Memo

STATE OF RHODE ISLAND
ENERGY EFFICIENCY & RESOURCE MANAGEMENT COUNCIL

To: Energy Efficiency & Resource Management Council
From: EERMC Consultant Team
CC: Becca Trietch
Date: March 11, 2021
Subject: EE and SRP Technical Working Group Updates

CONSULTANT TEAM

National Grid's Energy Efficiency (EE) Technical Working Group (TWG) and the Systems Reliability Procurement (SRP) TWG recently convened to discuss and gather feedback on relevant EE and SRP topics. The following intends to provide you with a high-level update regarding issues addressed in each meeting. Additional information about the TWG is on National Grid's website.[1]

1. ENERGY EFFICIENCY TECHNICAL WORKING GROUP

The EE TWG met on February 25th. The meeting included one presentation:

- Demand Response within the Energy Efficiency Programs.

Demand Response within the Energy Efficiency Programs

- National Grid ("the Company") presented an overview of Demand Response ("DR") within the Energy Efficiency Programs. The slides are attached to this memo.
- The Company's presentation included information about what DR is, why it is conducted, and the various methods and technologies used to implement it.
- The Company also offered a high-level description of its plan to expand the residential DR program by beginning to utilize customer solar inverters for power factor correction, as recommended in Navigant's 2019 report "Cost-Effectiveness of Electric Demand Response for Residential End-Uses".
- Stakeholders asked clarifying questions, and the meeting concluded early due to a conflicting Public Utilities Commission session.

2. SYSTEM RELIABILITY PROCUREMENT TECHNICAL WORKING GROUP

The SRP TWG met on January 20th and February 17th. The meeting agenda items for this meeting included the following:

January 20th:

- Review 2020 SRP Commitments and achievement – all achieved
- Quarterly update on SRP outreach efforts
- Update on Bristol 51 Non-Wires Alternatives (NWA) RFP
    - No cost-effective bids, but 3rd party DG project may assist in load relief, need to be re-analyzed

[1] https://www.nationalgridus.com/ri-energy-efficiency-technical-working-group

February 17th:

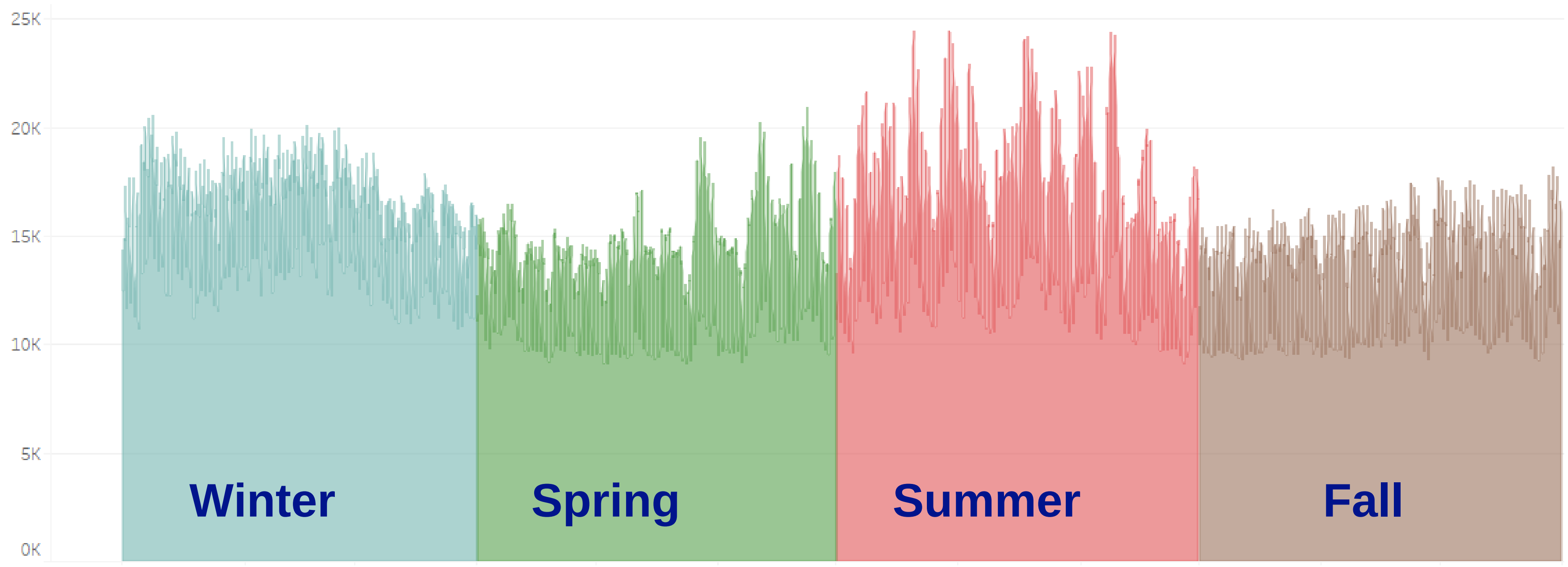
- Review of 2021 SRP commitments (7 total)
- Update on NWA learnings from New York
- Electric forecasting deep dive
    - Good discussion and opportunity for TWG member questions

The Company and the C-Team gave a joint presentation on SRP in 2020 at the January 2020 EERMC Meeting. The presentation can be found here.

Demand Response within the Energy Efficiency Programs

nationalgrid

What is Demand Response and Why do We Do It?



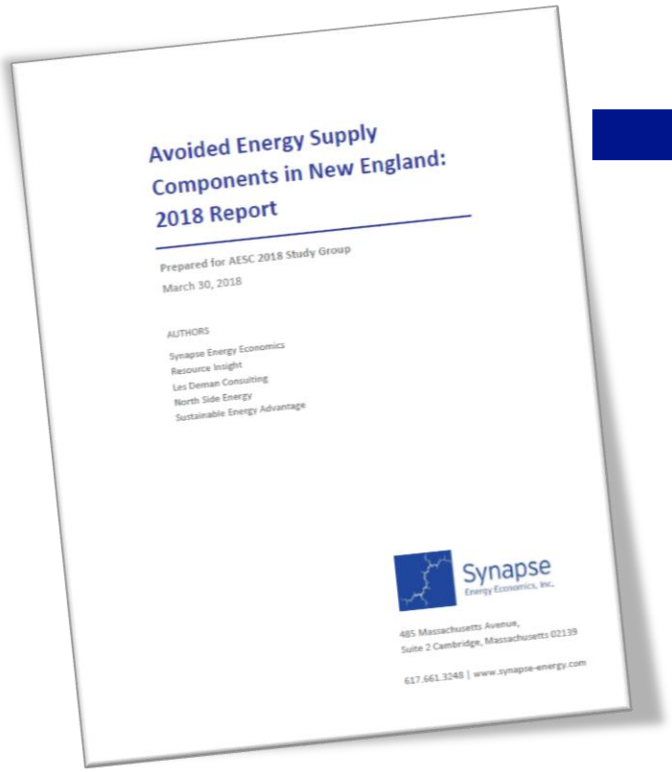
The whole grid is sized to meet the peak.

"The top 10% of hours during these year, on average, accounted for 40% of the annual electricity spend…"

Source: State of Charge – MA Energy Storage Initiative

How is the importance of peak loads accounted for in the Energy Efficiency Programs?

