

SPSC High DSM Load Forecast: Wyoming

Overview

Tables 1 and 2 present the High DSM load forecasts (Column D) for the balancing authorities in Wyoming, compared to the State-Adjusted (SPSC Reference Case) load forecasts. Table 3 directly compares the underlying energy efficiency projections for the reference case and High DSM case, in terms of their percentage of the hypothetical load forecast with no future energy efficiency savings. The following two sections of this document explain how the High DSM scenario efficiency savings projections were developed for each balancing authority.

Table 1. High DSM Load Forecasts for 2020: Annual Electricity Consumption (GWh)

Balancing Authority (In-State Portion)	A	B	C	D = A - (C - B)	E = (D/A - 1)
	State Adjusted (Reference Case) Load Forecast	Reference Case Efficiency Savings	High DSM Efficiency Savings	High DSM Load Forecast	Percent Change from State-Adjusted Load Forecast
	(GWh)	(GWh)	(GWh)	(GWh)	(%)
PACE	13,732	696	1,332	13,096	-5%
WACM	9,974	387	1,650	8,711	-13%
State Total	23,706	1,082	2,982	21,807	-8%

Table 2. High DSM Load Forecasts for 2020: Annual Peak Demand (MW)

Balancing Authority (In-State Portion)	A	B	C	D = A - (C - B)	E = (D/A - 1)
	State Adjusted (Reference Case) Load Forecast	Reference Case Efficiency Savings	High DSM Efficiency Savings	High DSM Load Forecast	Percent Change from State-Adjusted Load Forecast
	(MW)	(MW)	(MW)	(MW)	(%)
PACE	1,846	150	235	1,760	-5%
WACM	1,552	82	321	1,313	-15%
State Total	3,398	232	556	3,074	-10%

Table 3. Comparison of Reference Case and High DSM Case (2020 Cumulative Savings)

Balancing Authority (In-State Portion)	Reference Case Savings (% of Load Forecast w/o EE)		High DSM Case Savings (% of Load Forecast w/o EE)	
	GWh	MW	GWh	MW
PACE	5%	8%	9%	12%
WACM	4%	5%	16%	20%
State Total	4%	6%	12%	15%

Note: The percentages in this table were calculated by dividing the savings projection by the sum of the savings projection and the post-savings load forecast (e.g., High DSM savings divided by High DSM savings plus High DSM

load forecast)

PACE Balancing Authority

The High DSM savings projection for the Wyoming portion of PACE was developed from PacifiCorp's 2007 energy efficiency potential study (Quantec, 2007). Table 4 summarizes the energy efficiency potential estimates for PacifiCorp/Rocky Mountain Power's Wyoming service territory in the year 2027.

Table 4. PacifiCorp Energy Efficiency Potential (Wyoming Service Territory, 2027)

	Technical	Economic	Achievable
GWh	1,384	1,235	710
% of Baseline Sales	10%	9%	5%

Source: Quantec (2007), Tables 53, 55, and 57.

Notes: The study indicates that the potential estimates represent savings at the generator, and thus already include avoided T&D losses. The study also indicates that the baseline projection accounts for naturally occurring savings, thus the potential estimates are net of naturally occurring savings.

It is worth noting that the economic potential estimate in the PacifiCorp study is relatively low, as a percentage of baseline retail sales (9%), compared to other most other potential studies, which typically estimate economic potential to range from 15-25% of retail sales. As shown in Table 5, the source of this difference largely derives from the fact that industrial sales represent the large majority of the utility's load in Wyoming, and PacifiCorp's study estimates a low economic potential for the industrial sector (6% of baseline retail sales). It is not uncommon that potential estimates for the industrial sector are substantially lower than for the residential and commercial sectors.¹

Table 5. PacifiCorp Economic Potential Estimate (Wyoming Service Territory, 2027)

	Res.	Com.	Ind.	Total
Baseline Retail Sales (GWh)	1,699	2,646	9,032	13,377
Economic Potential (GWh)	298	412	526	1,235
Economic Potential (% of Retail Sales)	18%	16%	6%	9%

For the High DSM scenario, we assume that the full economic potential for 2027 is achieved throughout the Wyoming portion of the PACE balancing authority by the year 2020. Developing a High DSM load forecast based on this assumption involves three additional steps:

- 1) Estimating the peak demand savings associated with achieving the full economic potential
- 2) Extrapolating the study results from PacifiCorp's Wyoming service territory to the entire Wyoming portion of the PACE balancing authority

¹ For example, a recent potential study conducted for PSCo (KEMA, 2010) estimated a net economic potential of 10% for the industrial sector, compared to 24% and 20% for the residential and commercial sectors, respectively. In contrast, the recent potential study for Tri-State (Nexant, 2010) estimates more similar levels of economic potential across sectors: residential (19% of baseline sales), commercial (18%), and industrial (16%).

