Indiana Solar for All

2023 Community Impact

COMMUNITY IMPACT

In December 2022, Indiana Solar for All (ISFA) gratefully received a generous Community Impact Grant from the Community Foundation of Bloomington and Monroe County (CFBMC) together with an award from an unidentified donor-advised fund administered by CFBMC. This enabled ISFA, a nonprofit project of the Center for Sustainable Living, to fund solar arrays for eight low-income households in 2023. In addition, ISFA used its own funds to pay for four more LMI households to obtain rooftop arrays, for a total of 12 installations.

Six of these homes are located in the Trailview neighborhood, a Habitat for Humanity development on the northwest side of Bloomington housing 35 families. (Counting a Trailview award recipient from a previous year, 20% of this neighborhood now has solar.) The remaining six award recipients scattered around Bloomington are unaffiliated with Habitat. With the completion of these installations, ISFA has enabled 44 low- to moderate-income households to go solar from 2018 to 2023, reducing their electric bills by hundreds of dollars a year over the expected 25-year lifespan of the system.

Trailview residents commented on how working together strengthened their neighborhood specifically. Networking among all 12 families with over 12 community volunteers from various walks of life and income brackets further strengthened Bloomington's social cohesion. In the words of one volunteer, "Over several years working on the roof crew with ISFA, I've seen that in addition to building impactful solar projects, ISFA also builds impactful community." Last but not least, the households increased their awareness of the impact of their energy choices and began making significant cuts in their greenhouse gas emissions.

SAVINGS

All our award recipients will realize significant savings on their electric bills. The exact amount for each household remains to be seen; there is less than a full year's production, consumption and billing data because they were installed at staggered times. Six spring installations occurred between April 1 and June 10; then six fall installations between September 9 and November 4. After installation, various time-consuming processes that are not under our control need to be complete before production data become visible: the Monroe County Building Department had to inspect the system, Duke Energy had to complete the paperwork and, in some cases, change out the meter, and our supplier had to set up the accounts on the SolarEdge monitoring site.

Therefore, to model what a full year of data looks like, this report uses an example from the previous year's cohort. The bar chart below shows 12 months of data from the SolarEdge monitoring system of a family whose system began reporting on June 15, 2022. The first system installed this year began reporting data on June 6, 2023. The systems were both the same standard 3 kilowatt (kW) size. This chart provides a nearly exact model against which to compare this year's incomplete data for each household. The varying height of the bars above the line tracks the amount of sunlight received in each month of the year.

Each household can see this data for their own system. Here's how to read the example chart. The **Production summary** (top left) shows that the system produced 4 megawatt hours/4000 kilowatt hours of energy; this is close to the maximum a 3 kilowatt system can be expected to generate in Indiana. Part of the output (the green part of each bar) powered whatever electrical devices the homeowner had plugged in while the system was turning sunlight into electricity. This replaces what the homeowner would otherwise have had to purchase at retail rate (approximately $0.15 per kilowatt hour) from Duke.

The remainder (the blue part of the bar) shows how much the system was producing beyond what the house was using. This surplus energy went out on the grid to be used by other customers, and Duke compensated the homeowner with a credit on their electric bill. The value of a credit varies from year to year; this year it is about $0.09 per kWh.

This family was apparently home and using more self-generated electricity during the day from June through September 2022, consequently getting the most financial benefit from the system. In following months, the green bars shrink and the blue bars expand, showing that more of the output was sent to the grid (credited at $0.09/kWh) than was used on site (replacing grid energy billed at $0.15/kWh) during the day time.

The **Consumption summary** (top right) shows that this household consumed 4.21 mWh/4,210 kWh - just a little more than the solar system produced - over the course of the year. The purple bar segments here mirror the green bars above because they refer to the same thing: the amount of self-generated energy

the house used. The orange part of the bars indicates how much additional energy the house used from the grid (at $0.15/kWh).

What's interesting in the sample chart is that the family deliberately decreased the amount of grid energy they used over the course of the year. Above the line, the bars have the characteristic symmetry of the annual solar production curve determined by the length of day (remember, the June bars each reflect 15 rather than 30 days' solar production). Below the line, consumption tapers off significantly over time. This means that the homeowners are becoming more energy-efficient through becoming more aware and getting feedback from their monitoring app (consequently spending less). As has been said, if you want to manage something, you have to measure it.

With that background, we can turn to the data we do have for this year. The number of kilowatt hours cannot be usefully compared among households at this time because each household has had an active system for a different period of time, all during a time when the amount of sunlight is decreasing daily. But some valid observations can be made.