…like other benefits… Through the Avoided Cost Study


Avoided Energy Supply Components in New England: 2018 Report

Prepared for AESC 2018 Study Group

March 30, 2018

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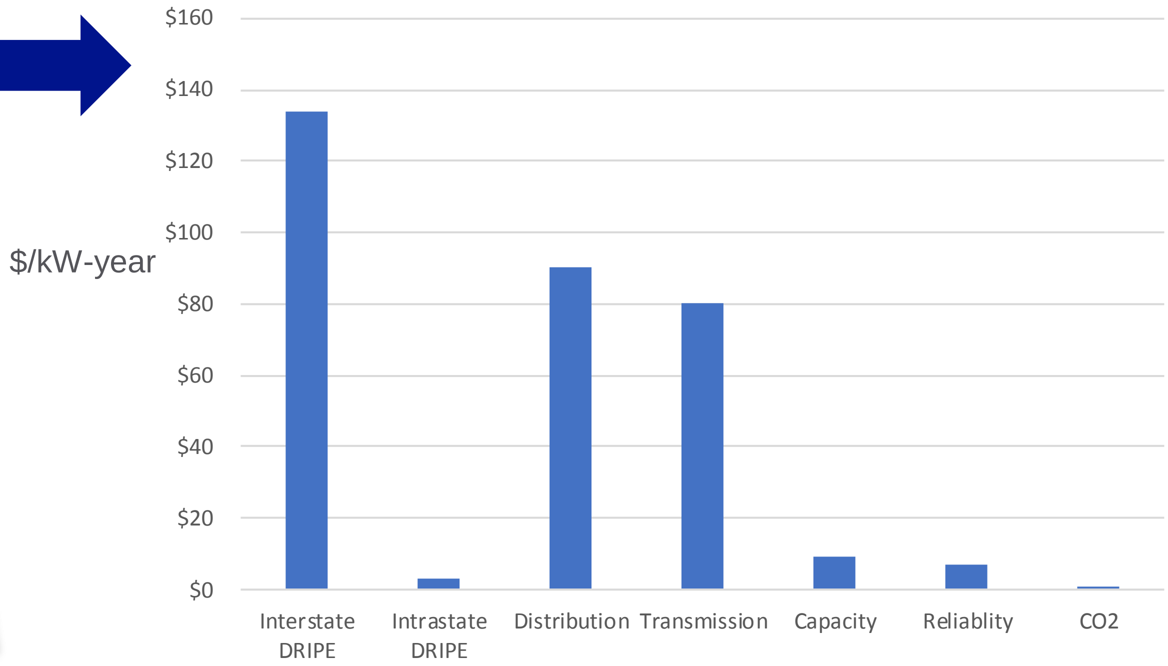
https://www.synapse-energy.com/sites/default/files/AESC-2018-17-080-June-Release.pdf

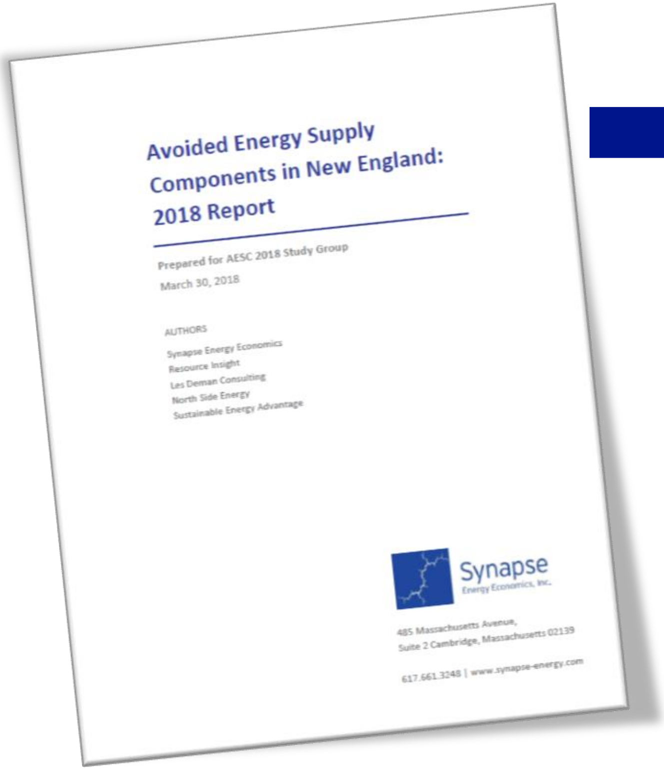
Relative Size of System Benefits Caused by Demand Response



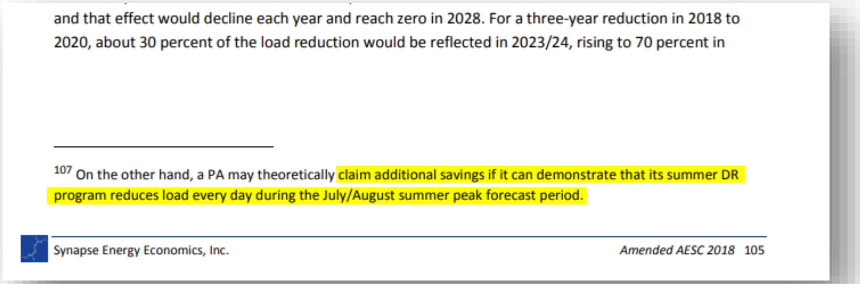
DRIPE

Differed Upgrades and Replacements

Hitting More Summer Peaks Causes More System Benefits

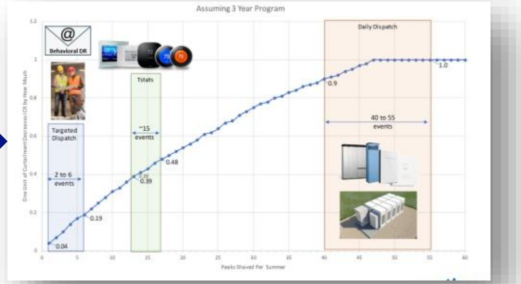


https://www.synapse-energy.com/sites/default/files/AESC-2018-17-080-June-Release.pdf

