

The background of the slide is a stylized, monochromatic blue-toned American flag. The stars in the upper left corner are visible as a grid of white dots, while the stripes below are represented by wavy, horizontal bands of varying shades of blue. The overall effect is a textured, patriotic backdrop.

***Are you talking about the
Inflation Reduction Act?
You should be!***

October 12, 2023

Your Presenters:



Daniel Lessing, LEED AP BD+C, CEM

Director of Business Development, Client Leader at BHDP Architecture
Cincinnati, OH



Ryan Hoffman, PE, LEED AP BD+C, CEM

Principal, Director at HEAPY
Dayton, OH



Seth Parker

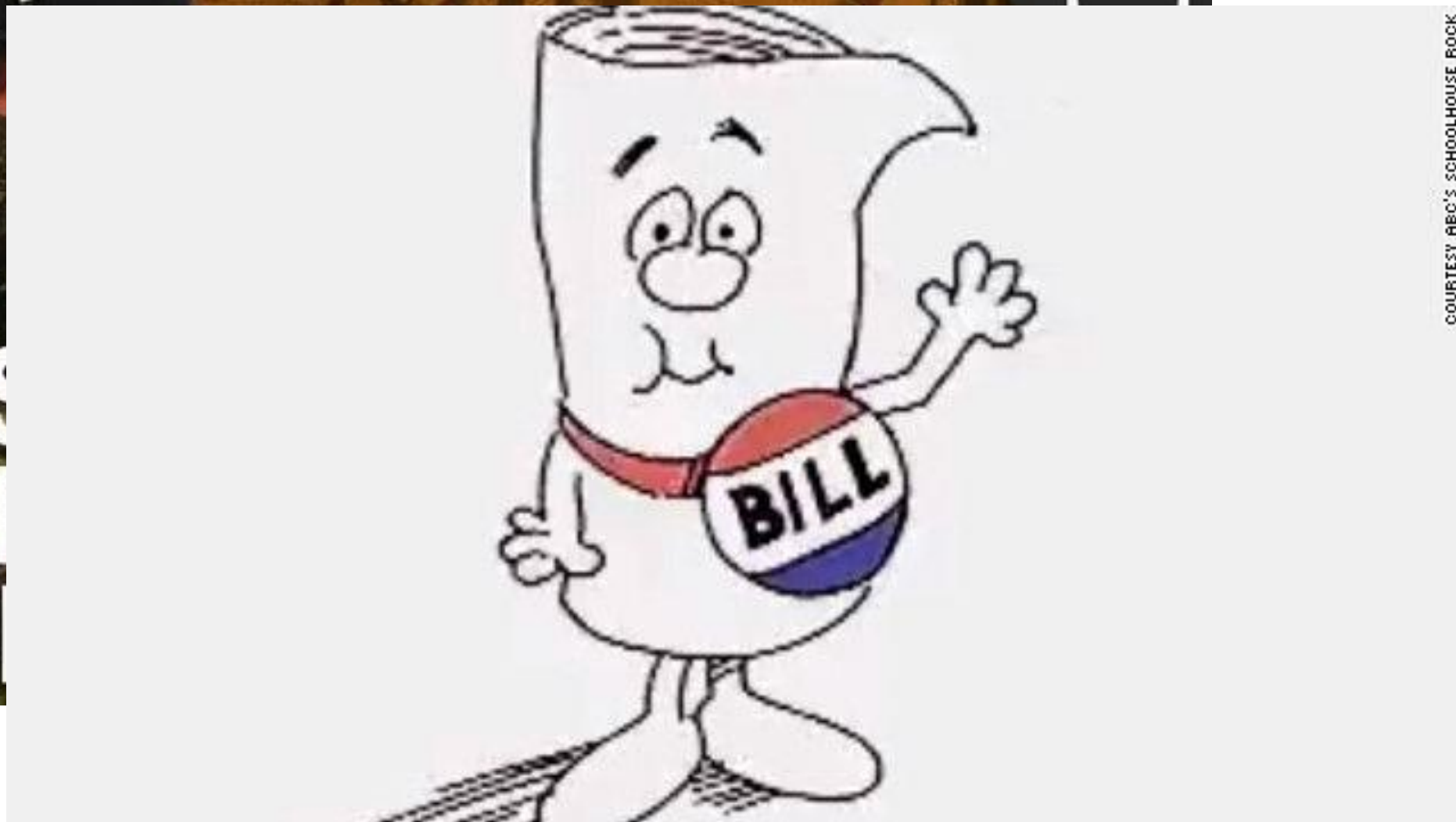
CEO at Melink Solar
Cincinnati, OH

Agenda:

1. What is it?
2. How much?
3. Prove it to me!
4. Teach me how!



What is the BIL?



COURTESY ABC'S SCHOOLHOUSE ROCK



“The single most important piece of legislation to our industry in a lifetime.”

What is it?

Bipartisan Infrastructure Law (BIL)

Provides \$1.2 trillion in federal investment to improve the nation's infrastructure, from transportation systems and power grids to broadband and other public works. Roughly half of the funding—\$550 billion in new spending—will flow into state and local governments over the coming years.

Inflation Reduction Act (IRA)

Directs new federal spending of \$390 billion toward reducing carbon emissions, lowering healthcare costs, funding the Internal Revenue Service, and improving taxpayer compliance



What is it?

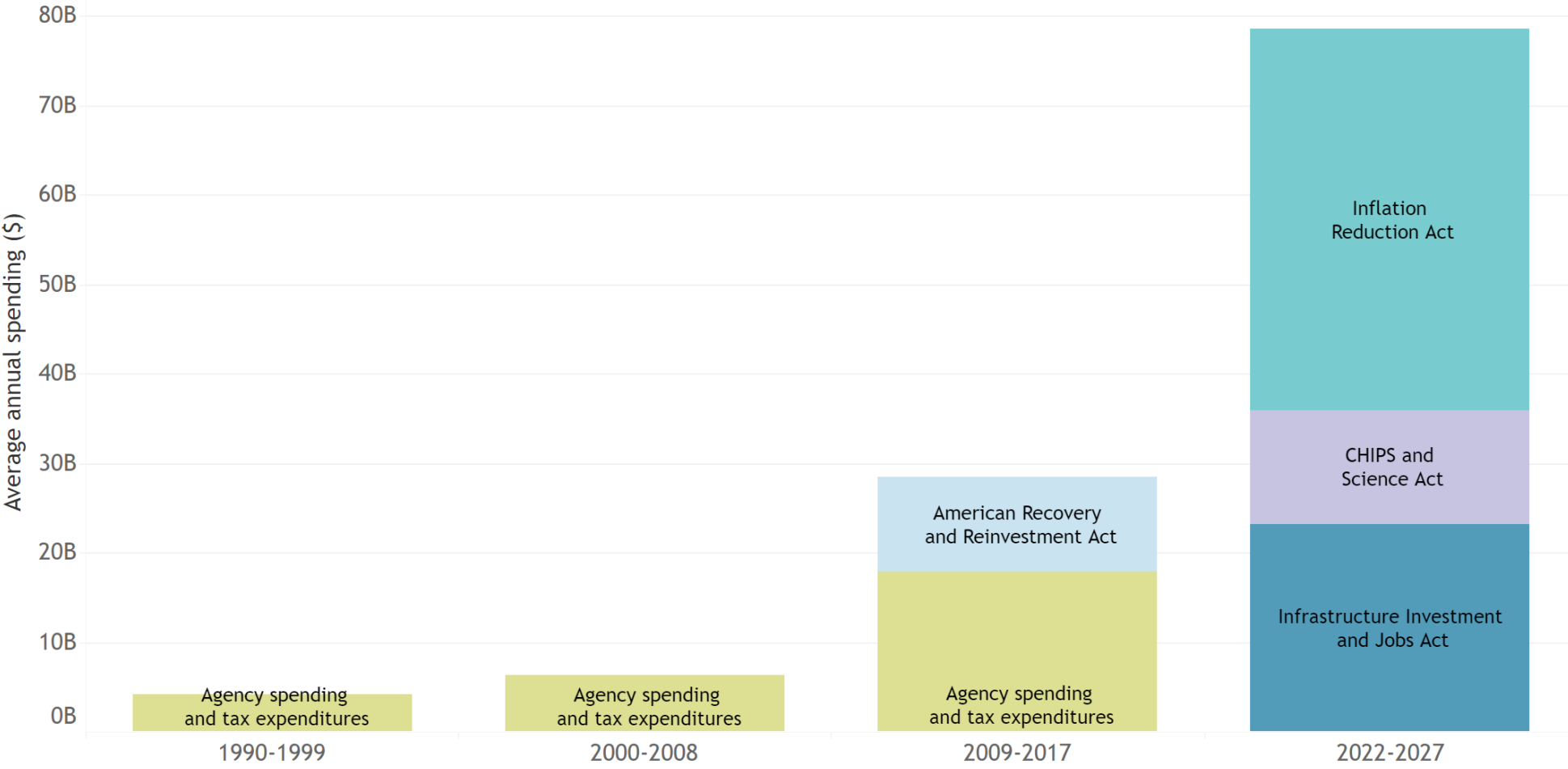
Inflation Reduction Act Technologies

The Inflation Reduction Act provides tax incentives for technologies across energy industry:

- [Solar Energy](#)
- Wind Energy
- Geothermal Energy
- [Ground Source Heat Pumps](#)
- Fuel Cells
- Microturbines
- [Combined Heat and Power](#)
- [Energy Storage](#)
- Biogas
- Waste to Energy
- [Dynamic Glass](#)
- [Microgrid Technology](#)
- [Electric Vehicles](#)
- [Electric Vehicle Charging Infrastructure](#)
- Carbon Sequestration
- Advanced Manufacturing
- Clean Hydrogen
- Zero Emission Nuclear
- Sustainable Aviation Fuel
- Biodiesel renewable fuel
- [Energy Efficiency](#)
- Energy Efficient Homes

How Much?