- One household is consuming 100% of the electricity they generate and not consuming any from the grid. If this continues, their entire electric bill will be $11.28 a month and they will end up with an annual energy profile close to the example examined above. Another, using 88% of their self-generated energy, follows closely. The rest fall in a range from 30%-71%.
- Averaged across the group, 49% of their self-generated energy is being consumed on site (replacing grid energy billed at $0.15/kWh) while the remainder is sent to the grid to be used by their neighbors (compensated by the utility at $0.09/kWh).
- Setting aside the highest and lowest amounts as outliers, self-generated energy represents between 15% and 31% of their total consumption as winter approaches. The average for the group is 23%. This percentage can be reasonably expected to rise as the days grow longer again and the homeowners learn to conserve energy.

Another way of looking at this: the fourth household installed in the spring had the lowest production numbers. This may indicate that they had more shading or that the system was disconnected temporarily. Interrupted connection is the most likely cause, because all the houses had similar site ratings to start with. Be that as it may, billing data provided by the homeowner shows that in the three months following the start of SolarEdge data collection, Duke billed $11.28 (connection fee only), $25.84 (fee + 91 kWh), and $25.10 (fee + 85 kWh) respectively. The billing for the same three months of the previous year were $103.93, $79.35, and $78.10 respectively. The comparison shows a significant savings and difference in cash flow.

SATISFACTION SURVEY

Both the award recipients and community volunteers were asked to complete a satisfaction survey. As of December 31, 2023, 12 people have responded, with award recipients in the majority (60%). Nine of the respondents left direct expressions of their satisfaction in response to two impact questions. (Final results may differ since the survey is still open.)

Here are representative answers to the question, *In addition to receiving a solar array, what has been the best part of your experience with ISFA so far?*

- "The skills I gained and and the relationships that I built"
- "The best part is helping the community and knowing others in the same need as me are also receiving and I am helping to achieve that for them."

Here are representative answers to the question, *How have you/your household been affected by your involvement in ISFA?*

- "The sense of community that has been created is heartwarming. I know much more about solar and how it improves our effects on global warming."
- "We have been positively impacted by the community involvement and the declining energy bills thanks to our system. We plan to save even more money by eventually changing more of our appliances to electric options as they age out."

Because of the pleasure of working together and making a meaningful contribution to the community, the work requirement of 80 hours was a source of satisfaction rather than being perceived as a burden. This Facebook video captures some of the fun people had "strutting on sunshine" while working: https://www.facebook.com/reel/661998615880438 In addition, people enjoyed eating lunch together, sharing their favorite dishes, including Ethiopian and Mexican specialties cooked by award recipients.

There were extras along the way. The electrical crew found a wire damaged from overheating in the clothes dryer circuit at one house, and an improperly terminated main-ground for the whole house. The crew installed a proper grounding clamp to correct the main-ground issue, and made a temporary fix to

the dryer circuit while alerting the homeowner to call an electrician before the issue caused a fire. A member of one roof crew found a minor leak and coordinated with the homeowner to patch it. And while they were up on each roof, all the roof crews made a practice of cleaning the gutters for the homeowners.

PROFILES

Itzel (award recipient)

Itzel and her sons, ages 10 and 15, moved into their Habitat home in 2017 and received solar panels from ISFA in 2023. Itzel has already seen her electric bills decrease 50% or more each month. The savings helped offset other cost of living increases. Knowing the panels' power cycle also helps her maximize savings. They used to run the washer and dryer at any time, but now Itzel makes a point of doing energy-intensive chores during peak daylight hours.

Jakob (award recipient, in plaid shirt)

"My installation experience has been positive, and I have learned a lot. Everyone was very eager to teach. I felt safe, I never heard anyone say they were worried for their safety which made me feel safer as well. I learned a lot about electrical in addition to installation on the roof. I was able to build lasting relationships with those I met in the crews and the community that I continue to keep in touch with."

Josh (community volunteer, in red shirt)

"Over several years working on the roof crew with ISFA, I've seen that in addition to building impactful solar projects, ISFA also builds impactful community. Homeowners from all backgrounds come together each install to learn new skills, teach and lead others, and make friendships that last beyond the projects. Each install, I look forward to the fun conversations and interactions as well as watching how the team members go above and beyond in finding ways to care for each other."

Gerardo (award recipient)

Gerardo has enjoyed working on five installations so far. With a little effort and patience all around, primary Spanish and English speakers have formed a formidably efficient bilingual team, achieving record installation times of under 4 hours per build. Gerardo says the Roof Crew is a great collaborative learning experience. "Sometimes there's a question, and I know the answer. Other times I know who does." He is looking forward to helping the next cohort. "I think even when my volunteer hours are complete I might still volunteer at Solar for All builds."