/kW
  - Imbalance Reserves-- $0.98/kW
- All levied on installed wind capacity, without differentiating:
  - Project Size
  - Project Diversity
  - Schedule Accuracy

Challenges to Alternatives

- Alternative billing determinants have to be implementable.
- Should send appropriate price signals.
- Minimum risk to revenue recovery.

Regulation and Following Charge

- Within-hour reserve requirements are unaffected by schedule accuracy and relatively unaffected by diversity.
  - Correlations are small on short time scales.
- Suggestion:
  - Charge regulation and following reserves against nameplate raised to a power of n, where n is a number between 1 (the current situation) and 2.
- **Recognizes relative cost contributions related to project size.**

Example: Effects on Current Fleet for n=1.5

Plant	Nameplate Capacity MW	Proposed Billing Determinant: Nameplate Capacity raised to the 1.5 power	Annual Charge @ $.31/kW-mon	Annual Charge Based on Proposed billing determinant @ $0.02723 per kwn-month	Proposed charge as percent of existing charge.	Approx Proposed Charge per MWh (32% cap fac) vs $1.33/MWh @ $.31/kw-mon
Vansycle	25	125	$ 93,000	$ 40,842	44%	$ 0.58
Stateline	90	854	$ 334,800	$ 278,971	83%	$ 1.11
Klondike I	24	118	$ 89,280	$ 38,416	43%	$ 0.57
Condon	50	354	$ 186,000	$ 115,518	62%	$ 0.82
Klondike II	76	663	$ 282,720	$ 216,479	77%	$ 1.02
Hopkins Ridge	157	1967	$ 584,040	$ 642,755	110%	$ 1.46
Leaning Juniper	100	1000	$ 372,000	$ 326,735	88%	$ 1.17
Big Horn	200	2828	$ 744,000	$ 924,147	124%	$ 1.65
White Creek	200	2828	$ 744,000	$ 924,147	124%	$ 1.65
Klondike III	226	3398	$ 840,720	$ 1,110,091	132%	$ 1.75
Biglow Canyon	126	1414	$ 468,720	$ 462,117	99%	$ 1.31
Nine Canyon @ 28%	27	140	$ 100,440	$ 45,840	46%	$ 0.61
Goodnoe Hills	96	941	$ 357,120	$ 307,329	86%	$ 1.14
Nine Canyon @ 52%	24	118	$ 89,280	$ 38,416	43%	$ 0.57
Klondike 3a	75	650	$ 279,000	$ 212,221	76%	$ 1.01
Arlington	103	1045	$ 383,160	$ 341,548	89%	$ 1.18
Willow Creek	72	611	$ 267,840	$ 199,616	75%	$ 0.99
Pebble Springs	100	1000	$ 372,000	$ 326,735	88%	$ 1.17
Hay Canyon	100	1000	$ 372,000	$ 326,735	88%	$ 1.17
Wheatfield	97	955	$ 360,840	$ 312,143	87%	$ 1.15
Tuolumne	137	1604	$ 509,640	$ 523,934	103%	$ 1.36
Biglow Canyon Phase 2	149	1819	$ 554,280	$ 594,259	107%	$ 1.42
Windy Flats Dooley (phase 1)	30	164	$ 111,600	$ 53,688	48%	$ 0.64
Windy Flats Dooley (phase 2)	233	3557	$ 866,760	$ 1,162,064	134%	$ 1.78
Harvest	100	1000	$ 372,000	$ 326,735	88%	$ 1.17
Combine Hills	63	500	$ 234,360	$ 163,383	70%	$ 0.93
Star Point	100	1000	$ 372,000	$ 326,735	88%	$ 1.17
Total Annual Revenues			$ 10,341,600	$ 10,341,600		

- Largest 7 projects pay 47% of total intra-hour reserve costs under current (n=1) system, pay 57% of reserve costs under n=1.5 allocation.
- Charges range from a low of ~$0.58/MWh to a high of ~$1.75/MWh

Imbalance: Capturing Schedule Accuracy and Diversity

- Idea is to charge the wind integration rate against net imbalance megawatt-hours instead of nameplate or project generation.
  - Seeks to provide correct price signal for better scheduling.
- Schedule errors that don't contribute to the net imbalance are not charged for that hour.
  - Important to ensure that less diverse projects pay more than more diverse projects.