Over the next decade, spending on climate will more than triple historic levels

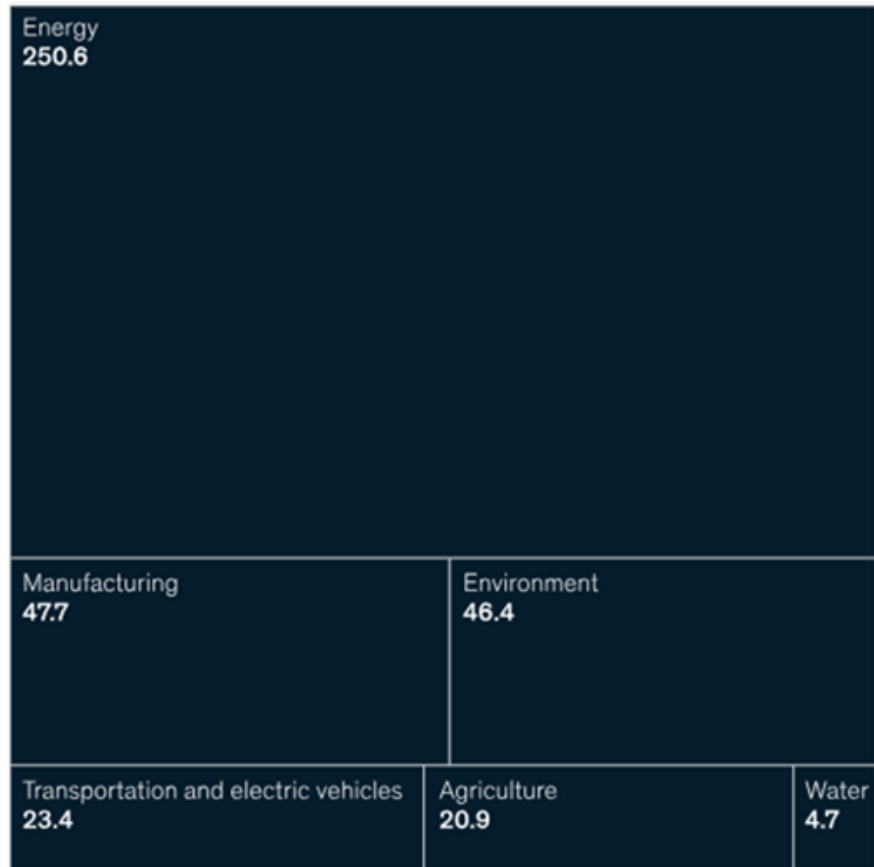


How Much?

The Inflation Reduction Act makes investments across a wide range of sectors.

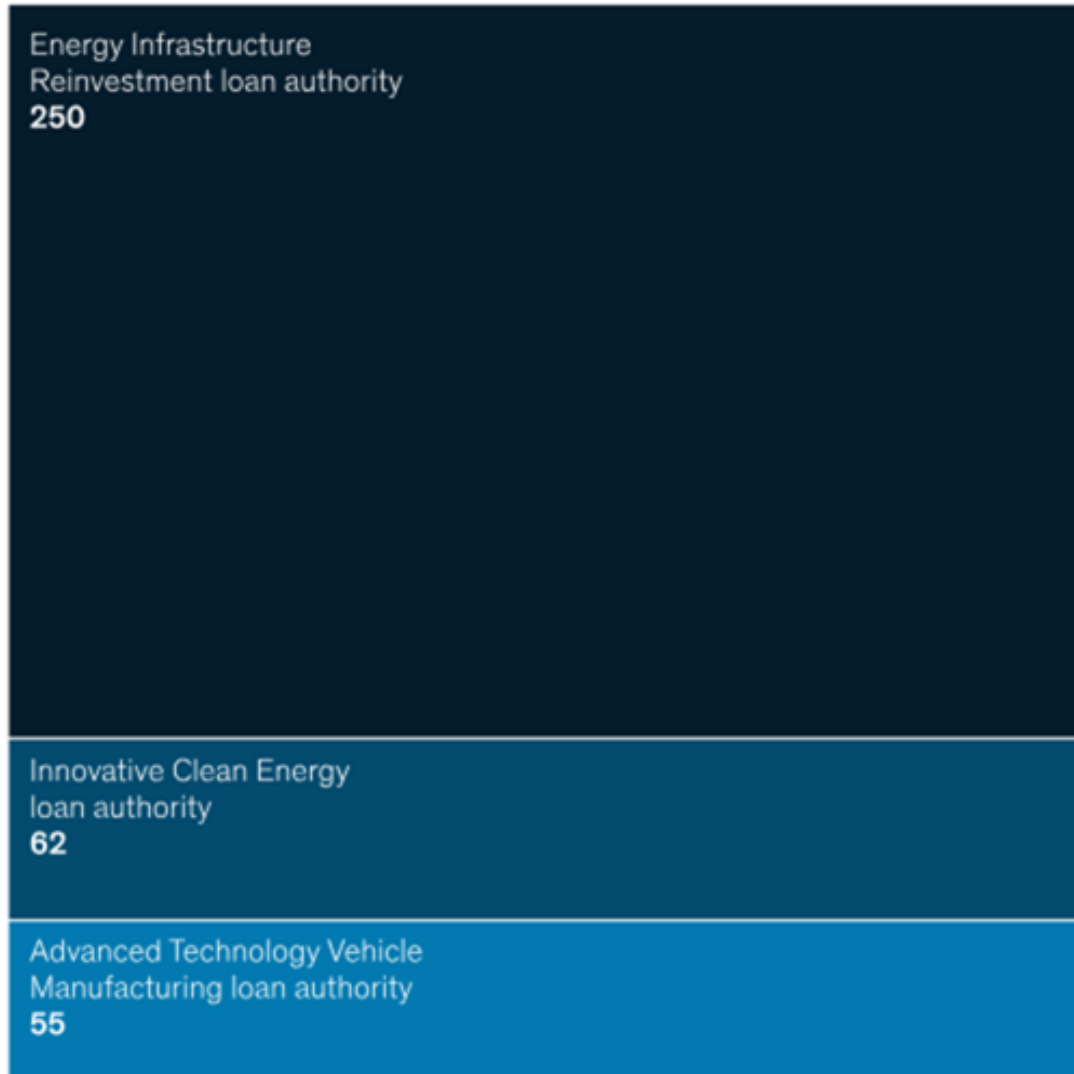
Inflation Reduction Act investments by sector, \$ billion

Total = **393.7**



How Much?

Loan authority **367**



How Much?

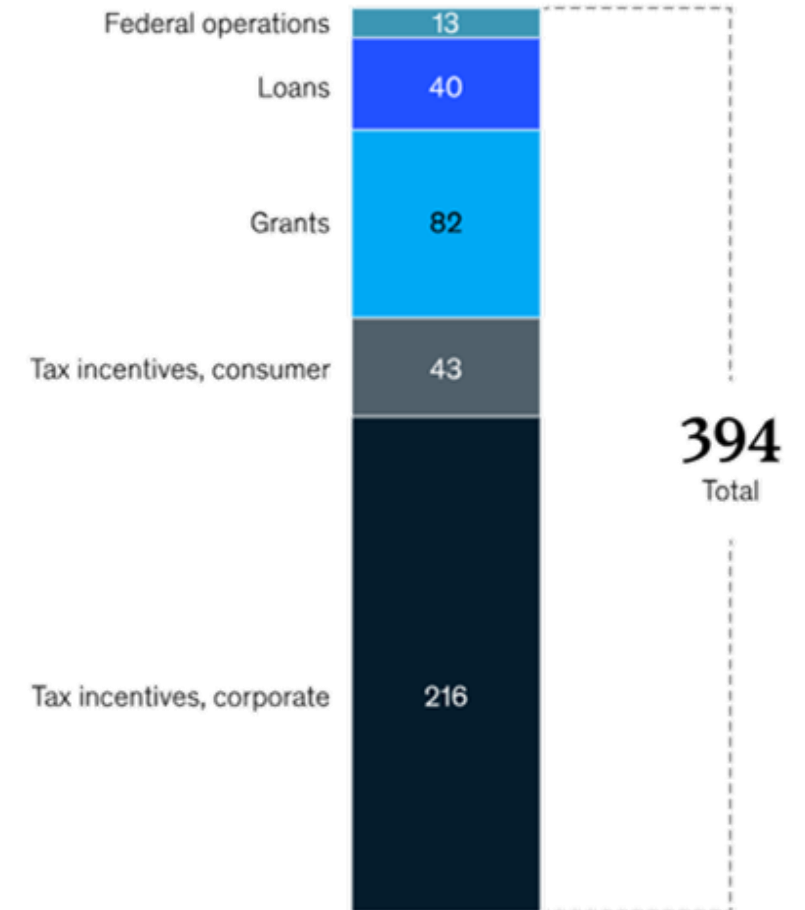
\$216B Tax Credit for Corporations!

Direct Pay...meaning an entity can claim the full amount even if its tax liability is less than the credit.

