

MEMORANDUM

TO: Commissioners, Kate, Justin, Bob D., Eric
FROM: Will and Neil
DATE: January 7, 2015
RE: Revenue and cost responsibility impacts of net metering.

I. Purpose

This memo responds to a request by Commissioner Kavulla for information on net metering activity within NorthWestern Energy's (NorthWestern) service area, its impact on NorthWestern's delivery service (transmission & distribution) revenue, and whether the revenue impact involves a subsidy. This memo is not a comprehensive analysis of the costs, benefits, or public policy merits of net metering. In preparing the memo, we relied on information provided by NorthWestern (see Attachment 1).

II. Background

Montana law allows a retail customer of a regulated utility to install a small electric generating facility on their premises, interconnect the generating facility with the utility's distribution system, and operate the facility in parallel with the utility's system for the purpose of offsetting part or all of their electricity requirements.¹ Mont. Code Ann. §§ 69-8-103(19), 69-8-602 (2013). The customer's electric generating facility must be fueled by wind, solar, or hydro power and its capacity cannot exceed 50 kilowatts. *Id.* at § 69-8-103(19). Customers who opt for this arrangement are called "customer-generators" and the arrangement is called "net metering." *Id.* at § 69-8-103(6) and (19).

A utility must allow a customer-generator to interconnect a generating facility using a standard kilowatt-hour meter capable of registering the flow of electricity in two directions, and must charge the customer-generator the same monthly fee it charges other customers in the same

¹ Montana-Dakota Utilities (MDU) is exempt from these net metering requirements pursuant to Mont. Code Ann. § 69-8-201(4). However, the Commission required MDU to implement net metering in Order 6846f (April, 2008) under the Energy Policy Act of 2005, which amended Section 111(d) of the Public Utility Regulatory Policies Act. Pub. L. 109-58, 16 U.S.C. § 2621(d)(11) (2005). Four of MDU's customers (two residential, two commercial) currently net-meter, all with wind generators. Cooperative electric utilities are exempt from net metering pursuant to Mont. Code Ann. § 69-8-605.

rate class. *Id.* at § 69-8-602. However, the law authorizes the Commission to require separate metering of the customer-generator's facility, if appropriate, based on public comment and an analysis of the costs and benefits of separate metering. *Id.* The law also authorizes the Commission to determine, after an opportunity for public comment, whether the utility will incur direct costs to interconnect customers' generating facilities and administer net metering that exceed offsetting benefits and whether any net costs should be imposed on customer-generators. *Id.* To date, the Commission has not been asked to analyze, and has not analyzed, the costs and benefits of separate metering or whether utilities incur costs to implement net metering that exceed the benefits.²

A utility must bill a customer-generator based on a net energy measurement. *Id.* at 69-8-603. When a meter reading indicates that the utility supplied the customer-generator more electricity than the customer-generator's facility generated in a billing period, the utility must bill the customer-generator for the net kilowatt-hours of electricity it supplied. When the customer generator's facility generated more electricity than the utility supplied in a billing period, the utility must credit the customer-generator's account for the excess kilowatt-hours of electricity and apply the credit in the subsequent billing period. After every 12 billing periods the utility must eliminate any kilowatt-hour credit balance from the customer-generator's account without compensation. *Id.*

Many of the costs a utility incurs to deliver electricity to homes and business are fixed in the short-run. Investment costs for poles, wires, substations, transformers, meters, billing and accounting systems, and trucks and maintenance equipment, and expenses associated with employee wages, do not tend to change from month-to-month based on the amount of electricity customers consume.³ However, utilities often bill customers for electricity delivery services through a combination of usage-based (i.e., per kilowatt-hour of electricity) and fixed prices. Currently, NorthWestern bills residential customers about 3.8¢ per kilowatt-hour and \$5.25 per month for delivery service. NorthWestern bills other services similarly. For example,

² Mont. Code. Ann. § 69-8-601 states that it is in the public interest to promote net metering because it encourages private investment in renewable energy resources, stimulates Montana's economic growth, and diversifies the energy resources used in Montana.