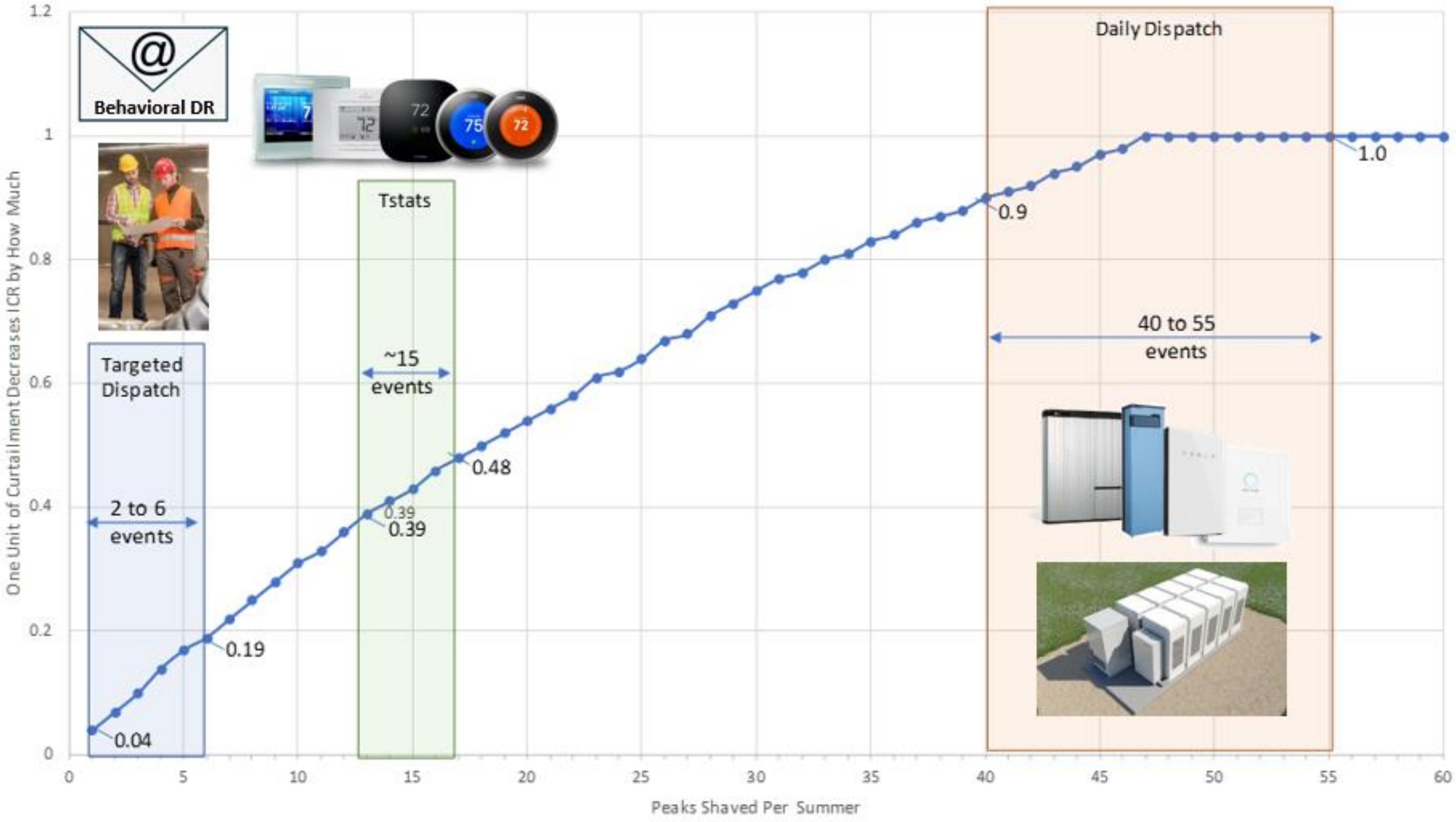

and that effect would decline each year and reach zero in 2028. For a three-year reduction in 2018 to 2020, about 30 percent of the load reduction would be reflected in 2023/24, rising to 70 percent in

[107] On the other hand, a PA may theoretically claim additional savings if it can demonstrate that its summer DR program reduces load every day during the July/August summer peak forecast period.

Synapse Energy Economics, Inc. *Amended AESC 2018* 105



Portfolio of Demand Response Maximizes Benefits



Connected Solutions

Curtailment Service Providers

Commercial and Industrial Customers

Targeted Dispatch
(Summer Peak Shaving)

Daily Dispatch
(Batteries)

Technology and Vendor Agnostic Approach includes:

Manual curtailment, HVAC, lighting controls, building management systems, process loads, combined heat and power, batteries, generators, fuel cells, batteries, etc.

Participating Curtailment Service Providers

CPower, Direct Energy, enel x, icetec, IPKeys (Secure Technology Integration Consulting & Software), nrg, voltus (Less Energy • More Cash)

165 Customer Accounts

28 MW of Curtailment

Direct Load Control

Residential Customers

NY&NE Thermostats

1. Alarm.com
2. Ecobee
3. Emerson Sensi
4. Honeywell
5. Lux
6. Nest
7. Radio Thermostat
8. Vivint

NE - Battery -Inverters

1. Generac
2. Outback
3. SolarEdge
4. Tesla

NE - EVs

NOT APPROVED

NE - Solar Inverters

COMING SOON

4,500 Customer Devices

4 MW of Curtailment

3 Options to Curtail

	Program Parameters	Typical Application
Targeted Dispatch	• 3 - 8 events per summer • 3 hours per event • **$35/kW-summer**	
Daily Dispatch	• 30 - 60 events per summer, 5 events per winter • 2 - 3 hours per event • **MA: $200/kW-summer** • **RI: $300/kW-summer**	
Winter Dispatch	• 5 events per winter • 3 hours per event • **$25/kW-winter** • **MA Only**	

Measuring Performance

How Demand Response is Implemented

Targeted Dispatch	Daily Dispatch	Winter Dispatch
• Usually Manual • Temperature setback ~3F • VFD speed limiting • Early setback • Process Changes • Rarely Lighting • Generators • Combined Heat and Power	• Usually Automatic • Batteries • Flywheels • Thermal Storage • Industrial Freezers	• Usually Manual • Snowmaking • Industrial Processes • Generators

TECHNOLOGY AGNOSTIC

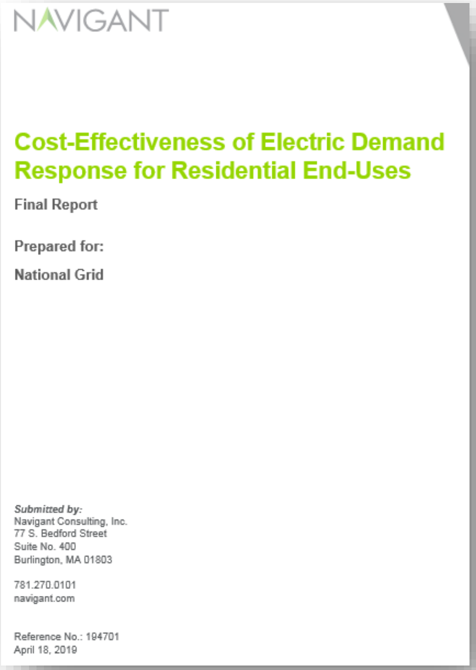
Roadmap to Expand the DR Residential Programs

1. **Commercial and Industrial Customers –**

    Reduce obstacles for battery storage (upfront cost)

2. **Residential Customers**

    Prioritize new devices according to Navigant Study



NAVIGANT

Cost-Effectiveness of Electric Demand Response for Residential End-Uses

Final Report

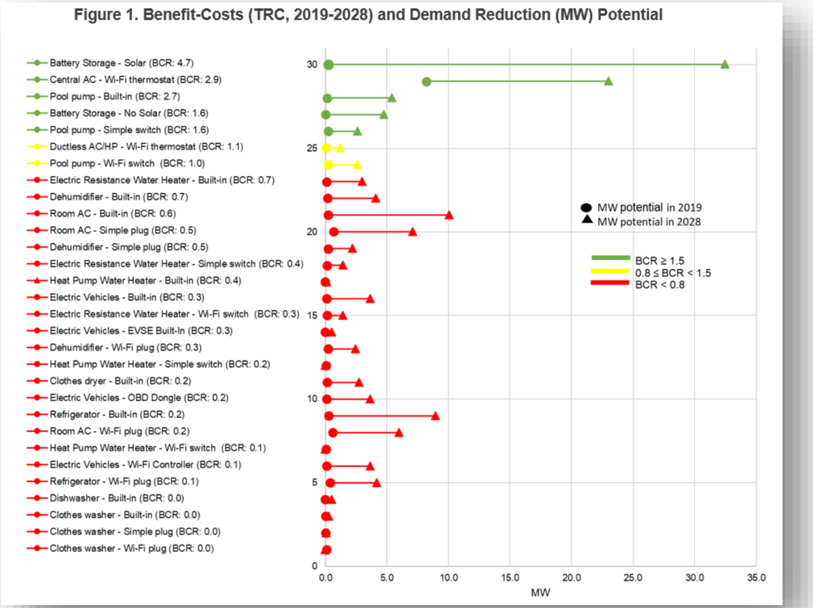
Prepared for:

National Grid

Submitted by:
Navigant Consulting, Inc.
77 S. Bedford Street
Suite No. 400
Burlington, MA 01803

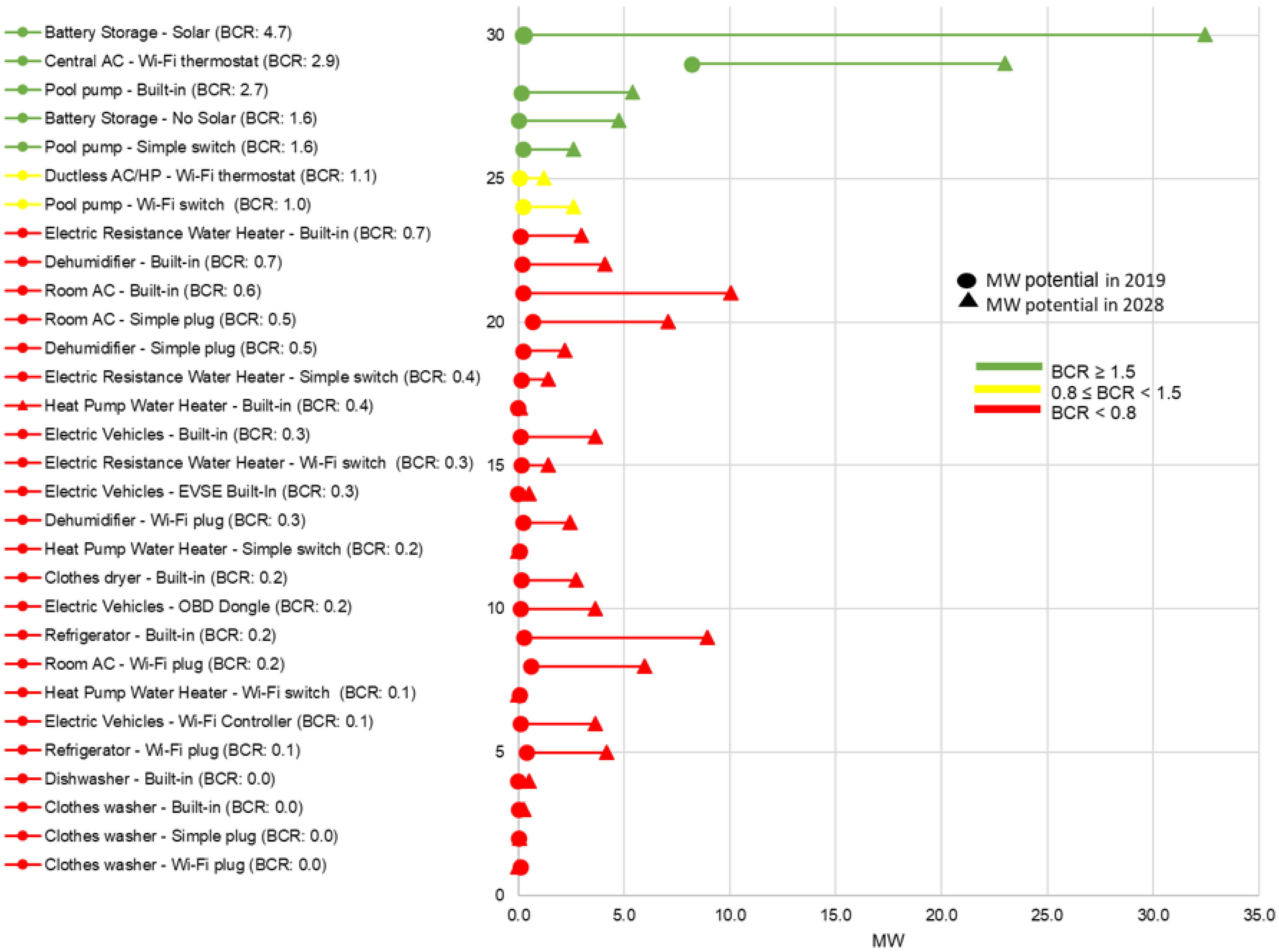
781.270.0101
navigant.com

Reference No.: 194701
April 18, 2019

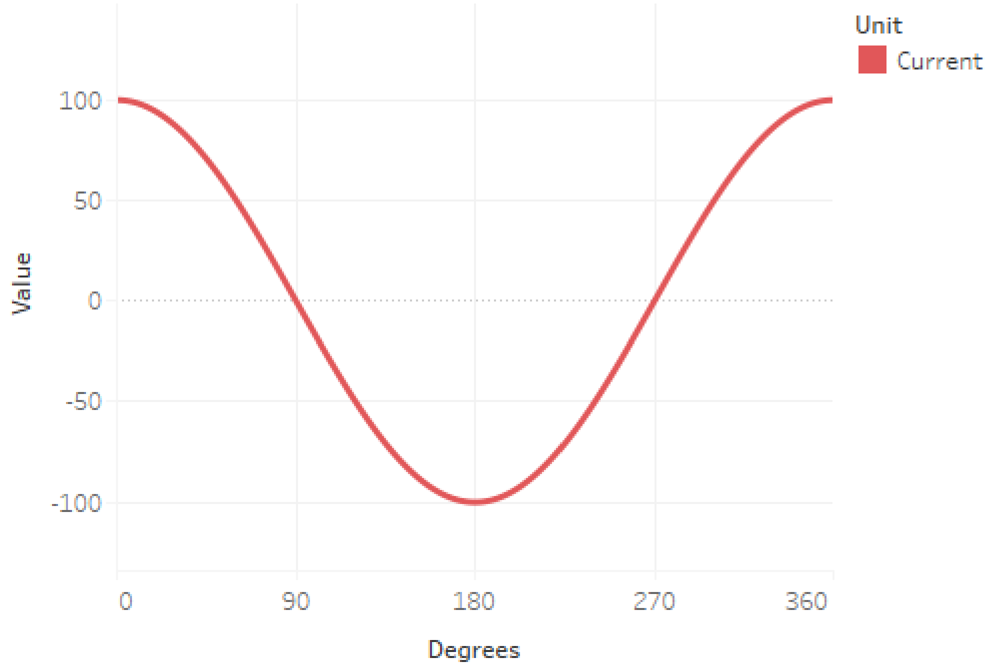


http://ma-eeac.org/wordpress/wp-content/uploads/Cost-Effectiveness-of-DR-for-Residential-End-Uses-Final-Report-2019-04-18.pdf

Figure 1. Benefit-Costs (TRC, 2019-2028) and Demand Reduction (MW) Potential



What is Power Factor?