Tax Deduct: Reduction in your taxable income/profit

Tax Credit: Reduction in your tax **(MUCH BETTER!)**

Energy and climate change funding in the Inflation Reduction Act, \$ billion



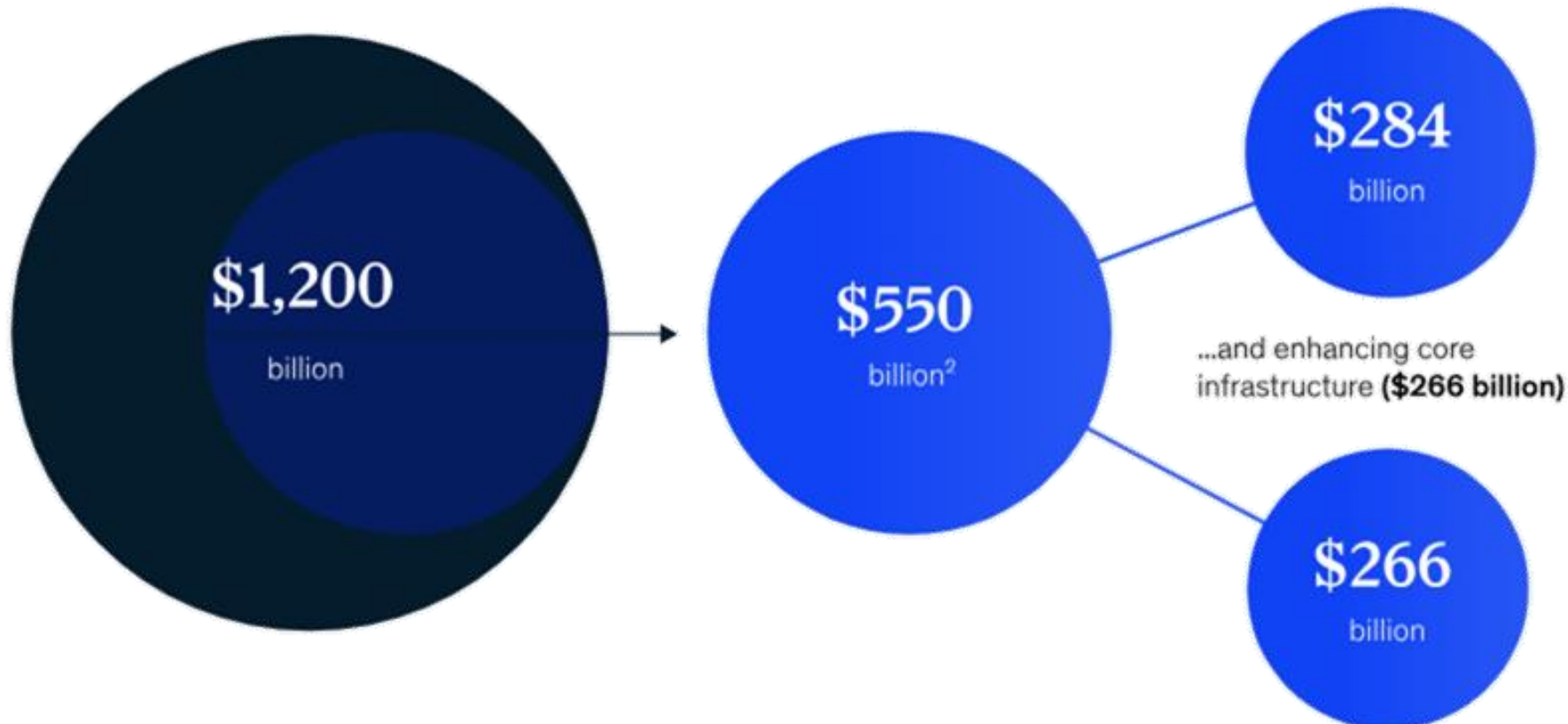
How Much?

Bipartisan Infrastructure Law (BIL) investments

The act allocates about **\$1.2 trillion¹** over 10 years ...

...including **\$550 billion**
in new spending...

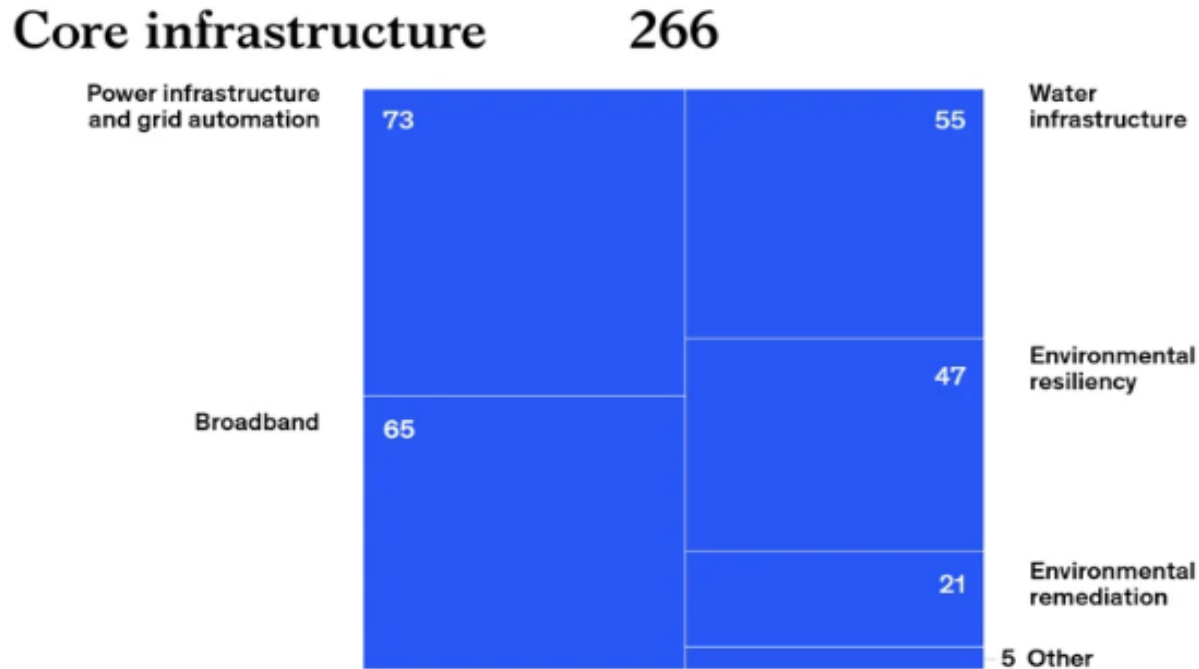
...divided between improving
the surface-transportation
network (**\$284 billion**)...



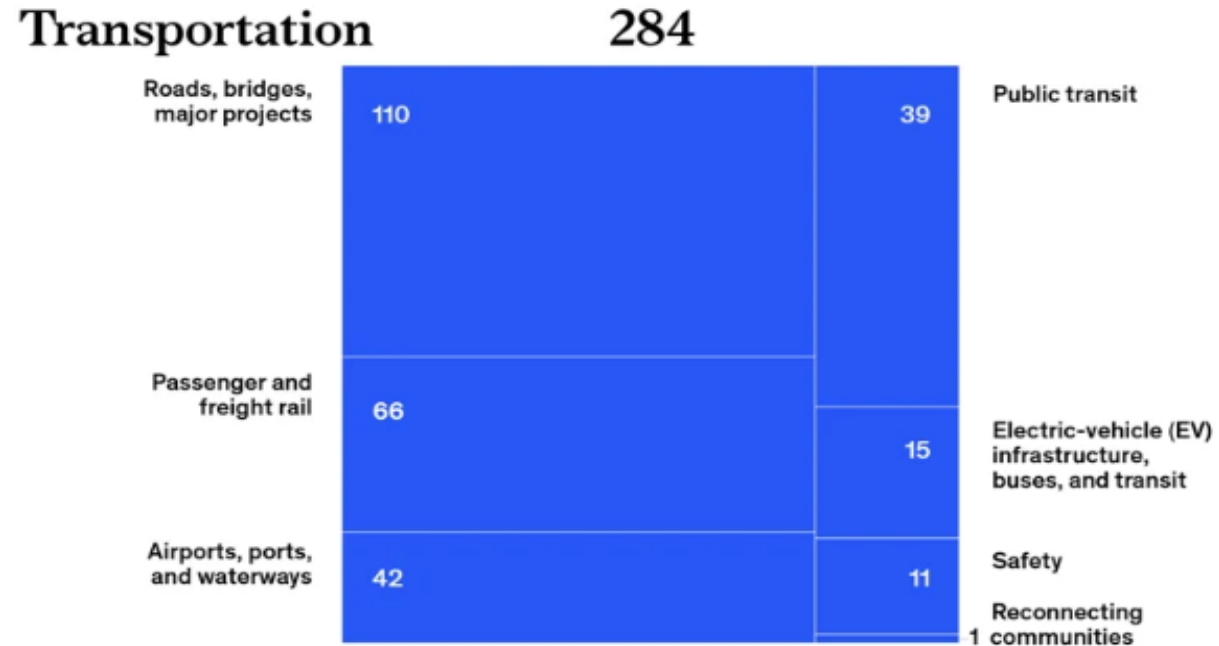
...and enhancing core
infrastructure (**\$266 billion**)

How Much?

The BIL will commit \$266B in new spending on core infrastructure: Power, water, broadband, and the environment.



The BIL will commit \$284B in new spending for transportation.