³ In the long run, a utility's delivery service costs are affected by customer consumption. By influencing customer-generators' demand, net metering may influence a utility's long-run marginal costs.

NorthWestern charges customers about 6.9¢ per kilowatt-hour for electricity supply service, although many supply costs are also largely fixed in the short-run, such as the investment costs for Colstrip Unit 4 and the hydroelectric plants and payments to contracted resources such as Basin Creek.

The Commission has historically approved this method of pricing electricity delivery service for a variety of reasons. Such price structures give customers greater control over their utility bills compared to price structures that recover delivery service costs through fixed charges alone. Such price structures may encourage utilities to control costs and may contribute to overall electricity prices that are equitable and promote efficient use of electricity. However, this method of pricing also allows customer-generators to reduce a portion of their bill intended to recover a utility's fixed delivery service costs; each kilowatt-hour of electricity a customer-generator's generating facility offsets means the customer pays about 3.8¢ less toward NorthWestern's delivery service costs.

Similar impacts occur when customers take action to become more energy efficient or simply change their consumption habits. In addition, revenue impacts from net metering do not occur in isolation. Many other factors affect whether a utility's prices, in aggregate, adequately recover the total cost of service, including weather, general economic conditions, the rate of customer growth, changes in the price of fuel and other factors of production, and tax changes, to name a few. When a utility's total revenue is not sufficient to cover its total costs (including a sufficient return on invested capital) it may look for ways to operate more efficiently and/or apply to the Commission for higher rates.

III. Estimated revenue impacts of net metering on NorthWestern

NorthWestern has provided the current number, installed capacity, and estimated annual energy output of customer-generator facilities operating within its system.⁴ As of October, 2014, 1,333 (about 0.4%) of NorthWestern's roughly 340,000 Montana customers were customer-generators. These customer-generators have installed about 5.6 MW of generating capacity,

⁴ In a November 14, 2014 email, staff requested that NorthWestern Energy provide specific net metering statistics, including the number of facilities by generating type (solar, wind, hydro) and customer category (household, business), total installed capacity, and historical data on the number of facilities. Attachment 1 is NorthWestern's response.

including 4.7 MW (83%) of solar photovoltaic (PV) generating capacity and 0.87 MW (15%) of wind generating capacity. On average, residential solar PV facilities appear to offset about half of a typical customer's annual electricity use, but we have not compared baseline electricity use to net metered use on a customer-by-customer basis.⁵

We estimated the annual impact of net metering on NorthWestern's delivery service revenue based on estimated annual energy output from existing customer-generator facilities. As the table below shows, existing customer-generator facilities produce about 7,351,000 kilowatt-hours of electricity annually. At current prices, NorthWestern's delivery service revenue would be about \$300,000 per year more but for the electricity generated by these facilities.⁶

Current net metering statistics*

	Residential	Commercial	Total
Customer-generators (Total)	1,040	293	1,333
Facility capacity (Total KW)	3,459	2,161	5,620
Annual facility energy (Total kWh)	4,499,000	2,852,000	7,351,000
Usage-based delivery service price (\$/kWh)**	\$0.037694	\$0.044929	
Annual revenue reduction	\$169,585	\$128,138	\$297,723

* As of October 2014

** Delivery service rates are the sum of transmission and distribution rates

NorthWestern recovers much of this roughly \$300,000 annual delivery service revenue reduction through two regulatory mechanisms. First, the Commission periodically sets delivery service rates in general rate cases. Those rates reflect the impact of net metering on the overall demand for electricity. Current usage-based delivery service rates reflect customers' overall demand in 2008 and, therefore, reflect the impact of customer-generator facilities installed before that time. Second, the Commission has implemented a lost revenue adjustment mechanism