- 3) Determining the overlap between the economic potential estimate and the SPSC reference case projection of savings from new federal standards

Estimating the peak demand savings associated with achieving the full economic potential

The PacifiCorp energy efficiency potential study does not report peak demand savings. We therefore estimate the peak demand savings associated with PacifiCorp’s economic potential estimate by applying a stipulated peak-to-energy savings ratio for each sector, based on the results of other potential studies conducted for utilities in the Southwest and Mountain regions (see Table 6). For PacifiCorp, we use the median value for each sector. Applying these peak-to-energy savings ratios to the projected energy savings in 2020 yields peak demand savings equal to 216 MW (see Table 7).

Table 6. Peak-to-Energy Savings Ratios (MW/GWh) from Recent Economic Potential Estimates

Utility	Study	Peak-to-Energy Savings (MW/GWh)			
		Residential	Commercial	Industrial	Total
APS	ICF (2007)	0.18	0.21	n/a	0.20
PNM	Itron (2006)	0.21	0.18	0.10	0.18
PSCo	KEMA (2010)	0.29	0.20	0.14	0.23
Tri-State	Nexant (2010)	0.17	0.21	0.20	0.19
Median		0.19	0.20	0.14	0.20

Table 7. Estimated Peak Demand Savings for PacifiCorp Economic Potential

Sector	GWh	Assumed MW/GWh	MW
Residential	298	0.19	58
Commercial	412	0.20	84
Industrial	526	0.14	75
Total	1,235	n/a	216

Extrapolating the study results for PacifiCorp to the entire Utah portion of the PACE balancing authority

The Wyoming portion of the PACE balancing authority consists primarily of PacifiCorp’s load, but also includes several small utilities and cooperatives. We extrapolate the PacifiCorp potential study results for each sector (residential, commercial, and industrial) to the entire Wyoming portion of PACE by simply scaling up the energy and peak demand savings potential based on the ratio of the total balancing authority retail sales to PacifiCorp’s retail sales, for that sector. While we recognize that this is a simplistic approach, and ignores potential differences in demographics, climate, and end-use characteristics, we also believe that it is a reasonable approximation given the data and resources available. This extrapolation, presented below in Table 8, yields an estimated 2020 net economic potential for the entire Wyoming portion of PACE equal to 1,332 GWh and 235 MW.

Table 8. Extrapolation of Economic Potential to Wyoming Portion of PACE

	Res.	Com.	Ind.	Total
<u>Retail Sales¹</u>				
PacifiCorp (Wyoming)	1,083	1,519	6,734	9,335
PACE (Wyoming)	1,254	1,691	6,775	9,720
<u>Net Economic Potential in 2020 (GWh)</u>				
PacifiCorp (Wyoming)	298	412	526	1,235
PACE (Wyoming)	345	458	529	1,332
<u>Net Economic Potential in 2020 (MW)</u>				
PacifiCorp (Wyoming)	58	84	75	216
PACE (Wyoming)	67	94	75	235

¹ Data Source: EIA-861 retail sales data for 2008.

Determining the Overlap between the Economic Potential and the SPSC Reference Case Projection of Savings from Federal Standards

The High DSM savings projection is equal to the sum of the net economic potential, plus any incremental savings from federal appliance and lighting standards that were included in the reference case but are not contained within the extrapolated potential estimate.² The PacifiCorp potential study was conducted in 2007, prior to enactment of any of the federal standards included in the SPSC reference case, and the report indicates that the baseline forecast does not account for any standards that had not already been enacted at that time. We therefore assume that the SPSC reference case savings from federal standards is *fully included* within the extrapolated PacifiCorp potential estimate, and no further adjustment is required in order to account for the incremental impact of those standards.

WACM Balancing Authority

The High DSM scenario savings estimate for the WACM balancing authority is based on the 2010 energy efficiency potential study for Tri-State Generation and Transmission Cooperative (Nexant, 2010). The potential estimates from that study, for the Wyoming portion of Tri-State's service territory in the year 2020, are presented below in Table 9.

Table 9. Tri-State Energy Efficiency Potential (Wyoming Service Territory, 2020)

	Technical	Economic	Max. Achievable ¹
GWh	402	308	179
MW	83	62	36
% of baseline retail sales	20%	15%	9%

Source: Calculated from detailed savings tables in Nexant (2010), Appendix A

² The reference case included savings both from ratepayer-funded energy efficiency and from federal appliance and lighting standards. We assume that the savings from ratepayer funded programs are wholly a sub-set of the net economic potential, and therefore it is necessary only to determine the overlap between the net economic potential and the reference case savings from federal standards.

