Metered Solar Water Heating Systems: a Nonnegotiable

by Piper Star Foster

Metering is essential if the SWH sector wants to expand and professionlize

The lack of meters for solar water heating technology hinders the advancement and legitimacy of the sector. Less than fifteen firms worldwide make performance meters suitable to residential solar water heating systems (SWH). The price of a residential BTU meter relative to total system cost is too expensive: often more than 10% . The market is expanding for affordable meters, since the largest global growth in SWH installations is expected in the residential sector between now and 2025. To be useful, these meters must report real-time data to the Cloud and provide a user-friendly Energy Dashboard. Interviews with 26 utility executives and manufacturers in North America identified common concerns caused by the large number of unmetered solar water heating systems. 1) There's no assurance that systems remain functional long-term; 2) unmetered systems can't participate in the REC, carbon or pay-for-performance markets; 3) there is no verification that public subsidies are well-spent; 4) "Big Data" can't be gathered or analyzed; 5) owners have no bragging rights with which to develop pride in ownership. A performance meter would solve all of this.

METERS ASSURE LONG-TERM FUNCTIONALITY

Public confidence in SWH technology is low for good reason: system failure has historically been pervasive. A 2009 Sandia National Labs report found that 50% of installed SWH systems failed within ten years of installation. If the system fails, the auxiliary heat continues to produce hot water. So, owners are often unaware their SWH system failed: hot water is nonetheless hot. The invisible nature of SWH operations demands performance metering to verify system activity. The meter is no less fundamental to SWH systems than the dashboard is to a vehicle. Despite market enthusiasm in the 1970s (recall that Jimmy Carter installed solar thermal panels on the roof of the White House in 1979) today interest in SWH is sluggish. The US composes just 1.3% of the installed solar thermal market globally. The North American market is valued at $500-600 million. Solar PV is a $5 *billion* market. Metered generation substantiates the sector's worth.

METERS ALLOS PARTICIPATION IN REC, CO_2 AND PAY-FOR-PERFORMANCE MARKETS

Solar water heating systems can't participate in the active and growing Renewable Energy Credits (REC) market since energy production can't be stated. Lakeland Electric in Florida was first in the nation to sell RECs from SWH generation. The Lakeland case shows the potential for thermal REC sales earned from the residential market. Chip Bircher, chair of the Utility Solar Water Heating Initiative (USH2O), called the Lakeland REC transactions "landmark for the solar hot water industry."

Carbon offsets are another neglected value proposition for metered SWH systems. An average residential system can offset between 3,000 and 5,800 lbs of CO2 per year, depending on the replaced auxiliary fuel. Without a meter, no carbon market will accept a *stated* offset. The global installation of SWH systems is calculated to save 531 million tonnes of CO2, according to the International Energy Agency.

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Performance payments are a popular method to structure incentives for SWH. But a meter must be installed on the system, and capable of uploading daily performance data to the rebater, for performance payments to even be considered.

METERS VERIFY THAT PUBLIC SUBSIDIES OR REBATES FOR SOLAR WATER HEATING ARE WELL-SPENT

Interviews with 26 utility companies and rebating organizations found that a BTU meter is rarely mandated residential systems. Performance metering is a priority among forerunning utilities and State-sponsored campaigns. Jeff Curry, program director at Lakeland Electric believes meters uphold the principles on which utility service is grounded. “For 100 years the utility industry has insisted that you can’t sell unmetered energy. We have to stand behind metering as the backbone of retail energy delivery. The meter proves that we deliver something of value. Meters are a utility ethic. Meters are in the utility company’s best interest.”

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Salt River Agriculture Improvement and Power District in the Phoenix area is the third largest public power provider in the US. Through rate-payer funds, SRP has incentivized more than 4,500 residential solar hot water systems since the program launched in 2004; currently 40 residential SWH systems per week are installed, receiving an average incentive of $1500. Commercial system sare metered.

The California Solar Water Heating Pilot Program ran between 2007 and 2010 in the San Diego area. In the final evaluation report, it concluded that, “Accurate and reliable metering is critical to evaluating ongoing system performance, providing host customer feedback, and enabling potential leasing arrangements and renewable or GHG credits.” Program Manager, Jordan DiGiorgio, worked on the 2007 pilot and is involved with its successor initiative. “We are seeking guidance from the California PUC on the form and nature of the statewide metering plan,” she commented.