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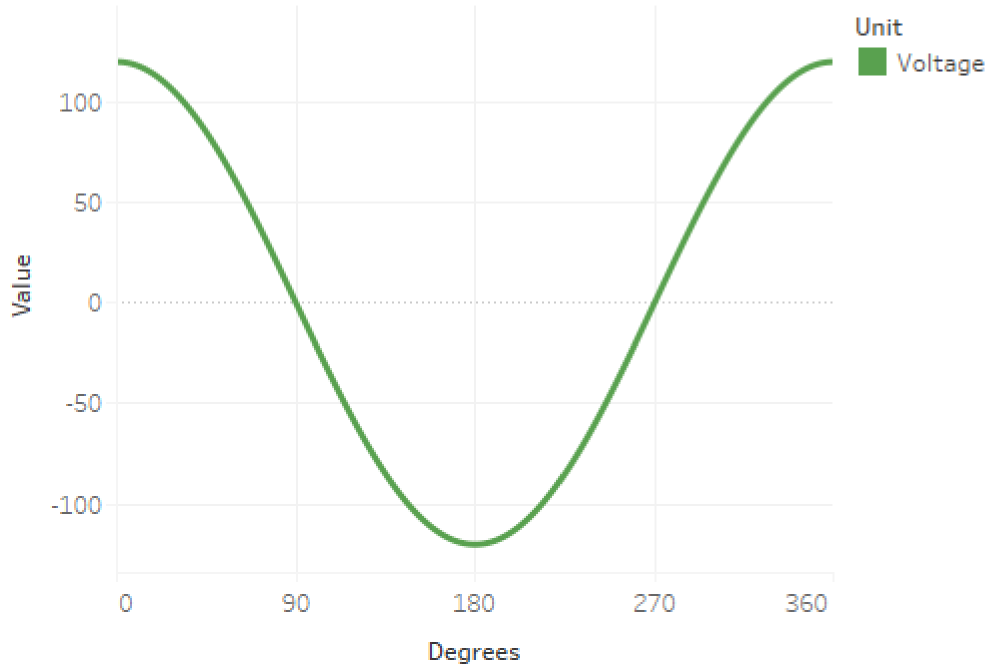

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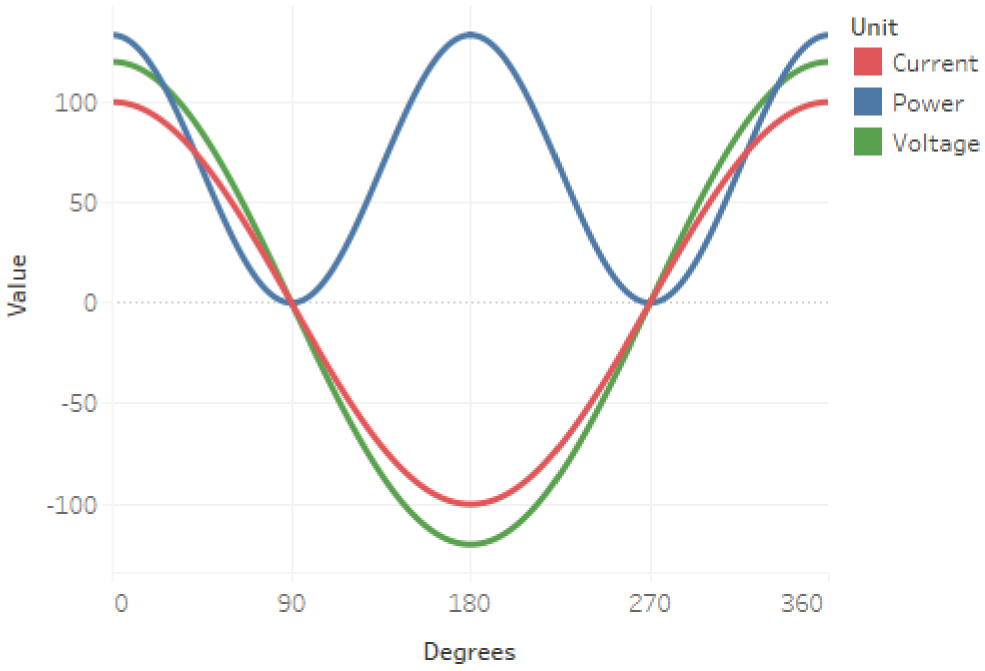
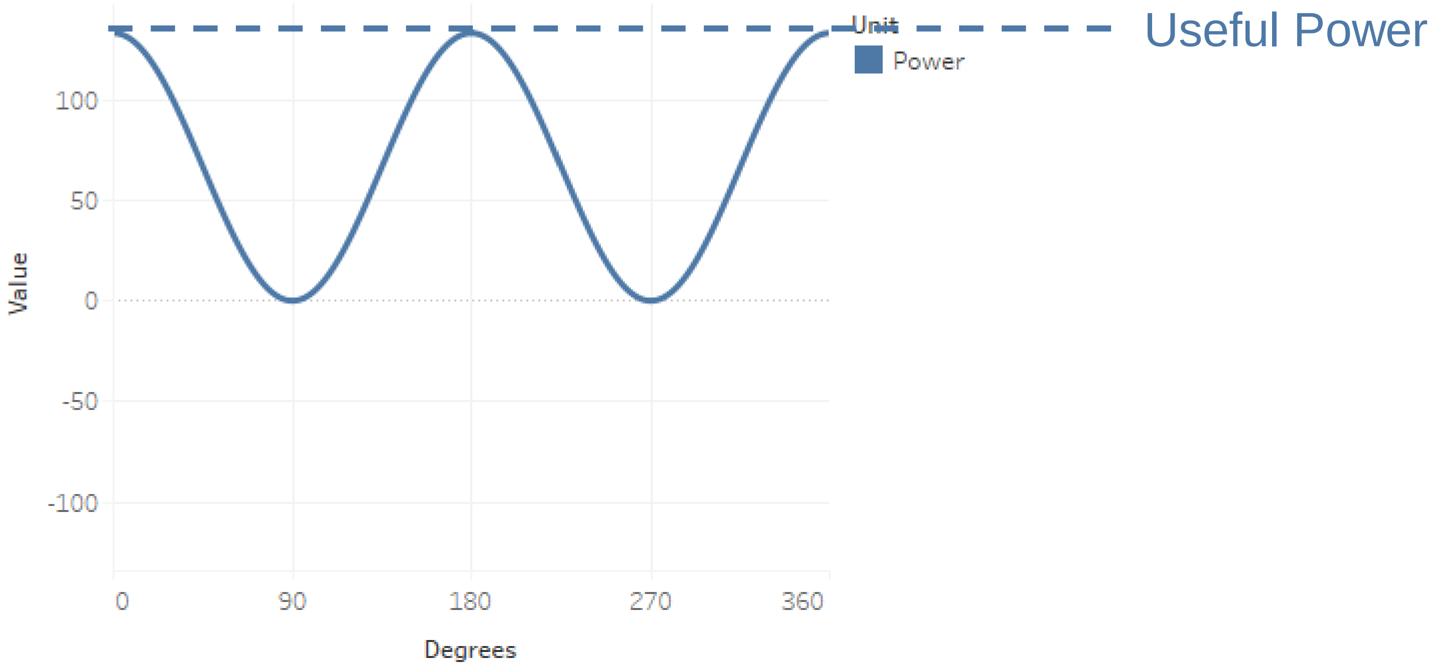


Power = Voltage x Current

[kW] = [V] x [A]

What is Power Factor?