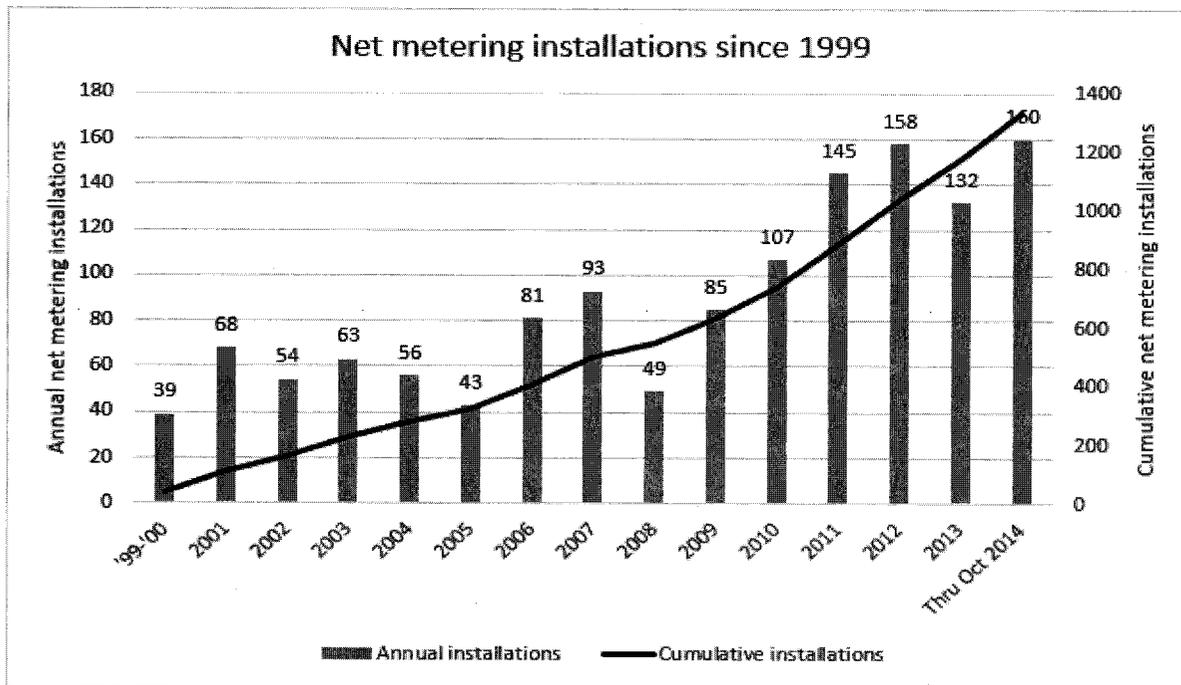
⁵ NorthWestern reported 960 residential solar PV customer-generators that generate a total of about 4,095,000 kilowatt-hours annually, or about 4,266 kilowatt-hours per customer per year. A typical NorthWestern residential customer consumes about 9,000 kilowatt-hours per year.

⁶ Annual revenue impacts are derived by multiplying estimated annual energy generation from customer facilities by the applicable usage-based delivery service tariff rates for the residential and non-demand metered business (Schedule GSEDS-1) rate classes. Together, these rate classes represent about 93% of all customers.

(LRAM) that allows NorthWestern to recover the estimated revenue impacts of net metering incentivized through universal system benefits programs between rate cases.⁷

In NorthWestern’s last general rate case the Commission approved a total cost of electric delivery service of about \$230 million. Or. 7046i, Dkt. D2009.9.129, pp. 54, 57 (Jun. 30, 2011). The roughly \$300,000 annual delivery service revenue impact from net metering represents about 0.13% of that annual delivery service cost and about 0.04% of NorthWestern’s roughly \$700 million total electric utility sales revenue in 2013. NorthWestern Energy 2013 Electric Utility Annual Report, Schedule 36.

Interest in net metering appears to be increasing. NorthWestern Energy provided the chart below showing annual requests for net metering arrangements since 1999 (also see Attachment 1).



