SP NGE
Microgrids

**Predictive Optimization
for Wilson Residence**

Proposal
Residential Load Displacement   2025.XX.XX

Capture maximum value from **Solar & Batteries** in a **Load Displacement** scenario.

Solution

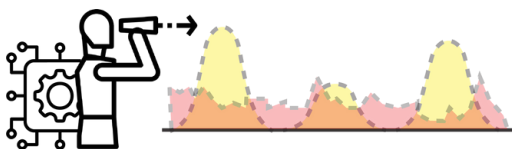# Hybrid PV ☀Optimization
Smart Storage & Load Shifting

Balance **Curtailment Reduction** and **Rate Arbitrage** 💲

with **Outage Protection** 🔋

to reduce grid expenditure by up to 40% and safeguard your energy
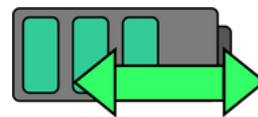
How it Works:

Forecast

Sponge EMC generates production & usage forecasts and monitors energy rates...
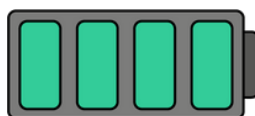
Control

to charge/discharge batteries & shift loads when it is most cost effective.

Protect

If Sponge detects at Outage Risk...

it makes sure your battery is fully charged...

so your family or business is protected.

On this page we are going to prove that
Your Hybrid PV System is Inefficient.

Once we identify inefficiencies, we can optimize against them

Inefficiency #1

Batteries have 2 use cases that are **not complimentary.**

Use #1: **Power Outage Protection**
To provide outage protection, **a battery should be near full charge.**

Use #2: **Harness Cheap Energy**
To harness cheap energy, **a battery should periodically be near empty.**

Inefficiency #2

The cost of battery power depends on **how it was charged:**

Solar Charging = Free (but *not always available*)

Grid Charging = Expensive (Day *= More Expensive*, Night *= Less Expensive*)

To save money, a battery should discharge when energy is most expensive.
A battery is only **efficient** if it harnesses the cheapest energy *available* in the time period before each discharge.

Optimization Challenge

Ensure batteries are charged before a power outage.

Utilize batteries (and shiftable loads) to ensure that system is always harnessing the cheapest energy available in a given time period.

solved by: **Hybrid PV** **Optimization**
Smart Storage & Load Shifting

Understand Sponge Optimizations

```
=If [
    Forecast = Cloudy, Battery Charges on low-cost overnight rate,
    Forecast = Sunny, Battery kept low to capture tomorrow's solar,
    Forecast = Outage Risk Detected, Battery Charges to 100%]
```
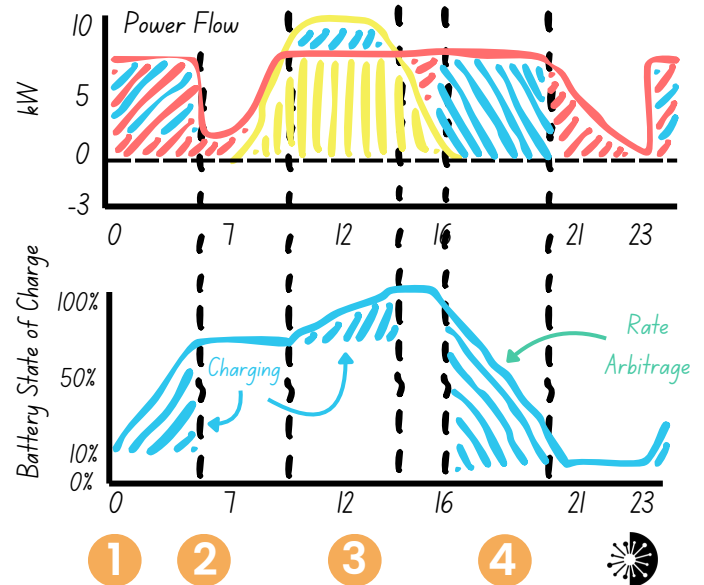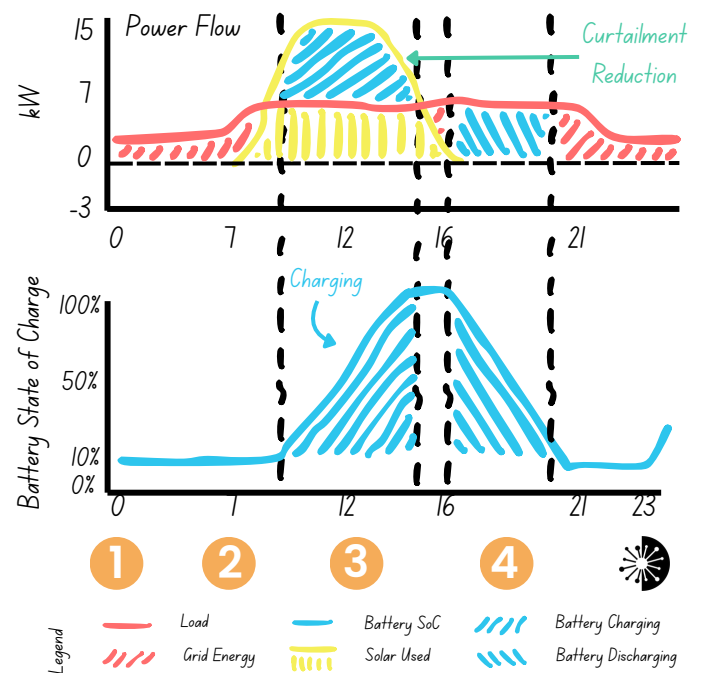
Wildly simplified Sponge algorithm

