MIKE AND ABBE'S OFF GRID JOURNEY

BACKGROUND

In April 2023, Mike and Abbe began a new chapter of their lives in their newly built home, in a beautiful corner of Denmark, Western Australia. Their story is one of determination, environmental responsibility, and a quest to reduce their carbon footprint. It all started with a straightforward yet profound challenge: the substantial costs and time required to connect their home to the grid. Faced with these obstacles, Mike and Abbe embarked on a journey of exploration. They sought out alternatives and stumbled upon a promising path—off grid living. Through extensive research, they became convinced that this was not only an eco-friendly choice but also a financially viable one.

CHALLENGE

High Grid Connection Costs: The substantial expenses and time required for connecting their home to the electrical grid.

Grid Reliability: Frequent power outages in their area, with extended restoration times after storms.

Environmental Responsibility: A desire to reduce their carbon footprint and live more sustainably.

SOLUTION

House Design Principles and Experience:

From its inception, their vision was clear: they aimed to create a practical, comfortable, and environmentally conscious living space.

Their home embraces solar passive design principles. It is strategically oriented with a northern-facing front, harnessing the sun's energy for warmth and illumination. Double-glazed windows provided exceptional insulation, keeping the interior comfortable year-round. Their efforts culminated in an impressive 7.5 energy rating, reflecting their commitment to sustainable living.

For temperature control, the house features a wood-burning fireplace, a heat transfer system, and ceiling fans for cooling during the summer. During the chilly winter months, the fireplace creates an inviting atmosphere but is rarely needed for heating due to the thermal efficiency of the home.

Solar Power and Battery Storage:

In their pursuit of energy independence, they installed 34 solar panels, with a total capacity of 13.3 kW, oriented at a precise 25-degree elevation and 15-degree orientation, to optimise year-round energy generation for Denmark's climate and geographic location. This solar array stands as the backbone of their off-grid infrastructure.

Inverters:

To efficiently manage their solar-generated power, they employed SMA Sunny Boy PV inverters (2 x 5 kW) and the SMA Sunny Island Battery inverter 8.0H. These devices are crucial in converting solar energy into a usable form and regulating battery charging.

Electric Appliances:

In addition to their solar setup, they invested in two heat pumps, an electric Weber-Pulse BBQ, electric garden tools, and an induction cooktop. These investments significantly reduced their reliance on conventional energy sources.

MOTIVATION TO GO OFF GRID

Their decision to embark on an off grid journey was fuelled by a series of realisations and compelling reasons. Initially, they had planned to connect to the grid and invest in a solar power system but soon discovered they would face exorbitant costs associated with upgrading the Western Power transformer that serviced their property and neighbouring homes. Western Power's quote process was not only costly but also uncertain, with estimated grid connection expenses ranging from $15,000 to $25,000. Frequent power outages in their region, often lasting days after severe storms, further underscored the drawbacks of relying on a conventional grid.

DECISION MAKING PROCESS

Financial analysis played a pivotal role in their decision-making process. Surprisingly, they found that going off grid was financially competitive over a ten-year horizon, essentially matching the cost of staying on the grid without solar.

Their journey took a fortuitous turn when their builder connected them with a Denmark couple who were already thriving in their off grid lifestyle. Eager to explore this alternative further, Mike and Abbe embarked on a site visit, immersing themselves in the off grid experience. The couple generously shared two years of energy data, shedding light on what life off the grid truly entailed. The data they examined was highly encouraging, especially for the sunnier seasons of Spring, Summer, and Autumn. It was evident that energy generation during these months would be more than sufficient to meet their needs. However, they delved deeper, meticulously evaluating the winter data. Their findings reassured them that, for most winter days, their solar generation would provide an adequate power supply.

SUFFICIENCY OF OFF GRID SYSTEM

Their battery system consistently achieves full charge between 10:00 am and 2 pm. Over the months from April to August, their power consumption statistics revealed a dynamic blend: 55% of their energy needs were met directly from solar generation, while the remaining 45% was drawn from their battery storage. Data monitoring indicates that Mike and Abbe utilise around 40% of their battery capacity on average. This prudent usage strategy allows them to accommodate occasional high-demand scenarios, such as visits from guests.

Their home's thermal efficiency maintains a comfortable average internal temperature of 21 degrees, even during winter.

LIFE OFF GRID

Initially, Mike and Abbe, found themselves habitually checking their energy consumption app to gauge the feasibility of running energy-intensive appliances, however, they soon adopted a more relaxed approach. They discovered that high-consumption appliances, such as ovens, dishwashers, and washing machines, did not consistently operate at their maximum power levels throughout their cycles. For example, their induction stove could be power-hungry when used at their highest settings, the duration of usage at these levels was generally brief. For other cooking tasks, the power required was significantly lower. This understanding allowed them to adjust their electrical consumption plans accordingly.

Their off grid system faced a stringent test during a very wet winter, with June 2023 alone receiving a staggering 400 mm of rain. After two consecutive days of exceptionally wet and overcast weather their power reserves dropped to 22%. On that morning, when the skies remained overcast, and the temperature barely reached 7 C^0 the couple experienced a minor issue for the first hour they were awake. However, as dawn broke, even the faintest glow on the horizon generated enough power to alleviate their concerns. On such occasions, they have made the conscious choice to refrain from running energy-intensive appliances like the washing machine or preparing a roast. Instead, they turned to the slow cooker, a reliable resource on gloomy days.

Their only concern rests with the unpredictability of weather conditions on the South Coast, a factor they have no control over. Nevertheless, they remain confident in the overall reliability of their off grid system.

PROS AND CONS

Their transition to off grid living brought forth a myriad of benefits. First and foremost, they have embraced their newfound environmental responsibility with pride. The reduction in their carbon footprint has left them with a deep sense of fulfillment.

Moreover, the couple bid farewell to the inconvenience and frustration of power cuts, enjoying uninterrupted electricity supply. Their decision to switch to electric appliances and tools, also contributes to their well-being. The absence of gas in their home means cleaner, healthier indoor air and a safer environment, particularly during bushfire seasons. Further, they have enjoyed the tranquillity and environmental friendliness of their electric garden tools, which are remarkably quiet, lightweight, and free of noxious fumes. The elimination of monthly utility bills has brought a sense of financial autonomy.

A drawback is their inability to feed excess power back to the grid, a feature commonly available to grid-connected solar system owners. Additionally, while their off grid system provides reliable power even during extended periods of wet and overcast weather, there remains a degree of uncertainty, albeit less than their experiences on the conventional grid.

Mike and Abbe's off grid journey serves as a powerful testament to the possibilities of sustainable and off grid living. Their story demonstrates the profound impact of personal commitment to environmental responsibility and the rewards of embracing off grid living. Through their journey, they have not only achieved energy independence but also cultivated a deeper connection with their environment and the empowering effects of informed decision-making.

Additional Resources

PVOutput: Public global solar data - https://pvoutput.org/live.jsp

Solar Quotes: Australian website with comprehensive information for anyone contemplating solar installation - https://www.solarquotes.com.au/

System Advisor Model: Free solar modelling software from the USA that can use Australian weather data to see how your solar system could potentially perform - https://sam.nrel.gov/