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Testimony by Dr. Gabriel Chan

Thank you Madam Chair, Rep. Long, and members of the committee for the opportunity to testify on bill H.F. 2625

My name is Gabriel Chan. I am an Assistant Professor at the University of Minnesota's Humphrey School of Public Affairs. I am here today in my own capacity as a researcher and private citizen, not as a representative of the University of Minnesota.

This bill would amend aspects of Minnesota's community solar garden program in Xcel Energy's service territory. [The community solar garden program in Xcel's territory was established by the legislature in 2013 and is now the largest community solar garden program in the country. As of the beginning of this month (March 1, 2019), there were 516 megawatts of community solar projects in 177 project sites in commercial operation, with an additional 378 megawatts of projects in design, construction, study, or in application across 311 project sites. This represents about half of all solar deployed in the state to date. Over 11,000 of Xcel's residential customers and over 14,000 total Xcel customers participate in the community solar program as subscribers to solar gardens.]

Community solar is a complex policy – but it is one that many stakeholders deem a critical tool in the toolbox for transitioning our energy system in a manner that broadens the base of stakeholders who can participate in the energy system. But due to community solar's complexity and its relatively recent development, best practices are still emerging. Of critical concern is to strike the appropriate balance of maintaining the financial health of utilities, allowing for appropriate third-party investment, creating opportunities for individuals to participate in making their own energy choices, and making sure that low-income households and those most affected by the high costs of energy are included and made better off.

This bill would reform Minnesota's community solar garden program, the largest in the country. I would like to focus my comments on the economics of the program and make three points: (1) energy customers already vary substantially in the extent to which they are “paying their fair share” for energy system costs, (2) the community solar program's growth to date involves a cost shift of about \$0.54 - \$1.02 per month for an average residential customer but that cost shift can be capped with well-designed policy, and (3) Minnesota is well on its way to designing a cost-shift cap in the form of the Value of Solar tariff but some reforms are needed.

1. Customers do not all pay their “fair share”

We receive our electricity through a vast and complicated infrastructure system. Technology and policy have changed how this system has evolved, but a central principle has been that there are large, so-called “fixed costs” that are needed to cost-effectively serve customers. It wouldn't make sense to have multiple, competing electric grids, so instead we all share one. Anytime there is shared infrastructure, there are likely to be cost shifts. For

example, the cost of providing electricity at night is about 25% of the cost of providing electricity during the day. But customers pay a single price for electricity (except in Xcel's small pilot program). And so when customers shift their usage from day to night, they save their neighbors money – and vice versa. As with other industries, we accept these cost shifts as a necessary part of how we govern and manage our electricity system to meet our collective goals of simple, affordable, and reliable electricity service.

2. Ratepayer impacts of the community solar program

Community solar gardens represent a shift in change in how Minnesota's energy system works. The community solar gardens in Xcel's territory are the largest form of electric generation that Xcel does not own or directly procure. A key question then is how to fairly set the terms for third-party solar developers given the lack of markets that could otherwise set the terms of competition. In other words, in the absence of competition, what is the appropriate basis for setting compensation for different energy providers?

The default approach most states have taken is to implement a policy called “net metering” that treats power generated by third parties equivalent to power consumed by those parties. Minnesota passed the nation's first net metering policy in 1983, and since, 40 states have followed suit. There are some challenges with net metering, particularly around whether or not third-party solar owners are paying their “fair share.” The Lawrence Berkeley National Lab studied net metering and concluded that at current solar levels, there was a small cost shift. They concluded that non-solar owners could see their bills increase by 0.25% but also could decrease by as much as 0.25% due to net metering. At levels of solar penetration much higher than today (10% by 2030), LBNL concluded that the rate impact on non-participants of net metering would be between negative 4-5% and positive 4-5%.

To put this number in context, natural gas price volatility—as derived from market-based forecasts—suggests that electric rates have a one-in-ten chance of increasing by over 8% by 2030 due only to changes in fuel prices.

The community solar garden program was initially compensated under a net-metering styled policy. I have performed my own calculations of the cost-shift induced by the community solar garden program. Based on the operating solar gardens as of the beginning of this month, I calculate that the average Xcel residential customer will see their bills increase by **\$1.02 per month**. This calculation reflects medium/long-run cost savings in avoided energy infrastructure; excluding those savings would imply a higher cost shift of \$1.77 per month. However, solar also reduces environmental impacts, and if those impacts are monetized and shared equally among ratepayers, the total impact is reduced to **\$0.54 per month**.