Cloudy Forecast

1 Sponge forecasts a cloudy day

2 **Battery is partially charged on low-cost nighttime energy**

3 Room is left to capture small amount of excess solar

4 **Low-cost grid energy and solar stored in battery** used for **rate arbitrage**

Power Flow

kW

10
5
0
-3

0   7   12   16   21   23

Battery State of Charge

100%

50%

10%
0%

0   7   12   16   21   23

Charging

Rate Arbitrage

1 **2** **3** **4**

Sunny Forecast

1 Sponge forecasts a sunny day

2 **Battery is kept at a minimum state of charge overnight**

3 More **excess solar is captured** and stored – **reducing curtailment**

4 Low-cost, solar-charged battery energy is used for rate arbitrage

Power Flow

kW

15
7
0
-3

0   7   12   16   21

Curtailment Reduction

Battery State of Charge

100%

50%

10%
0%

0   7   12   16   21   23

Charging

1 **2** **3** **4**

Legend
— Load
/// Grid Energy
— Battery SoC
||| Solar Used
//// Battery Charging
\\\ Battery Discharging

Sponge leverages usage and production forecasts to ensure that your system is always using the lowest cost form of energy. We regularly reduce energy bills by an additional 40%

Sponge can also manage loads like EV (Fleets) and Water Heaters (Chillers) to ensure that they consume the cheapest forms of energy available.
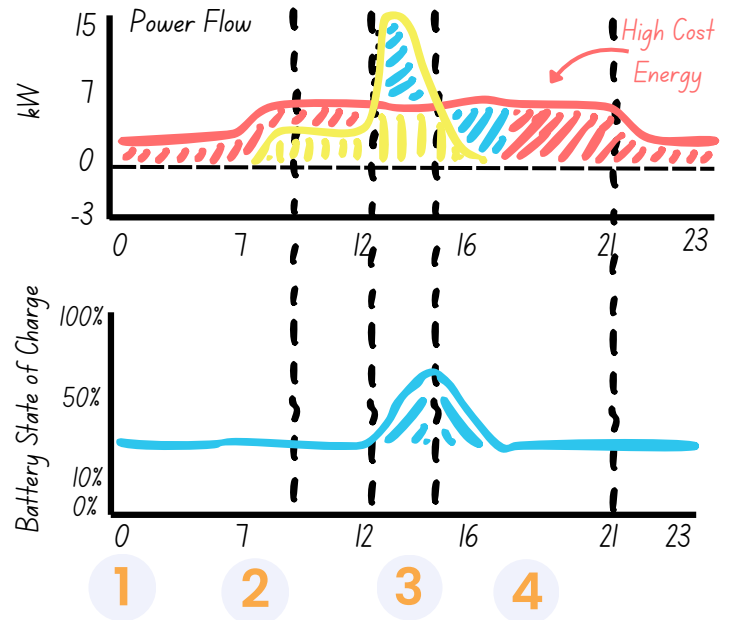
Partial-Sun Forecast

Regular Battery

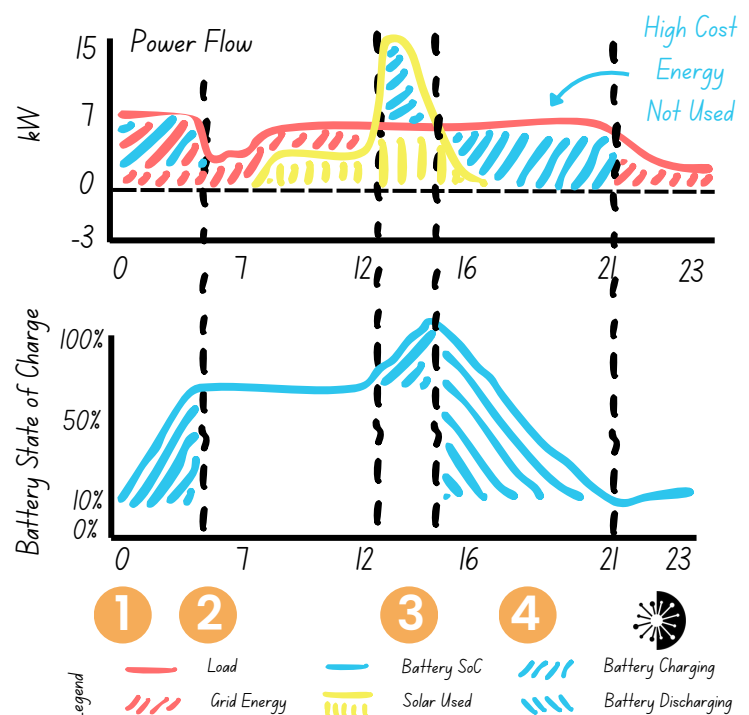**1** Battery Min-State-of-Charge may be higher for outage protection