Notes: The potential study indicates that the baseline projection accounts for naturally occurring savings, thus the potential estimates are net of naturally occurring savings.

¹ Max. Achievable scenario assumes incentives cover 100% of incremental measure cost. The study also estimated achievable potential under three other incentive levels.

For the purpose of the High DSM scenario we assume that the full economic potential is achieved in the Colorado portion of the WACM balancing authority region. Developing a High DSM load forecast for the balancing authority involves three additional steps:

- 1) Adding avoided T&D losses to the economic potential estimate
- 2) Extrapolating the potential study results to the entire Wyoming portion of the WACM balancing authority
- 3) Determining the overlap between the estimated potential for WACM and the SPSC reference case projection of savings from new federal standards

Adding Avoided T&D Losses to the Potential Estimates

The potential estimates presented in the Tri-State study represent savings at the customer meter. The economic potential estimate must therefore be scaled up to the bus-bar to account for avoided T&D losses, based on an estimated marginal T&D loss factor (7.7%).³ The results of this adjustment are shown below in Table 10.

Table 10. Tri-State Economic Potential (Wyoming, 2020) Including Avoided T&D Losses

	Res.	Com.	Ind.	Irrig.	Total
GWh	83	14	224	12	334
MW	14	3	45	5	67

Extrapolating the Study Results to the Entire Colorado Portion of WACM

The Wyoming portion of the WACM balancing authority consists of numerous utilities (the largest being Powder River, Cheyenne, High Plains, and Lower Valley). Tri-State G&T serves about one quarter of the total load within the Wyoming portion of WACM.

To extrapolate the Tri-State potential study, we follow a similar procedure as with the PACE balancing authority. Namely, we scale up the potential study results for each sector, in proportion to 2008 retail sales for that sector. This extrapolation is presented below in Table 11, which indicates that the total economic potential in the Wyoming portion of WACM is estimated to be 1,539 GWh and 301 MW in 2020. These values represent savings at the bus bar and are net of naturally occurring savings.

³ Tri-State's potential study cites an average T&D loss factor of 5.5%. We assume that marginal T&D loss factors are equal to 1.4 times the average T&D loss factor, based on preliminary analysis conducted by Jim Lazar and shared with members of the DSM working group. Marginal loss factors are the relevant metric for estimating avoided T&D losses from DSM and are higher than average loss factors, because resistive losses increase exponentially with load.

Table 11. Estimated Economic Potential for Wyoming Portion of WACM

	Res.	Com.	Ind. & Irr.	Total
<u>2008 Retail Sales</u>				
Tri-State (WY)	387	56	1,210	1,653
WACM (WY)	1,465	2,721	2,785	6,970
<u>Net Economic Potential in 2020 (GWh)</u>				
Tri-State (WY)	83	14	237	334
WACM (WY)	314	681	545	1,539
<u>Net Economic Potential in 2020 (MW)</u>				
Tri-State (WY)	14	3	50	67
WACM (WY)	53	132	116	301

¹ Data Source: EIA-861 retail sales data for 2008.

Determining the Overlap between the Net Economic Potential and the SPSC Reference Case Projection of Savings from Federal Standards

The Tri-State potential study indicates, in general terms, that the baseline projection accounts for savings from federal standards, although the study does not identify the specific standards that were incorporated into the baseline analysis. Notwithstanding this lack of specificity, we assume that the baseline in the Tri-State study does account for all federal standards that had been adopted prior to the date of the study (i.e., the EISA standards and a sub-set of the DOE standards in the reference case savings estimate), but does not account for those new standards in the SPSC reference case that DOE is scheduled to adopt within the next 2-3 years. Table 12 identifies the reference case savings estimate associated with these two groups of federal standards.

The High DSM savings projection is therefore equal to the sum of the estimated net economic potential and the savings from federal standards that are assumed to be captured within the baseline of the extrapolated potential estimate, as shown in Table 13.

Table 12. Overlap between SPSC Reference Case Projection of Savings from Federal Standards and Net Economic Potential Estimate

	GWh	MW
Included in Potential Study Baseline (i.e., incremental to potential estimate)	111	20
Not Included in Potential Study Baseline (i.e., contained within potential estimate)	40	9
Total Reference Case Projection of Savings from Federal Standards	150	29

Table 13. Total High DSM Savings Estimate for the Colorado Portion of WACM

	GWh	MW
Net Economic Potential	1,539	301
Reference Case savings from federal standards included in potential study baseline	111	20

Total	1,650	321
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