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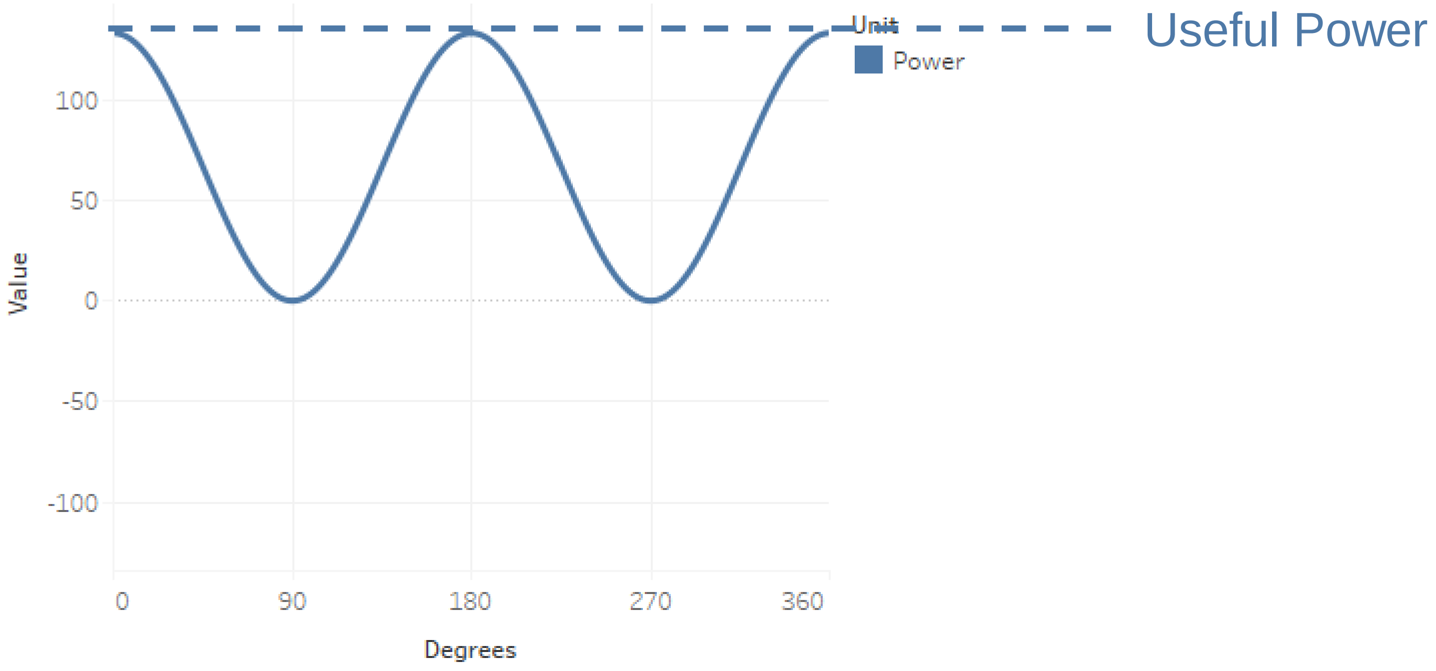
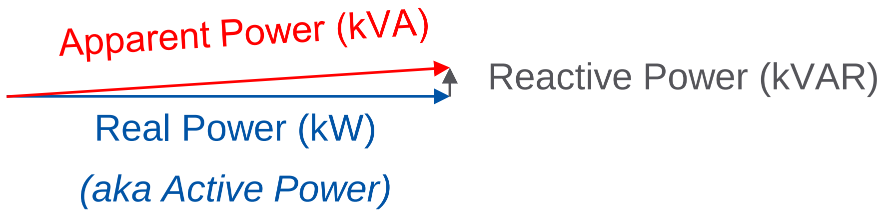
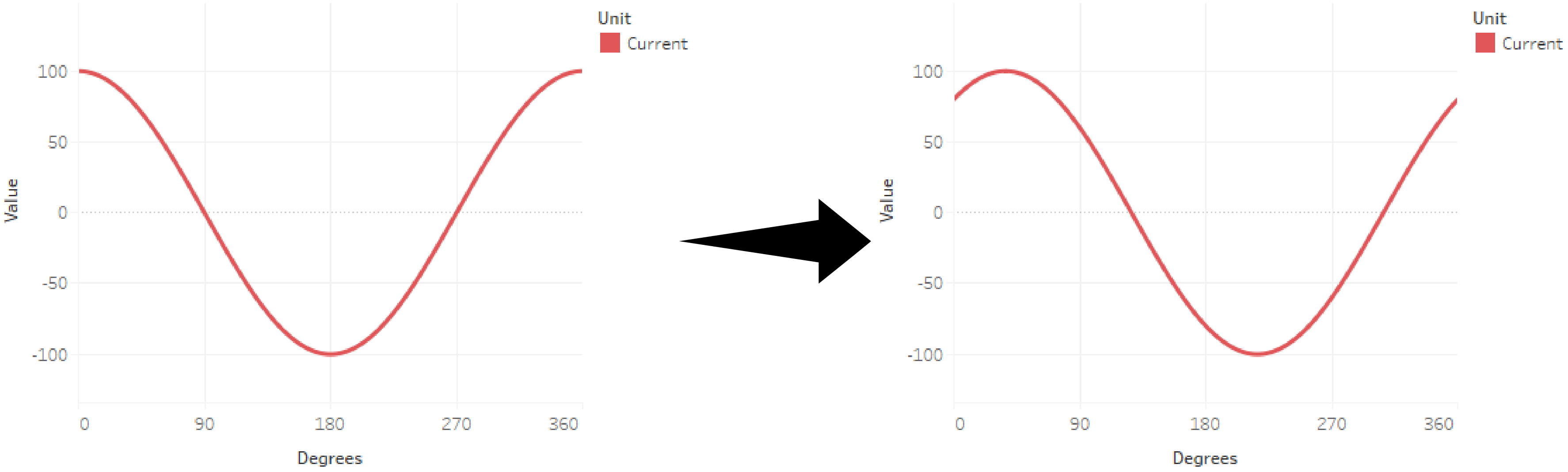




Before

After



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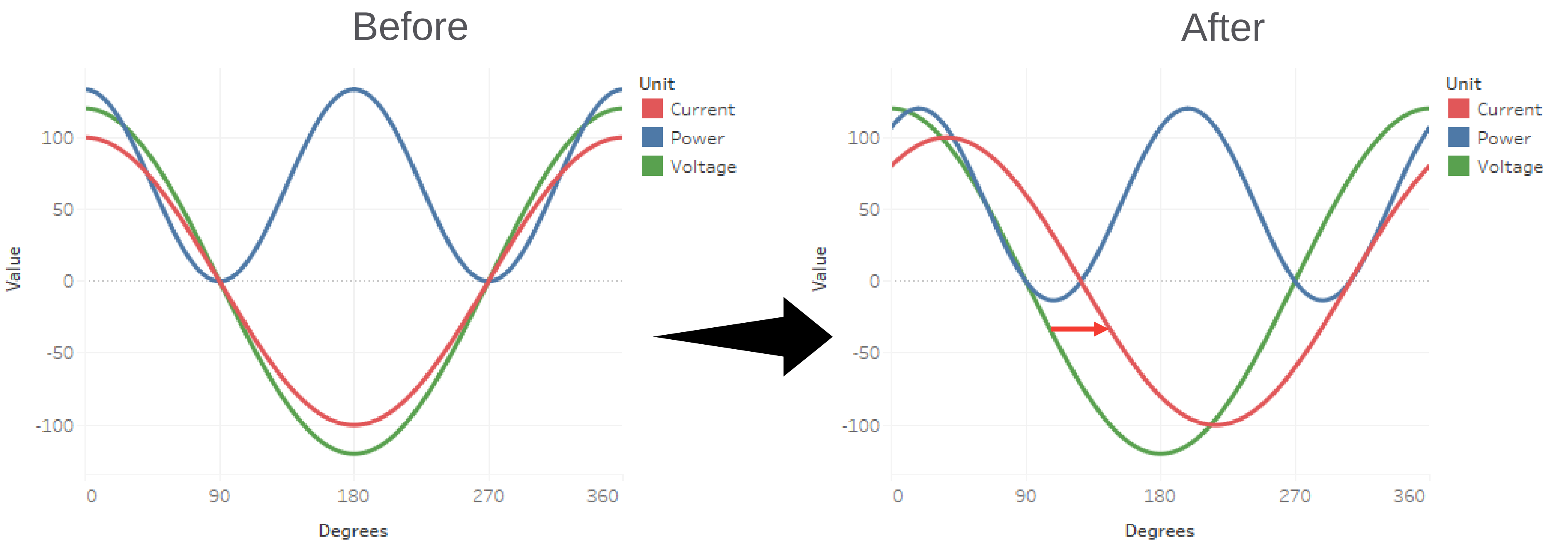