2 Battery does not capture low-cost night time energy

3 Battery receives minimal charge from excess solar in afternoon

4 Battery energy runs out before evening demand, expensive grid energy is used instead.

Partial-Sun Forecast

SPONGE

1 Sponge deems outage risk low, allows for more discharge previous day

2 Battery is charged with low-cost night time energy

3 Space is left in the battery to capture the small amount of excess solar

4 Battery runs through evening demand spike, saving money

Legend:
- —— Load
- ⁄⁄⁄⁄ Grid Energy
- —— Battery SoC
- ⁄⁄⁄⁄ Solar Used
- ⁄⁄⁄⁄ Battery Charging
- ⁄⁄⁄⁄ Battery Discharging

Sponge's intelligent forecasting ensures you extract the most value from your system under every weather condition.

$21,960
Est. New Savings over 25 Years

**42%**
Less Grid Energy Cost

23%
Faster Payback Period

	Description	Annual Utility Cost	Total Annual Savings
Baseline	Demand	$3,966	$0
Proposed Solar	Demand - Generation	$2,198	$1,768
Solar + Sponge	Demand - Optimized Generation & Arbitrage	$1,659	$2,333
Sponge Savings		-	**$539**

SPONGE EMC

Sponge Energy Management Controller	$1,275
HST	$166
TOTAL	**$ 1,441**

Financial Analysis

At Sponge, we pride ourselves on providing a sound financial solution. In this case, we are able to achieve an equipment investment payback period of 2.6 years. Incorporating the EMC cost into your total investment, we calculate that we could reduce your payback period by up to 4 years. In the renewable energy world, a value proposition like this is a true no-brainer.
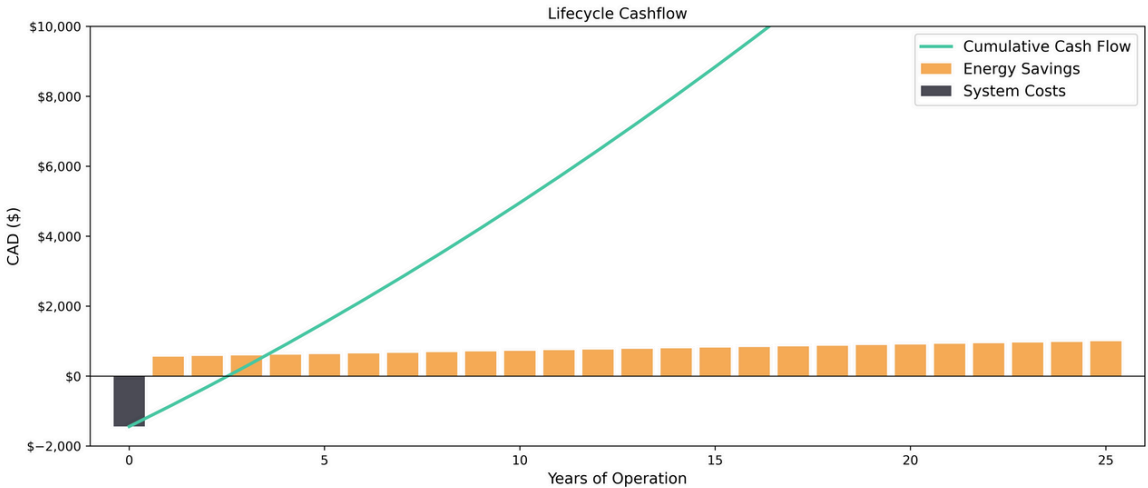
PROPOSAL

Wilson Project Commentary

To the Wilson Household,

Thank you for taking a look at Sponge Microgrid's Proposal to add battery control to your new solar and battery system. We hope that you will see that this addition is a sound financial investment, backed by an innovative Canadian company that is here to support you on your solar journey.

Your Savings Simulation:
Our simulation of your savings takes into account that you have two EV's and significant household load, such that even in the summer months during peak solar production, you may not have much excess energy to be stored in your batteries to offset evening and nighttime energy usage.