Example

Col 1	Col 2	Col 3	Col 4	Col 5	Col 6
Hour	Hourly System Imbalance (MWh)	Wind Generation (MWh)	Wind Sched Imbalance (MWh)	Eligibility	Qualifying Imbalance (MWh)
1	1	125	0	1	0
2	17	124	1	1	1
3	-1	121	4	0	0
4	15	127	-7	0	0
5	10	103	25	1	25
6	13	84	19	1	19
7	-18	122	-39	1	39
8	14	117	6	1	6
9	-32	123	-6	1	6
10	19	103	20	1	20
11	-6	77	26	0	0
12	4	63	15	1	15
13	-20	100	-38	1	38
14	37	114	-13	0	0
15	-9	124	-10	1	10
16	-16	123	0	0	0
17	70	69	54	1	54
18	-5	120	-51	1	51
19	70	118	2	1	2
20	36	83	35	1	35
21	-33	94	-10	1	10
22	-36	97	-3	1	3
23	20	80	18	1	18
24	-13	90	-10	1	10
Totals:	137	2500	35	19	360

System Imbalance for Each Hour.

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6	13	84	19	1	19
7	-18	[illegible]	[illegible]	1	39
8	[illegible]	[illegible]	[illegible]	[illegible]	6
9	[illegible]	[illegible]	[illegible]	[illegible]	6
10	[illegible]	[illegible]	[illegible]	[illegible]	20
11	[illegible]	[illegible]	[illegible]	[illegible]	0
12	[illegible]	[illegible]	[illegible]	[illegible]	15
13	[illegible]	[illegible]	[illegible]	[illegible]	38
14	[illegible]	[illegible]	[illegible]	[illegible]	0
15	-9	[illegible]	[illegible]	[illegible]	10
16	-16	[illegible]	[illegible]	[illegible]	0
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Wind imbalances contributing to system imbalance get charged the wind integration rate.

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Wind imbalances contributing to system imbalance get charged the wind integration rate.