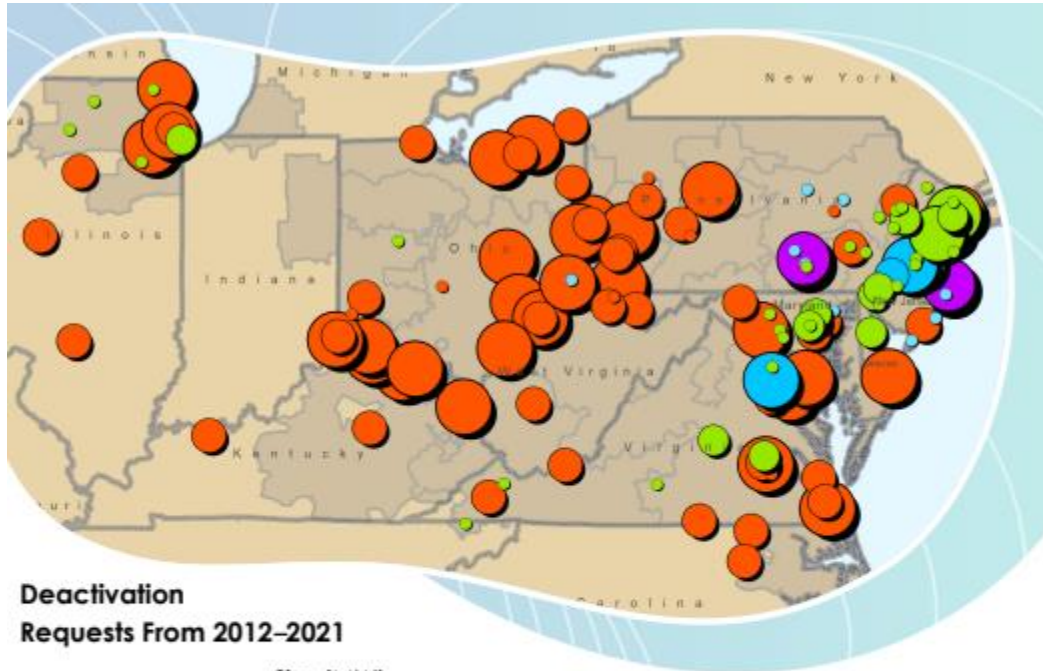
Disclaimer



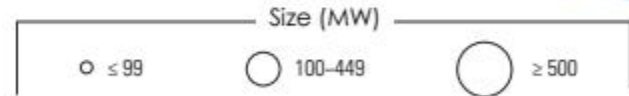
- **I am not your accountant...**
- Tax law is constantly changing.
- Within Inflation Reduction Act, further clarifications are expected to be released in the coming months by the Department of Treasury

Prove it to Me!

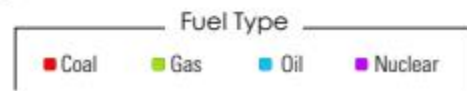
GRID OF THE FUTURE – DECARBONIZATION IN PJM



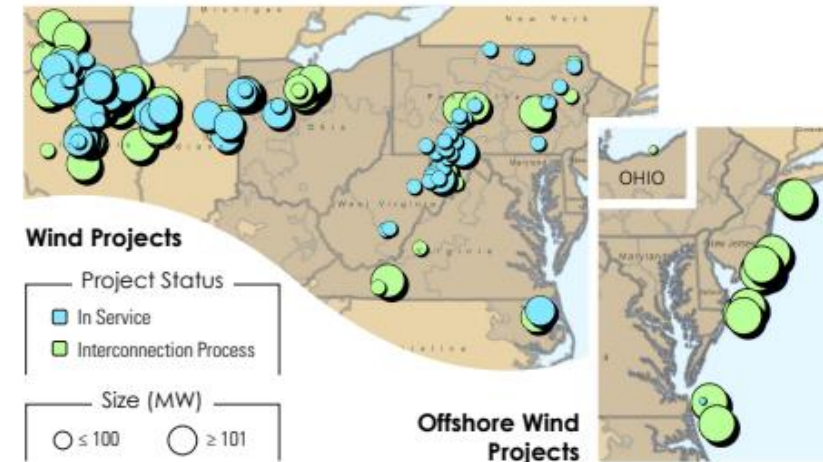
Deactivation Requests From 2012–2021



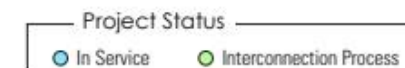
From 2012 through 2021, 24,507 MW of generation retirements accounted for \$4.1 billion of baseline transmission investment. The remaining 16,702 MW that retired during this time did not require system enhancements to maintain grid reliability.



Generation Trends



Solar Projects



Prove it to Me!

THEN AND NOW: GEOTHERMAL



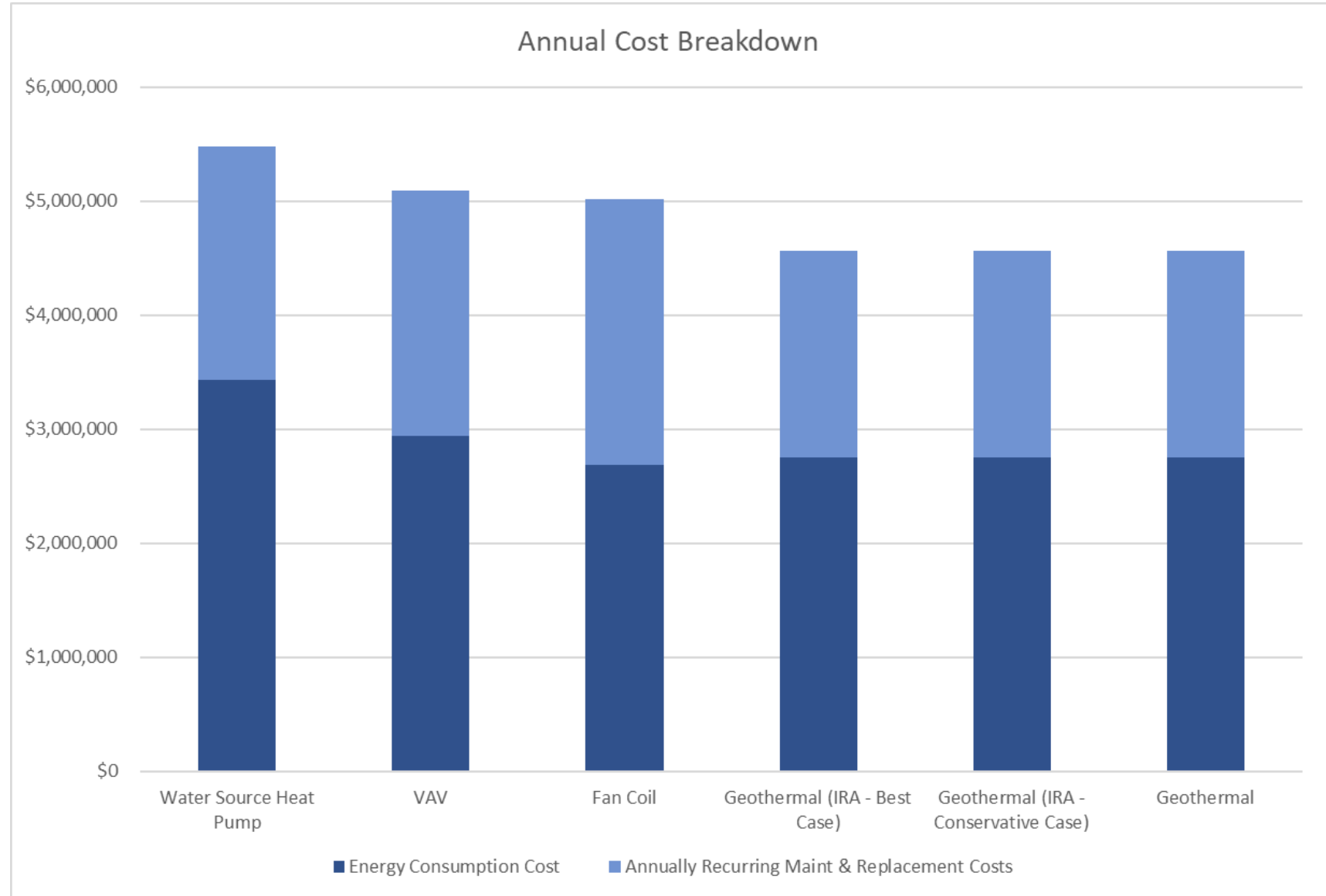
Prove it to Me!