Inclusive of all solar gardens in the application queue, I calculate that the bill impact for residential customers will grow to **\$1.62 per month** excluding environmental benefits and would be **\$0.78 per month** including environmental benefits. For the average Xcel customer, this would represent a bill increase of **1.9%** with offsetting environmental

benefits equivalent to 1% of monthly bills, for a **net effect of 0.9%**. These cost shifts are due exclusively to projects that fall under the tariff scheme in the first years of the program before the Value of Solar was implemented. It is also important to note that new policies at the state and national level, fuel costs, and other value streams will ebb and flow -- and so realized cost shifts may be greater or lower than these figures.

I have provided supporting documentation for these calculations, including spreadsheets with citations to filings in the Public Utilities Commission dockets on my website [<https://chan-lab.umn.edu/ratepayer-impact-of-xcel-community-solar-program>]

3. The Value of Solar is designed to eliminate cost shifts

While the impact of net metering's cost shifts is estimated to be smaller than other cost shifts and uncertainties in the energy system, a fair energy system would minimize all cost shifts. Once again, Minnesota has taken a nation-leading step in designing a successor approach to net metering. This approach is called the "Value of Solar" (or "VOS") and was also established in 2013 along with the community solar program. The Value of Solar establishes a compensation mechanism for solar gardens that is proportional to the value that solar creates. The VOS involves a complex set of calculations to derive the price that owners of solar should be paid so that in net, solar receives no subsidies from ratepayers. Instead, solar is compensated only for the value that it creates to the system.

In other words, the Value of Solar seeks to eliminate all net cost shifts from the solar garden program. This means that all new solar gardens, starting in 2018 will not create a net impact on ratepayers once all short-run, long-run, and environmental benefits are factored in. **This means that as solar gardens continue to grow under the VOS, participants can continue to save money and the net impact on non-participating Minnesotans would be zero - - as long as the VOS is accurate.**

The current VOS is our best estimate of solar's value, but there is room for methodological improvement. The VOS has declined by about 30% since the methodology was first implemented in 2015, but I don't think any analysis would support this magnitude of decline in the real value of solar. The VOS's implementation is highly technocratic, and there is a need to incorporate new data and research. It's critical to have public trust in this process, as the VOS plays a dual role in ensuring system fairness and in shaping the market for solar investment.

This bill would introduce a number of important revisions to how the VOS is calculated.

First, it would shift authority and appropriate funding for the Department of Commerce to manage the CSG program, including the VOS calculation. This would be a significant improvement. In the status quo, the Department of Commerce "owns" the VOS methodology, but has not revised the methodology since 2014—and does not intend to do so in the near future. We know the energy system is changing and there has also been a significant amount of new

research on how to calculate the VOS that is not reflected in the current formula. Appropriating resources to Commerce to manage the VOS process could allow for the methodology to be revised, as already enabled by statute.

Second, it turns control for calculating the VOS from Xcel Energy to Commerce. This also would ensure that our public servants are in the driver's seat for setting this rate, which forms the basis for "competition," to a neutral party.

Third, the VOS would move to a three-year rolling average. This would help smooth the volatility seen in recent VOS calculations that result, in large part, due to fluctuations in the price of natural gas. [Ironically, part of the value of solar is avoiding purchasing natural gas. Solar does not have fuel price risk, and so there is an added benefit of solar in reducing the volatility in electric rates that ratepayers are exposed to as a result of natural gas price fluctuations. However, due to the way the VOS is calculated, what should be a benefit to solar development (reduced volatility) shows up as a business risk (cost) because the VOS has fluctuated from year-to-year due to volatility in solar's benefit to reducing natural gas purchase prices. Forecasts of avoided natural gas prices tend to fluctuate with a high correlation to the current spot prices of natural gas, so moving toward a three-year average would help smooth out this volatility and remove this perverse pass-through of natural gas fuel risk.]

The VOS is the lynchpin of the community solar program to balance fairness for non-participants, create an investment environment to allow solar to thrive in only the configurations that advance the public interest, and to set the terms by which third-party solar developers are allowed to generate power in Xcel Energy's territory. Getting this number right is critical to make the system work. But what's needed is more than just a single number, but rather a framework and process for adapting the VOS over time. As the energy system changes to accommodate new forms of load (e.g. electric vehicles that are likely to charge at night), to replace generation to reduce greenhouse gas emissions, and maintain reliability in the face of generation retirements and generation intermittency, the VOS is the most promising vehicle on the table to set the terms under which community solar can grow.

It's also critical that the VOS reflect actual avoided costs. As Xcel moves toward its pledge of carbon-free electricity by 2050, the VOS methodology needs to adapt to represent the actual decisions that are avoided by building solar gardens. The VOS methodology already has built into a philosophy of protecting ratepayers. A properly implemented VOS would minimize all net cost shifts and protect ratepayers – that is what it is designed to do.

Thank you, and I would welcome your questions.