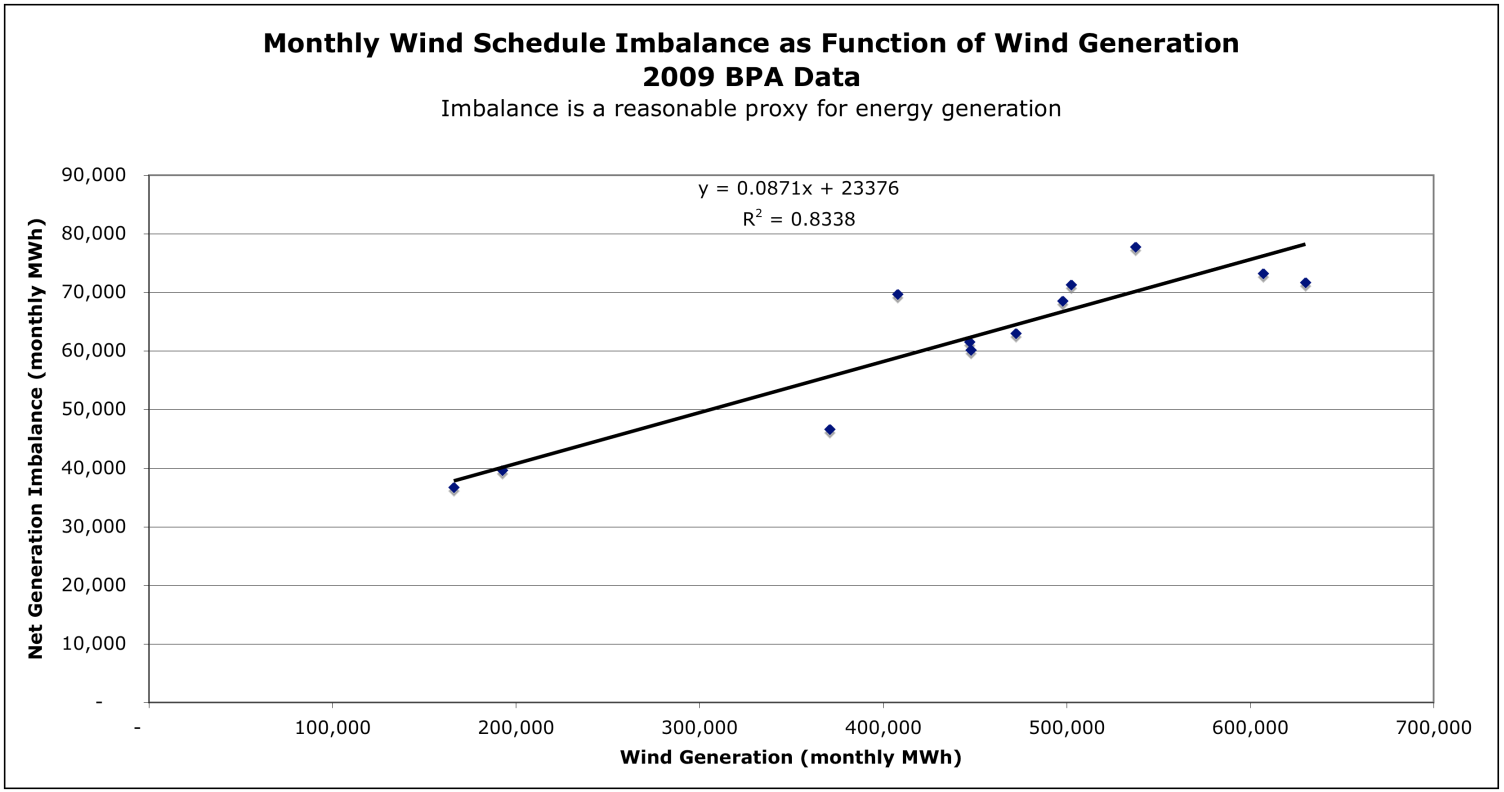
Less diverse projects will have more "eligible" hours and pay on relatively more MWh.