SAMPLE GEOTHERMAL ANALYSIS

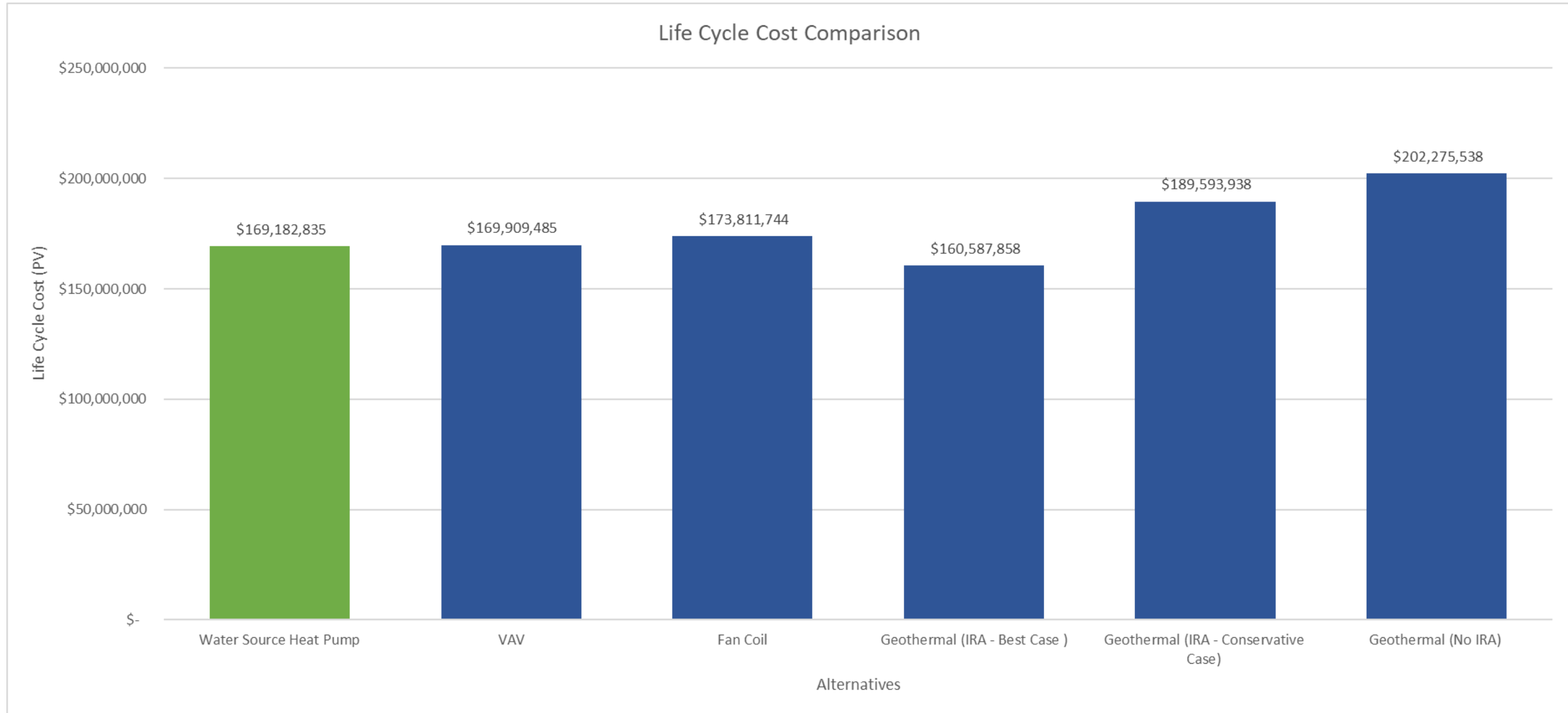
- Central condenser water pumping system
- Chiller and Boiler plant eliminated with a fully geothermal system
- Water source heat pumps throughout
- Non-HVAC systems could be tied into condenser water system
- Possible heat recovery chiller to provide hot water for hydronic heating
- Possible cooling towers and boilers to reduce overall wellfield size
- Large closed-loop geothermal wellfield: 2,500 wells, 500 ft deep

Prove it to Me!

Life-Cycle Cost Analysis

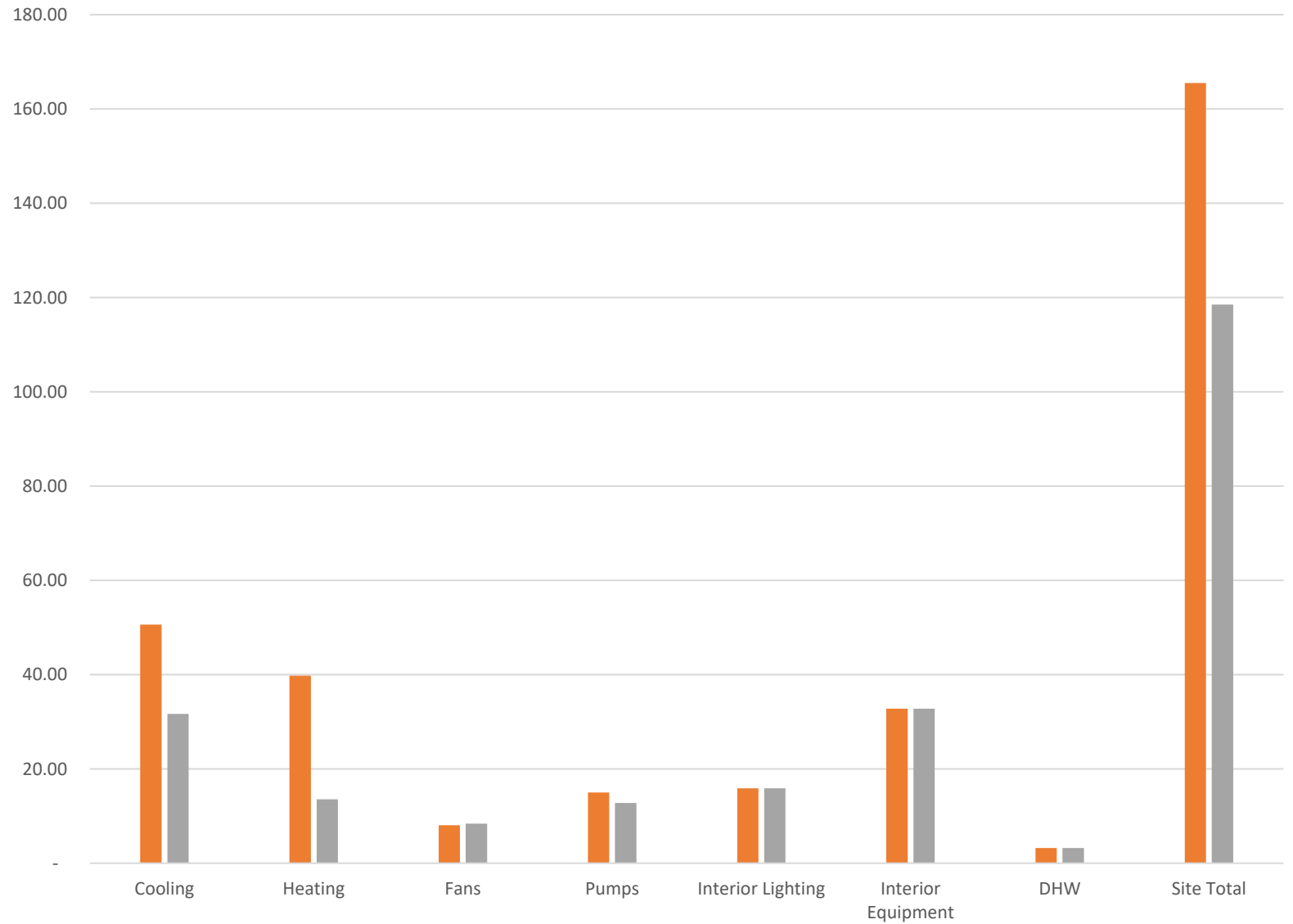


Prove it to Me!



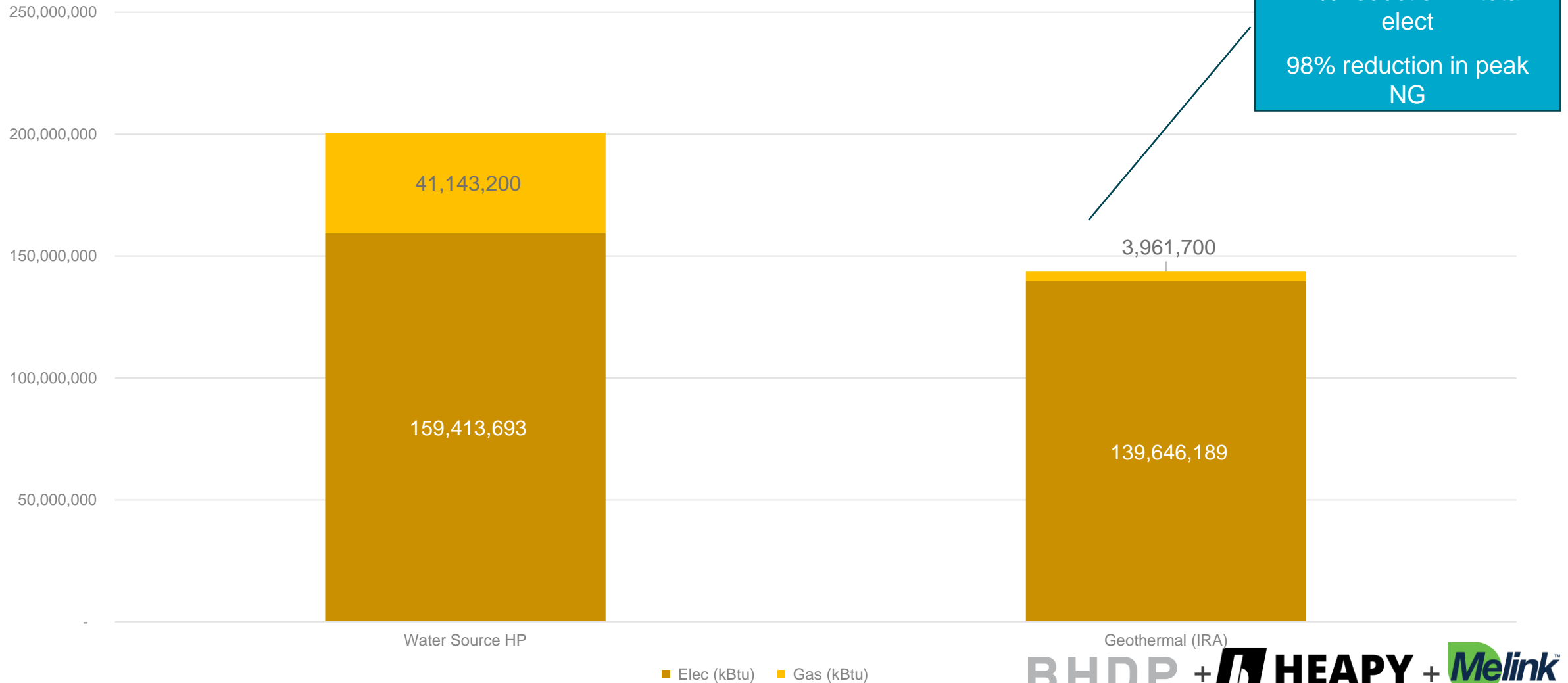
Prove it to Me!

EUI, Water Source Heatpumps vs. Geothermal



Prove it to Me!