⁷ Mont. Code. Ann. § 69-8-402 establishes electric utility universal system benefits programs. NorthWestern’s E+ Renewables program is a qualifying universal system benefits program that provides financial incentives to encourage customers to install small electricity generators such as roof-top solar PV systems that are eligible for net metering. The Commission approved a lost revenue adjustment mechanism for delivery service revenue in Or. 6574e (Dec. 14, 2005). NorthWestern has sought and received Commission approval to recover lost delivery service revenue associated with its E+ Renewable program. See, e.g., Dkt D2012.5.49, Or. 7219h.

IV. Equity impacts of net metering

As described above, net metering changes customer-generators' consumption profiles. All other things equal, given that NorthWestern's delivery service costs are largely fixed in the short-run and are recovered mostly with usage-based prices, the change in customer-generators' consumption profiles shifts how delivery service costs are recovered from customers – less from customer-generators, more from other customers. Currently, this shift amounts to less than 50¢ per year for a typical residential customer.⁸ The change in customer-generators' consumption profiles may also shift the recovery of electricity supply service costs, but we cannot quantify the size or direction of the shift with the information we have.

We were asked whether the shift in delivery service cost recovery with net metering creates a subsidy. Determining whether the price of a service is subsidized requires marginal cost of service information.⁹ We do not have, and have not analyzed, NorthWestern's marginal cost of delivery service and so cannot answer the question. Historically, evaluating a utility's marginal cost of service has been complex and contentious due to differing views on how to measure marginal costs. Analyzing subsidies in the provision of utility service is also complicated by the averaging that necessarily occurs in the process of measuring costs and setting prices – even without net metering some customers pay more towards delivery service costs than others. In addition, delivery service impacts represent only part of the total impact of net metering on noncustomer-generators and NorthWestern's total cost of service.

It should be possible to develop reasonable estimates of the overall costs and benefits of net metering. NorthWestern is probably best positioned to initially perform an analysis for its system, which could then be filed with the Commission and made available for stakeholder and public review and comment – in fact, distributed generation/net metering potential and cost

⁸ This figure assumes customer-generators have reduced their payments for delivery service costs by \$300,000 per year and that NorthWestern has recovered the reduction through rate adjustments and the LRAM. The residential class's share of this amount, based on the delivery service cost allocation the Commission approved in Order 7046i, is approximately 43%, or \$129,000 per year. Dividing this cost evenly by NorthWestern's approximately 278,000 residential customers equals 46.4¢ per customer per year.

⁹ Marginal cost is the cost to produce one more unit of service or, equivalently, the cost saved by producing one less unit of service. See, e.g., Kahn, A. (1988). *The Economics of Regulation: Principles and Institution*. Cambridge, MA: MIT Press. The price of a service is subsidized if it is less than the marginal cost. Pearce, D. (1992). *The MIT Dictionary of Modern Economics*, Cambridge, MA: MIT Press.

effectiveness analyses should already be part of NorthWestern's resource planning (see Admin. R. Mont. 38.5.8210(2)(b)). Such a process would allow the Commission to consider the appropriateness of actions authorized in the net metering law or identify other appropriate actions to recommend to future Legislatures.

ATTACHMENT 1

Response to questions from MPSC staff regarding net metering on NorthWestern's system

1. Current number of net metering installations in NWE's Montana service territory (separate out solar, wind, other),

1,218 solar + 110 wind + 5 other = 1,333 total

2. Current number of household vs. business installations (separate out solar, wind, other), and

960 residential solar + 258 commercial solar = 1,218

77 residential wind + 33 commercial wind = 110

3 residential other + 2 commercial other = 5

Net Metered Cumulative: Thru Oct 2014				
		Residential	Commercial	Total
Photovoltaic	Customers	960	258	1,218
Wind	Customers	77	33	110
Other	Customers	3	2	5
Total	Customers	1040	293	1,333

3. Current total installed generating capacity of net metering installations in the household and business sectors (separate out solar, wind, other).