Last Year's Concern

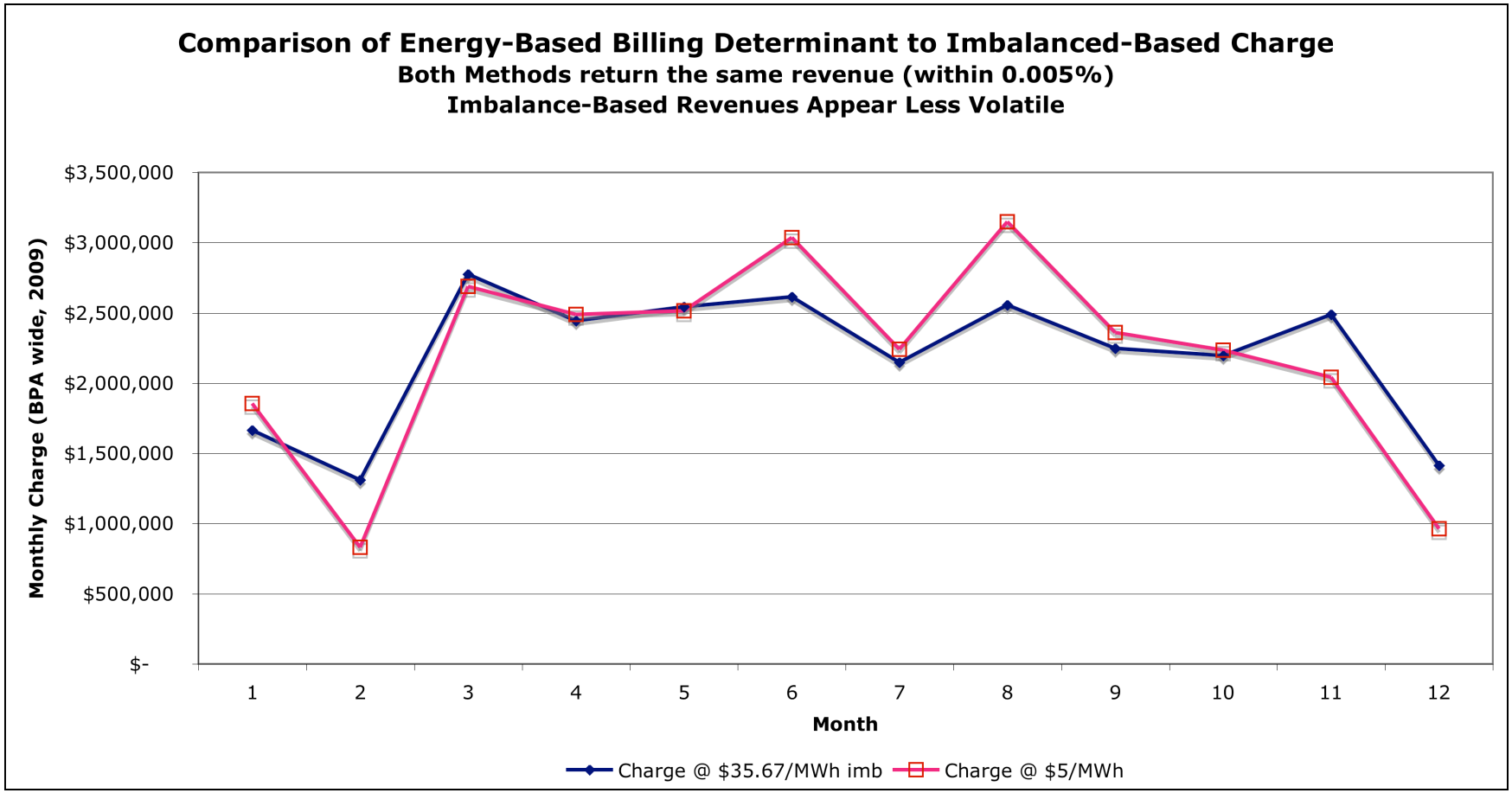
- Can we have certainty over revenue recovery?
  - Revenue recovery is not completely assured using either nameplate or energy generation as the billing determinant.
    - Not sure how much wind will actually interconnect over the rate period (nameplate uncertainty).
    - Not sure what the capacity factor of the interconnected projects will be (energy uncertainty).
  - Does using net imbalance as billing determinant increase the uncertainty?

Not Necessarily

- Nearly linear relationship between energy generation and net imbalance energy in 2009.



Net Imbalance More Constant Than Energy in 2009



- Month to month variability was less for a wind energy imbalance charge than a wind energy charge in recovering equivalent revenues.

Summary

- Charging the generation imbalance reserve portion of the wind integration rate based on imbalance energy:
  - Directly incentives better scheduling practices.
    - Rate of $5/MWh of generation equates to charge of about $36/MWh applied to energy imbalances.
  - Properly incentives diversity.
    - Projects siting inside the Gorge area pay more than those sited in more diverse areas.
  - Does not appear to introduce more revenue recovery uncertainty than an energy-based charge.
  - Is about as complex to implement as existing GI rate.

Discussion

- Intra-hour charge based on nameplate^{n} billing determinant.
- Imbalance reserve charge based on net imbalance energy.