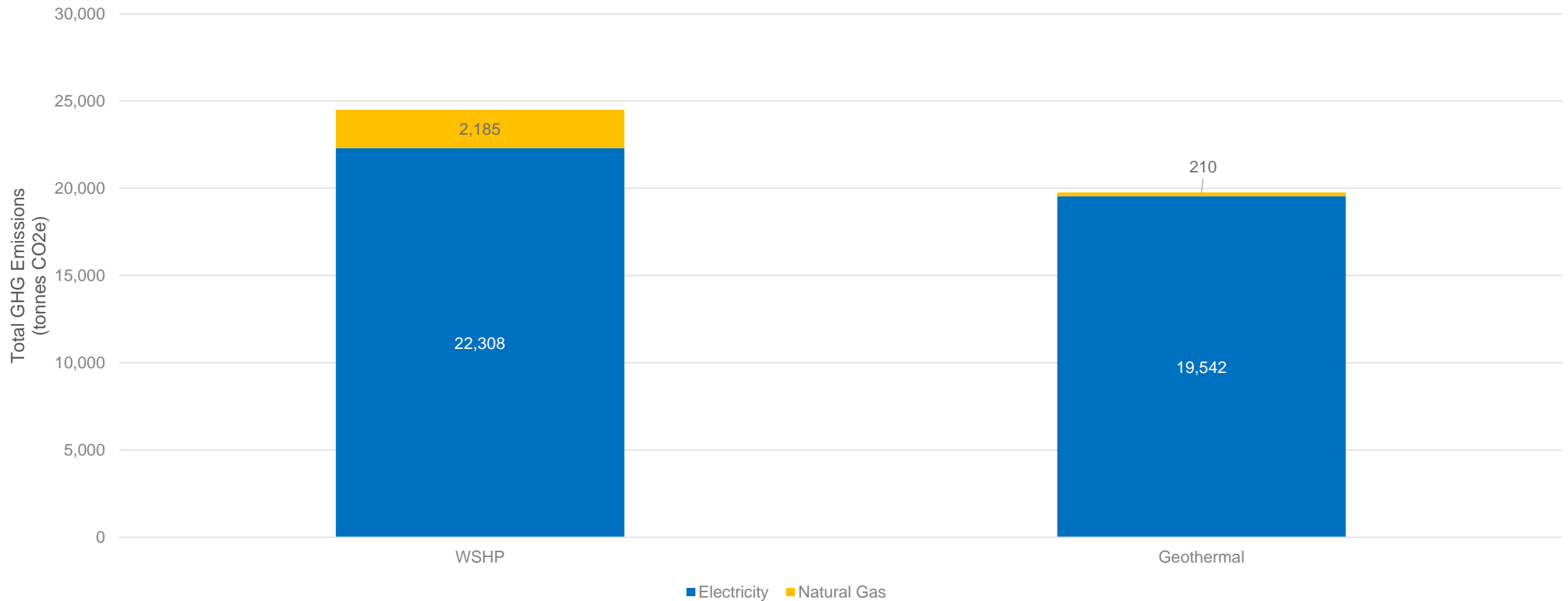
Total Annual Energy Breakdown



elect
12% reduction in total
elect
98% reduction in peak
NG

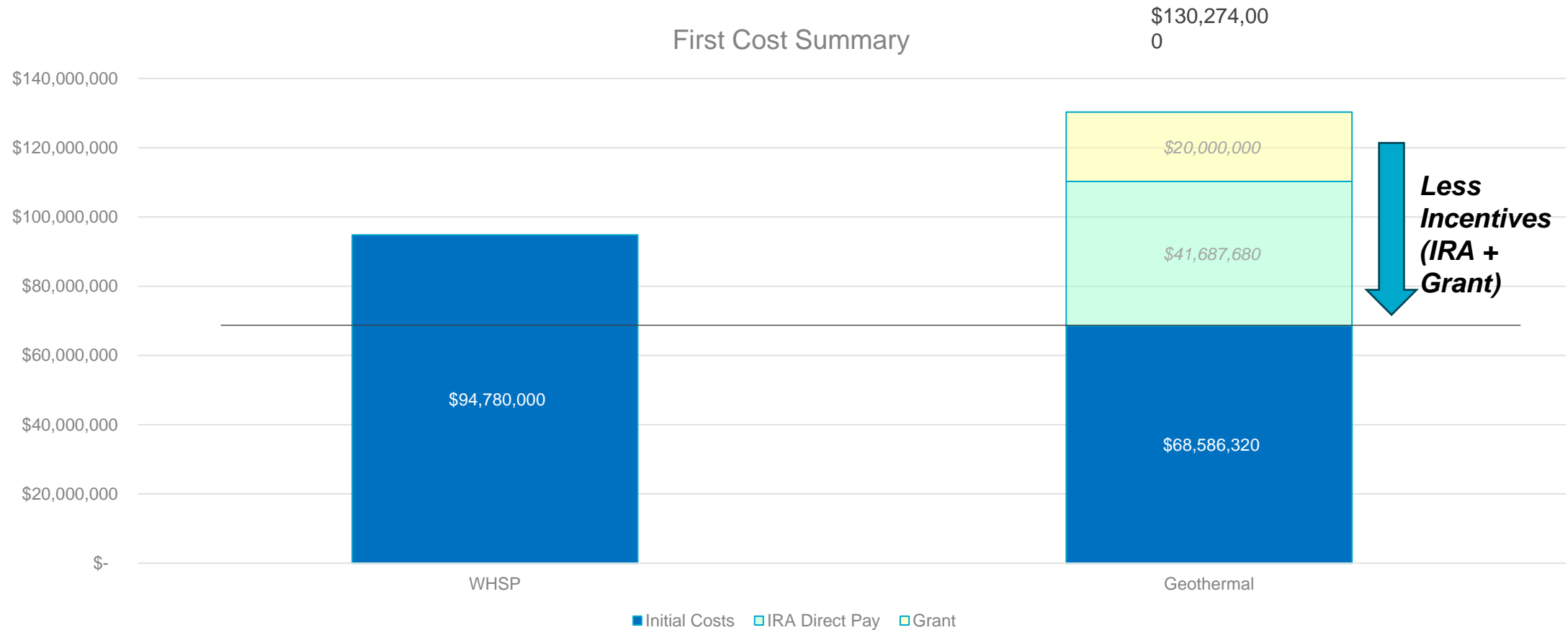
Prove it to Me!

Annual Greenhouse Gas Emissions



Prove it to Me!

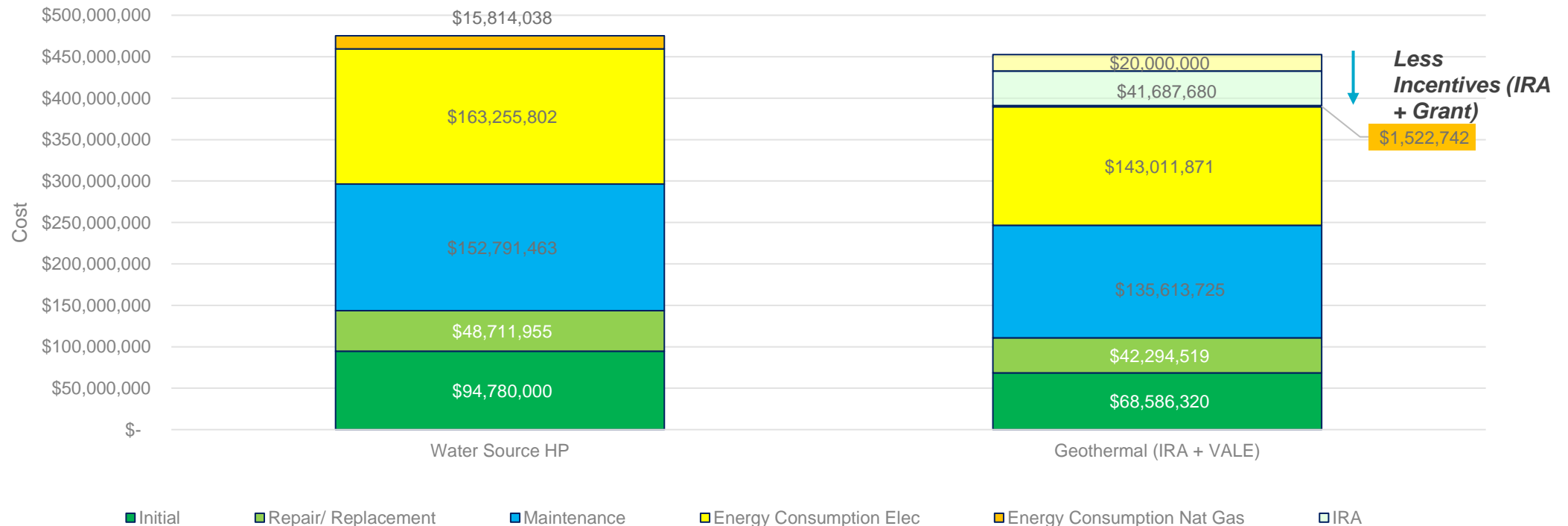
First Cost Business Case Projection w/ Incentives



Prove it to Me!

40 Year Cost Breakdown: GEO vs WSHP w/ Incentives

40 Year Cost Breakdown



WHSP 40 yr LCC ~ \$475,535,000 **GEO 40 yr LCC ~\$391,029,000**

Teach Me How!

Sample Solar Customer: Introduction



About the customer

Building sq: **45,000 sq/ft**

Location: **Mason Ohio**

Company type: **Manufacturing/Private**

Customer motivation(s) / situation:

The company seeks to...

Hedge against rising electricity cost

Branding/Employee attraction

Sustainability/Right thing to do

Resulting in...

Energy Savings

HR+PR Benefits

Increased Revenue

Teach Me How!