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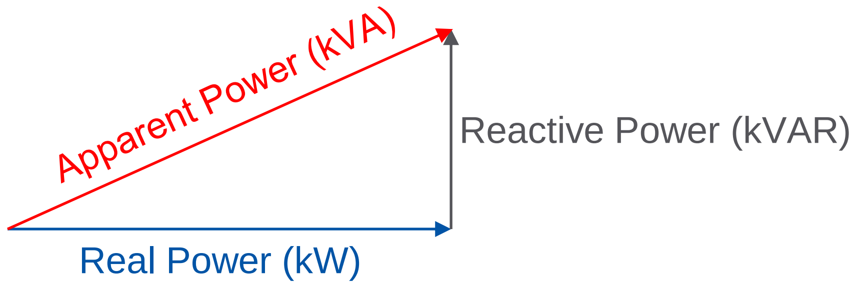
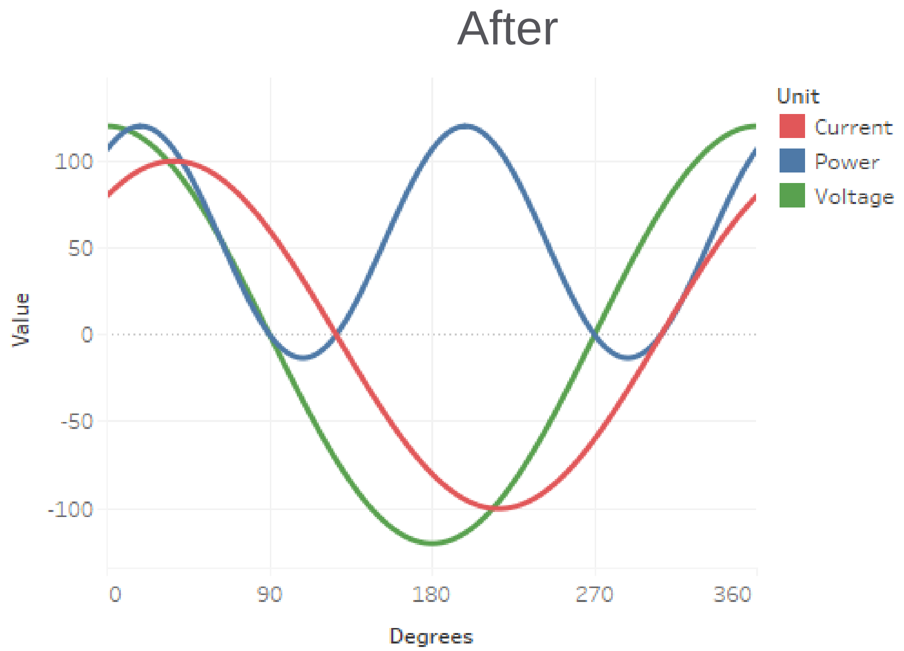




The Solutions

Traditional Solutions

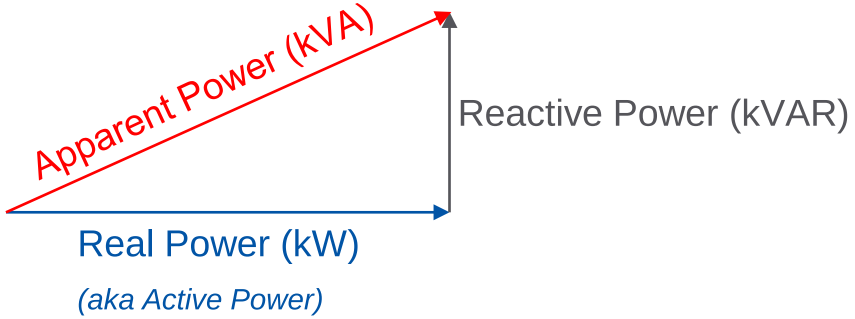
Increase power production

Power Factor Correction with Utility Capacitor Banks

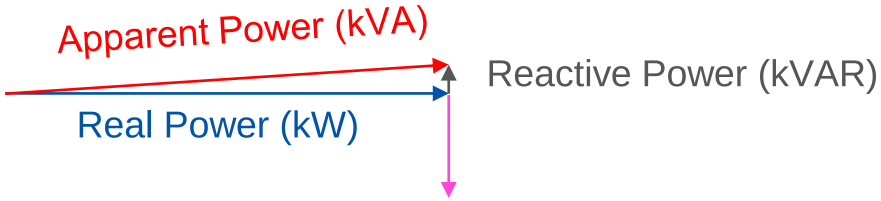
Power Factor Correction with Customer Solar Inverters

How Savings are Measured

Before



After



Apparent Power Without PF Correction (Counterfactual)