Solar residential = 4,095 MWh/yr

Wind Residential = 313 MWh/yr

Other Residential = 91 MWh/yr

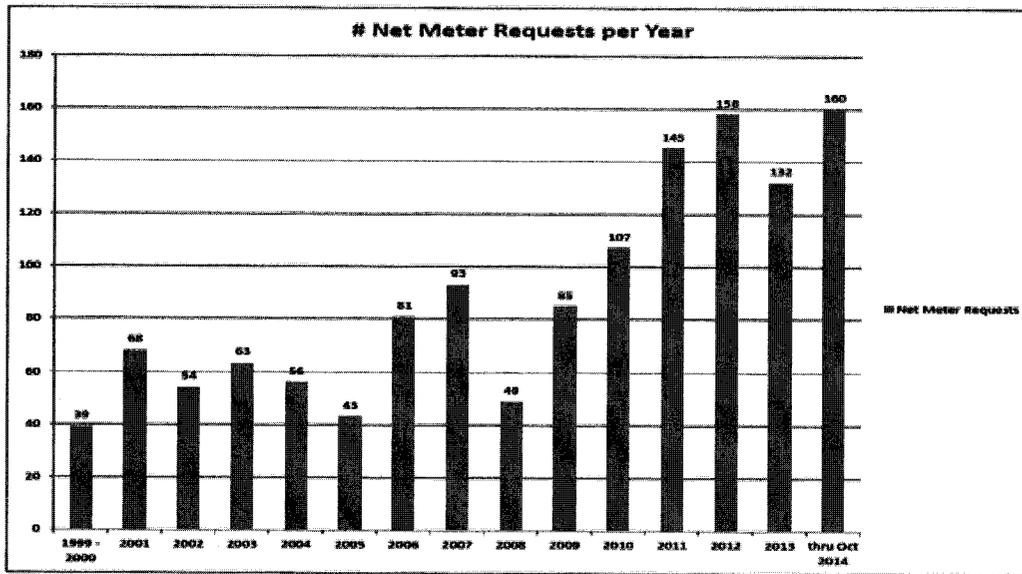
Solar Commercial = 2,114 MWh/yr

Wind Commercial = 369 MWh/yr

Other Commercial 368 MWh/yr

Net Metered Cumulative: Thru Oct 2014				
		Residential	Commercial	Total
Photovoltaic	Customers	960	258	1,218
	MW	3.040	1.626	4.665
	MWh	4,095	2,114	6,209
Wind	Customers	77	33	110
	MW	0.402	0.466	0.867
	MWh	313	369	682
Other	Customers	3	2	5
	MW	0.018	0.070	0.088
	MWh	91	368	459
Total	Customers	1040	293	1,333
	MW	3.459	2.161	5.621
	MWh	4,499	2,852	7,351

4. Historical year-end net metering installations since 1999.



Also, can someone confirm the following:

1. From the SBW report, E+ Renewable systems saved/generated 2,375,014 kWh over the 2007-2011 evaluation period. Are all these renewable systems net metered?

There may be some that are not net metered.

2. The 2013-2014 tracker period, E+ Renewable savings/generation was 548,311 kWh and lost T&D revenue was about \$20,360.

The E+ Renewable savings/generation value of 548,311 kWh is the 2013-2014 tracker 9 months actual + 3 months estimated annual savings/generation for the projects that came on-line and were expected to come on-line during the 2013-14 tracker period. \$20,360 for lost T & D revenue is a reasonable value for the annual generation associated with these projects. The lost revenue included in the 2013-2014 tracker for these incremental projects would be half of the annual value. These lost revenue values do not include lost revenues associated with generation/savings from projects that came on line prior to the 2013-14 tracker period.

3. The SBW report determined that solar PV systems funded through the E+ Renewable program had capacity factors in the range of about 15% - 16%, with the average for commercial sector systems being slightly higher than residential systems.

The SBW report used a weighted average of 0.157 (15.7%) for commercial solar PV projects and a weighted average of 0.147 (14.7%) for residential solar PV projects.