Sample Solar Customer: **System Details**



About the proposed system

Annual Consumption: **413,616 kWh**

Roof mounted System:

Solar PV Year One: **358,879 kWh**

Solar PV Offset: **86%**

of Panels: 600

Project Duration: 4 Months

Teach Me How!

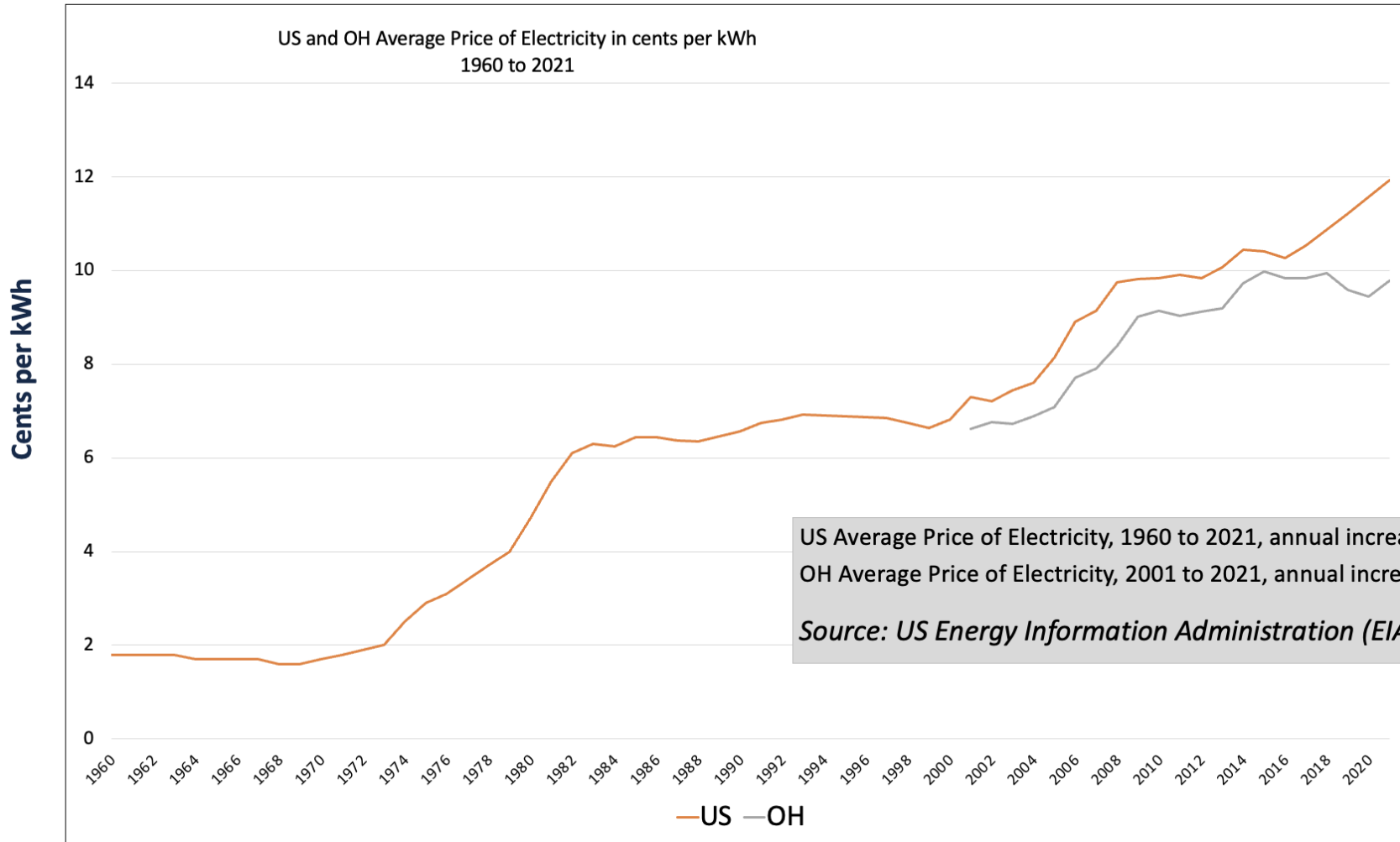
ENERGY ECONOMICS



Teach Me How!

Increasing Electricity Price Trends

National average increase of 3.15% PER YEAR between 1960 and 2021



Teach Me How! Recent Pricing: Skyrocketing Rates

Cincinnati, Cleveland, Columbus and 2 more
Industrial All Utility Bill Trends

Customer Type
Industrial

City
(Multiple values)

Utility Type
(All)

Report Date
1/5/2015 9/5/2023

Monthly Usage (kWh)
100,000

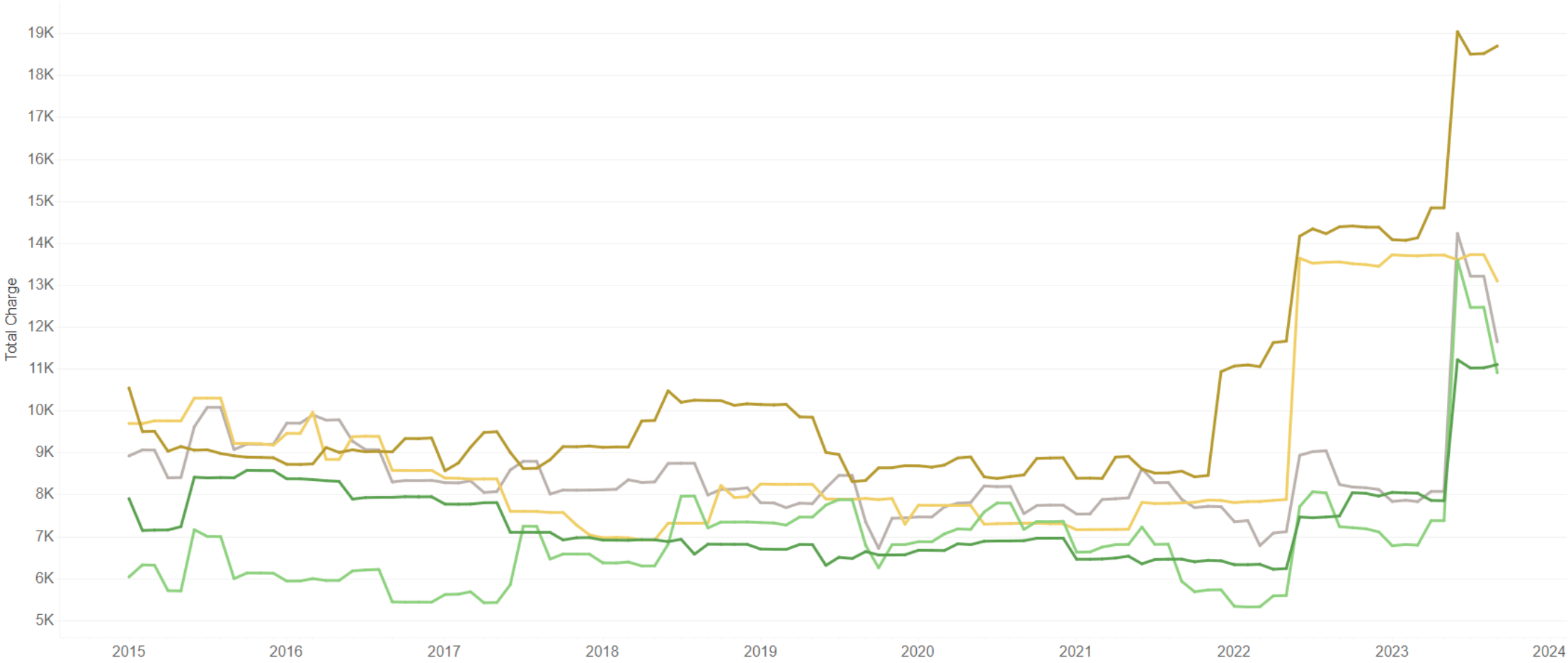
Demand (kW)
305

Reactive Demand (kVAR)
0

Mcf or Ccf
Mcf

Monthly Usage (Mcf or Ccf)
10

- City
- Cincinnati
 - Cleveland
 - Columbus
 - Dayton
 - Toledo



Teach Me How!

Utility Rate Structures

Typical Utility Rate Structures include 3 major elements:

- **Fixed Charges**– The cost to have service, which is independent of usage.
- **Consumption Costs (\$/kWh)** – the costs of the total energy consumed for the period.
- **Demand Costs (\$/kW)** – the cost of the rate of energy delivered for the period. Customers are typically billed at their “peak demand”, meaning the highest rate of energy delivered for 15 continuous minutes in a month.