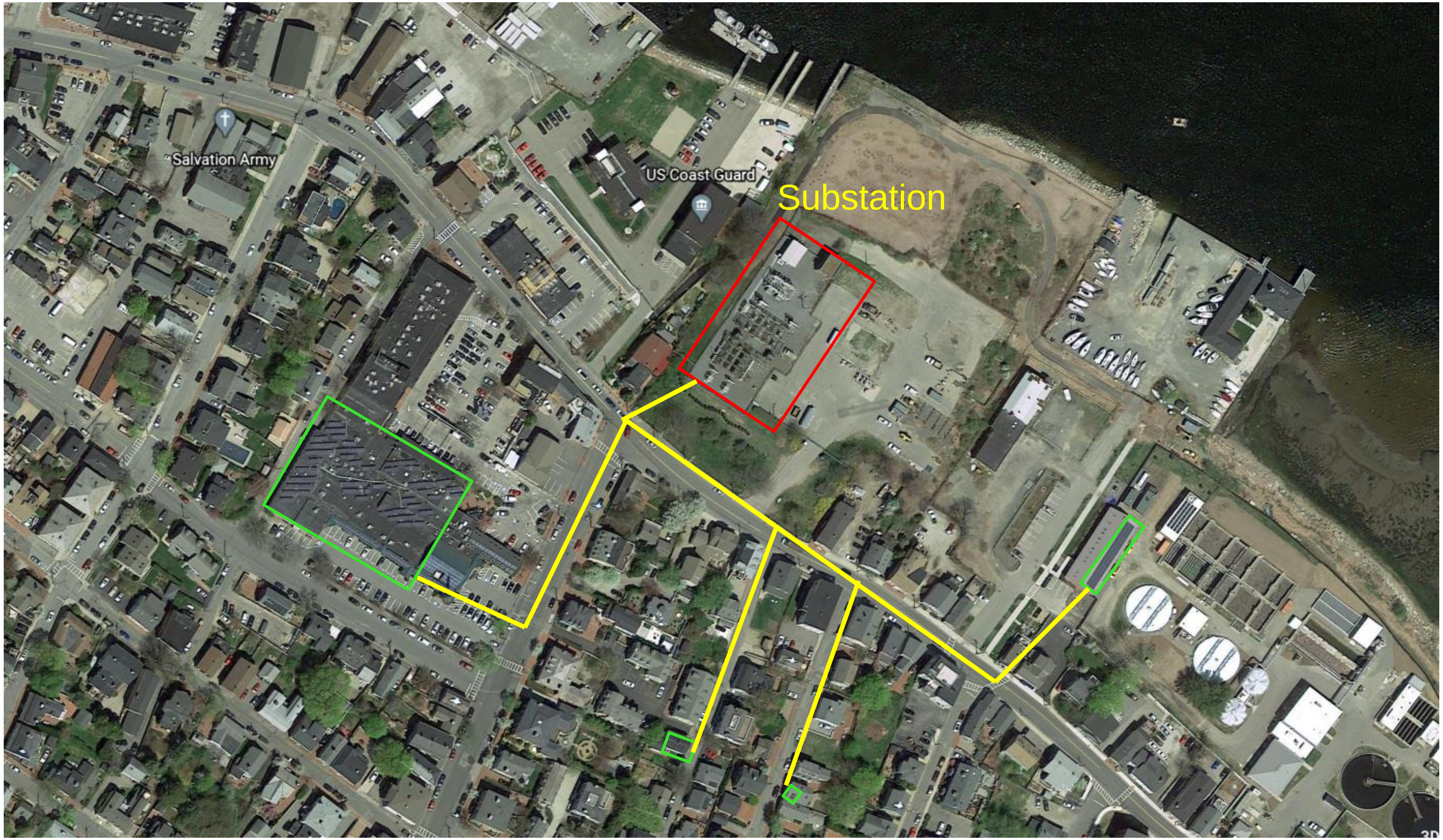
Apparent Power With PF Correction (Actual)

$$\text{Apparent Power Saved} = \overbrace{\sqrt{\left(\text{Real Power}\right)^2 + \left(\text{Reactive Power Before} - \text{Reactive Power Injected}\right)^2}}^{\text{Without PF Correction}} - \overbrace{\sqrt{\left(\text{Real Power}\right)^2 + \left(\text{Reactive Power Before}\right)^2}}^{\text{With PF Correction}}$$

$$\text{Apparent Power Saved } (kVA) = \sqrt{(5MW)^2 + (1MVAR - (-0.1MVAR))^2} - \sqrt{(5MW)^2 + (1MVAR)^2}$$

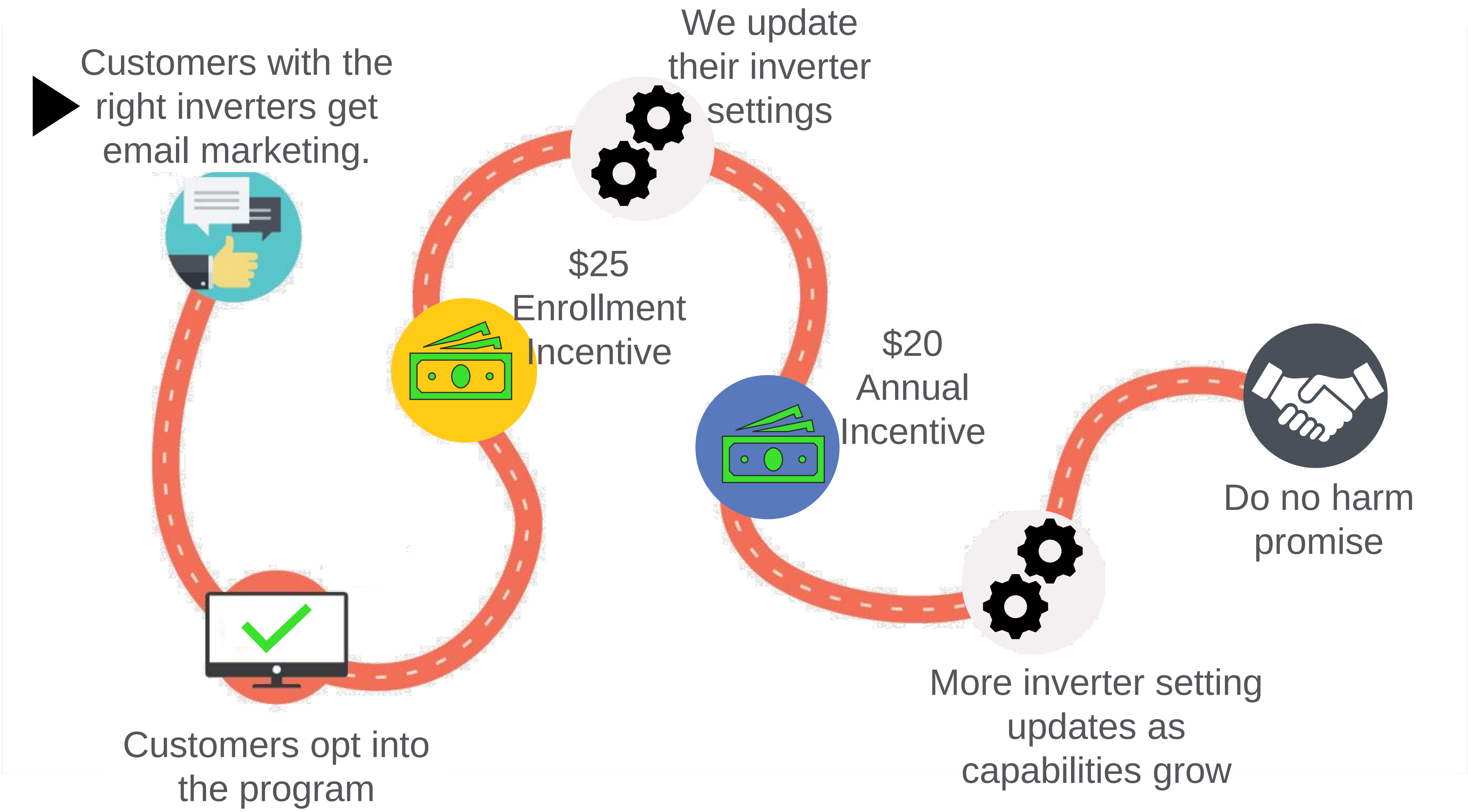
$$= 5.12\ MVA - 5.10\ MVA$$

$$= 0.02\ MVA$$



$$\textit{Apparent Power Saved } (kVA) = \sqrt{(5MW)^2 + (1MVAR - (-0.1MVAR))^2} - \sqrt{(5MW)^2 + (1MVAR)^2}$$

Repeat this calculation for each feeder and each hour…


Customers with the right inverters get email marketing.
We update their inverter settings
$25 Enrollment Incentive
$20 Annual Incentive
Do no harm promise
More inverter setting updates as capabilities grow
Customers opt into the program