For this reason, the majority of your predicted savings are derived from days similar to 'Optimization 2: Cloudy Forecast (Rate Arbitrage)'. This means that Sponge will have a smaller impact over the summer, while expanding your system savings during winter months. Sponge will help turn your solar/battery investment into a balanced full-year payback machine.

On Sponge Optimization:
Please note that the optimizations explained above are simplifications. Sponge assesses weather, usage, grid pricing and outage risk forecasts every 10 minutes. It uses these forecasts to update inverter set points in order to control your batteries state-of-charge. Sponge is continuously optimizing your energy system to save you money. The examples given above are patterns that can be regularly identified within our optimization algorithm.

Integration with your Inverter
- Sponge EMC will leverage Modbus TCP or TRU to connect to your Inverter.
- The Sponge EMC will communicate locally with the inverter to alter inverter set points.
- The Inverter portal will remain the central hub for system performance monitoring
- The Sponge Monitor Base, available on the EMC touchscreen interface as well as online on our webapp will remain available to you to view savings derived by the Sponge EMC, as well as system status and yield, should you choose to view it there.

About Sponge

Sponge Microgrids Inc is leading innovator in predictive control for renewable energy systems based in Ontario, Canada. We have developed cutting-edge forecasting and optimization solutions that monitor, predict and enhance the performance of renewable energy systems, both off-grid and grid-tied.

Our technology is patent pending and has been deployed at numerous active projects across Canada.

Jeremy Lytle, MASc
CEO

Bas de Bruijne, MSc
CTO

Sponge Offering

The Sponge solution includes the delivery, installation and commissioning of our Energy Management Controller, which operates our proprietary control algorithms. But it doesn't stop there. Our team has full remote access to every system we deploy, enabling over-the-air updates, remote monitoring, system maintenance and most importantly, quality assurance.
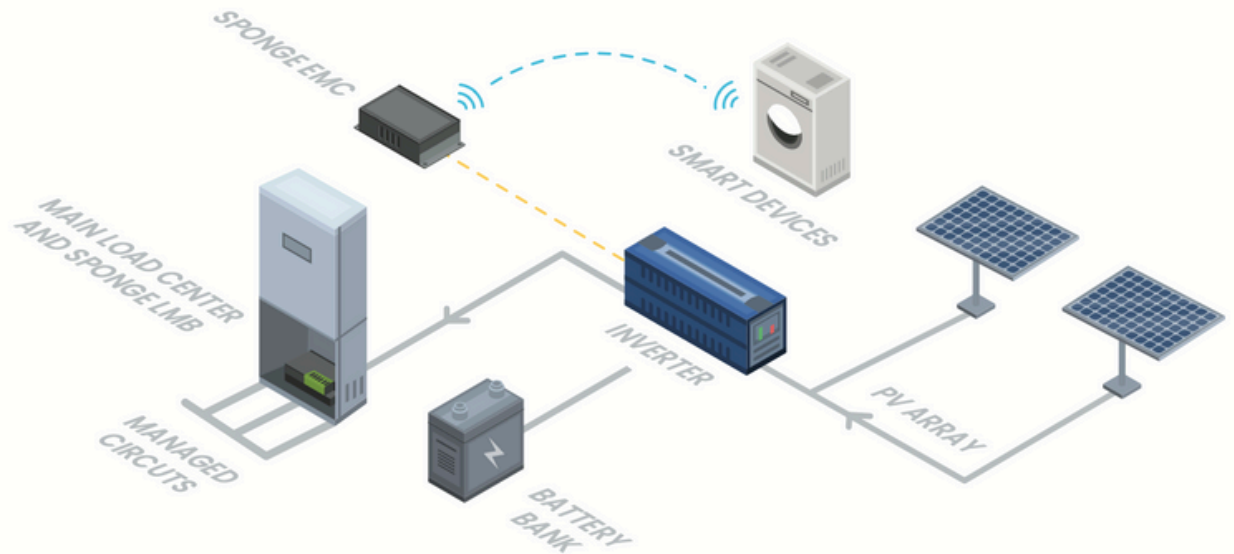
Control Philosophy

At Sponge, we respect that system reliability is paramount. Thats why our control approach is simple and nonintrusive. Our controls operate completely outside the loop of mission critical system operations and simply make adjustments to targeted set points as required in order to instigate the performance we want to see. After the control action, defaults settings are restored. This means that there is no incremental complexity or reliability risk introduced, just added value and improved performance.

Order Information

01. Reach out to your installer to confirm your decision to procure the Sponge EMC.

02. The Sponge EMC will be added to you existing payment schema.

03. The Sponge EMC will be installed by your solar installer with commissioning support from Sponge Microgrids.

Thank you for considering our proposal.
We welcome your feedback and look forward to discussing next steps.

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Microgrids

Monitor | Control | Optimize