The Massachusetts Clean Energy Center’s solar water heating initiative provides $1000 toward the cost of a residential meter. Initially, about half of the residential installations were equipped with meters. “Once installers were familiar with the program, many more signed their customers up right away,” said Christy Howe, Project Manager.

METERS, PLUS “BIG DATA,” EQUALS COMPETITIVE ADVANTAGE

Data that SWH meters gather appears boring. But in fact, what appears to be “exhaust data” is rich with potential. Solar yield measurements, time-stamps, site orientation, climate zone, demographics, DHW water consumption, and manufacturers’ comparative performance are but the green shoots that indicate the breadth of information possible to gather and usefully assess.

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An emerging term for the analysis of volume intelligence is "Big Data." Big Data references the information that is "beyond the ability of traditional database software tools to capture, store, manage, and analyze." McKinsey Global Institute reports that Big Data will become a major market driver in coming years. It's forecast to enable a 60% increase in retailers' operating margins, save $148B in operational efficiencies within the global government sector and add more than $300B in value to the market annually, according to 451 Research Group.

What appears to be "exhaust data" is in fact rich with market potential. Smarter data yields smarter devices

Employing Big Data analysis is not entirely new to the renewable sector: Vestas collects performance and weather data on every turbine ever installed. Smarter data will yield smarter devices, and smarter devices yield smarter data. "There is no such thing as stale data. There is no such thing as uninteresting data. The fact that is uninteresting makes it interesting to me," said Michael Lopp, Director of Palantir Technologies, which queries Big Data sets.

When it comes to Big Data analysis, it is a *good* devil that's in the details.

METERS GIVE THE CONSUMER A REASON TO BRAG

It often takes months or years before system owners realize their SWH system doesn't work. Then systems are commonly orphaned because owners have lost interest in repair or maintenance. But, when meters relay data to an energy dashboard, the system owner has a tangible, daily report from the system. Patrick Altier of Solar Trek notes the median age for a SWH install customer is 52. The mature audience is ostensibly not techie. Nonetheless, Altier has found them to be deeply engaged and proud of the energy dashboard which he offers with each system. "My clients can look at their dashboard from their easy chair and see system performance. I provide them a freestanding console. They show the dashboard to their friends. They are psyched!"

Monitoring technology builds rapport between a system owner and their investment. Monitors encourage maintenance and repair.

Bragging rights and the status that high-tech dashboards convey motivate purchase decisions. As the uptake of home energy monitoring devices drop in price and increases in adoption, the public is coming to expect smartphone apps and elegant data delivery.

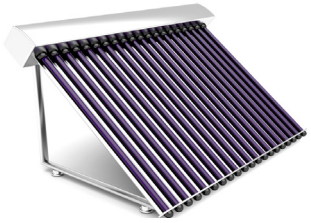
Jerry Marizza, the New Energy Program Coordinator at United Power in Colorado says, "If you let the utility bill tell the whole story, the customer has no visual. The industry needs to put some sizzle on SWH! Customers want the visual!"

CONCLUSIONS

Lack of performance metering is a major trawl on the promised momentum for which the solar water heating sector hopes. Are meters a panacea? They can contribute meaningfully . Reliability,

transparency, and accuracy are the missing elements of professionalism for which the sector cries out. Meters antidote these deficits. Though solar water heating remains a niche market for Americans, it is a dominant technology in the rest of the world. Given that North Americans spend $32 billion on DHW annually, composing between 50 and 80% of residential utility bills, the potential for smart SWH systems is tremendous.

Experts note that some customers see SWH as an "old technology," and are counseled to "get rid of their SWH system to make room for solar PV." Cost effective, Cloud-tied, real time metering with consumer-friendly energy dashboards will help the sector prove its worth and build its case.



SOLAR WATER HEAT METERING IMPACT

all-electric fuel switcher saves $390/yr
$375 meters from Amatis = fast payback
average meter cost: $1600

installer gets repair revenue
average cost to repair broken SWH: $274
forfeited chance for customer service

smart meter reports real time data to Cloud
data populates Energy Dashboard
pride of ownership develops
dumb meter less useful

owner doesn't know system failed
meter: enables timely repair
no meter: system is abandoned

THE ENERGY OF THINGS

Amatis Controls designs and manufactures cost effective meters, monitors and controls. All our devices communicate effortlessly with the Cloud using a communications protocol called 6LoWPAN. Our Energy Dashboard provides every client with the power of real time data to ensure optimum performance. We are committed to positively influencing systems of all scales with the power of live and cost- effective data.

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