A sink faucet turned on full blast for 10 seconds has
HIGH Demand
LOW Consumption

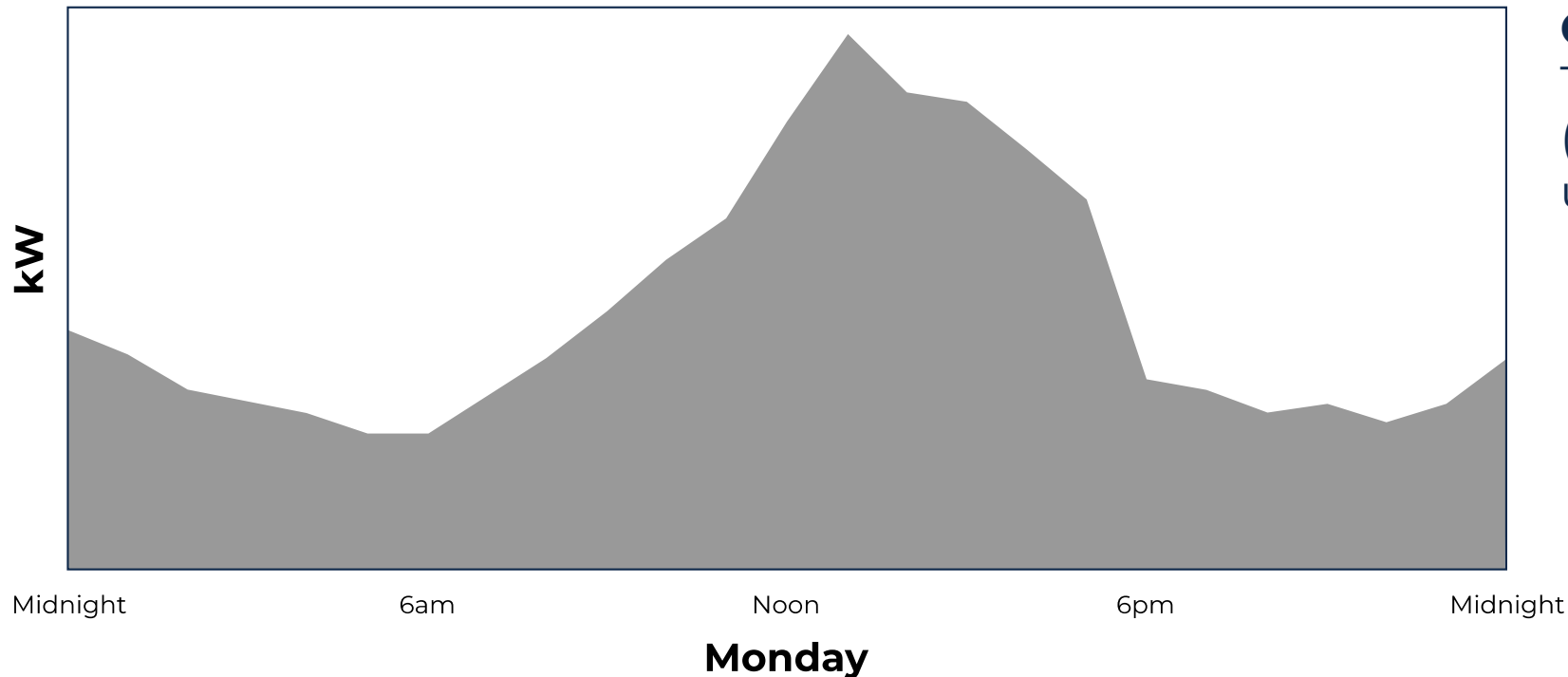


A sink faucet left to drip for a month has:
LOW Demand
HIGH Consumption

Teach Me How!

Utility Rate Structure

A look into your utility bill

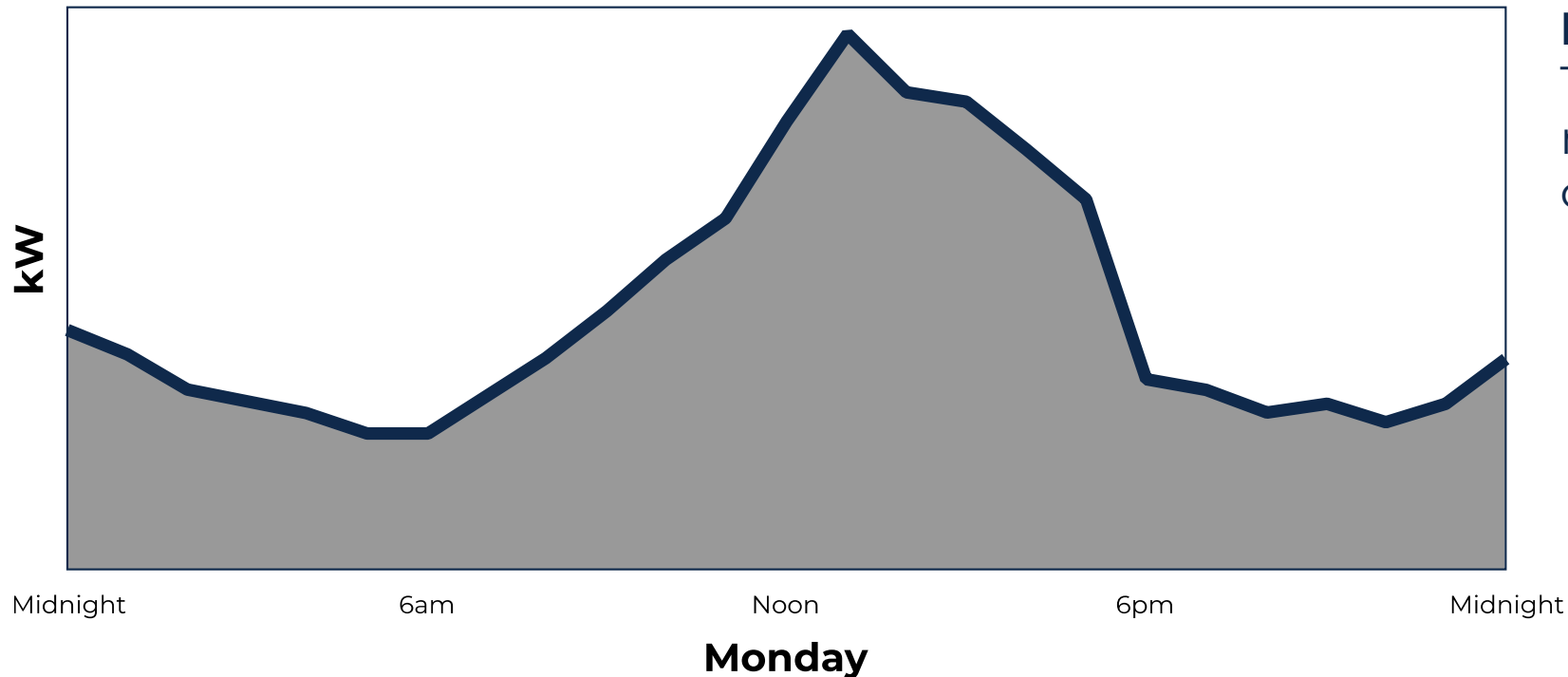


Consumption
The total volume
(amount) of energy
used

Teach Me How!

Utility Rate Structure

A look into your utility bill



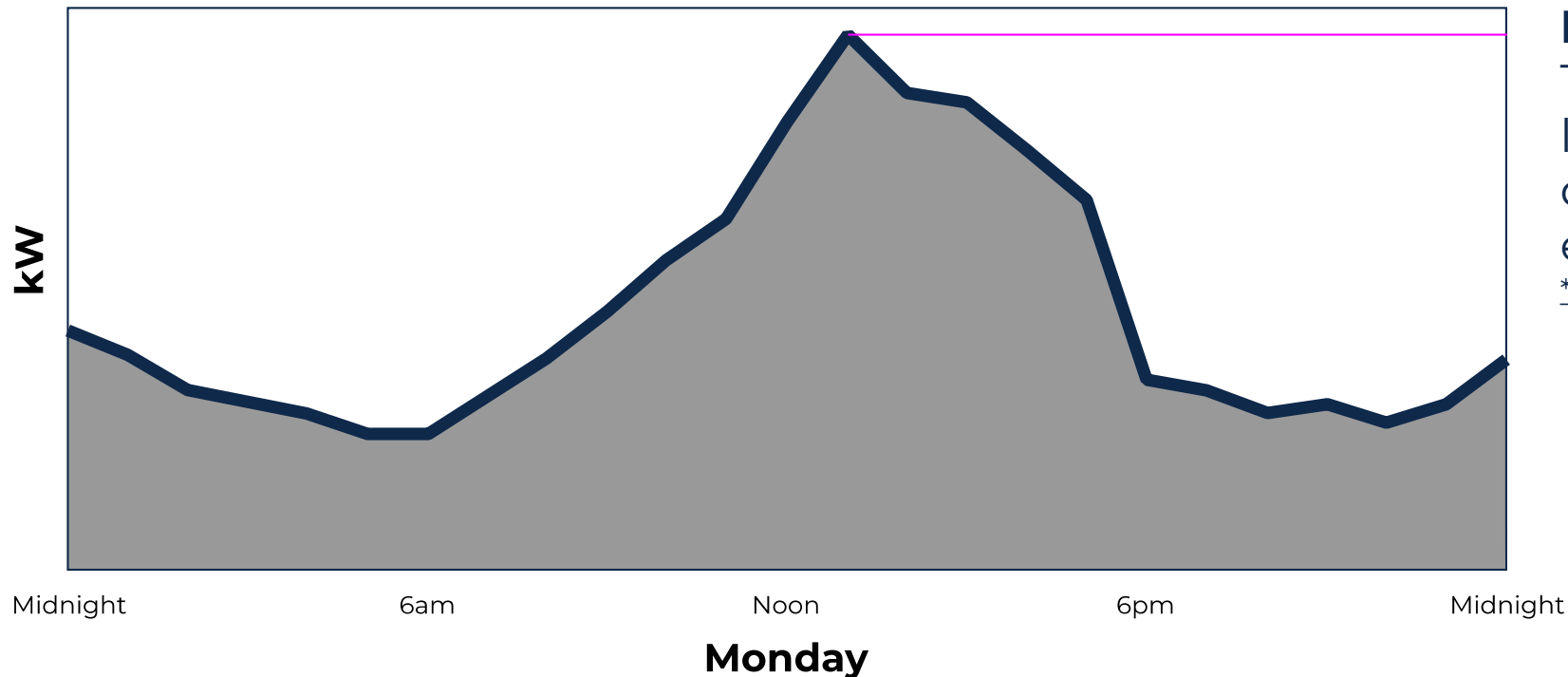
Demand

The highest momentary rate of consumption

Teach Me How!

Utility Rate Structure

A look into your utility bill



Peak Demand

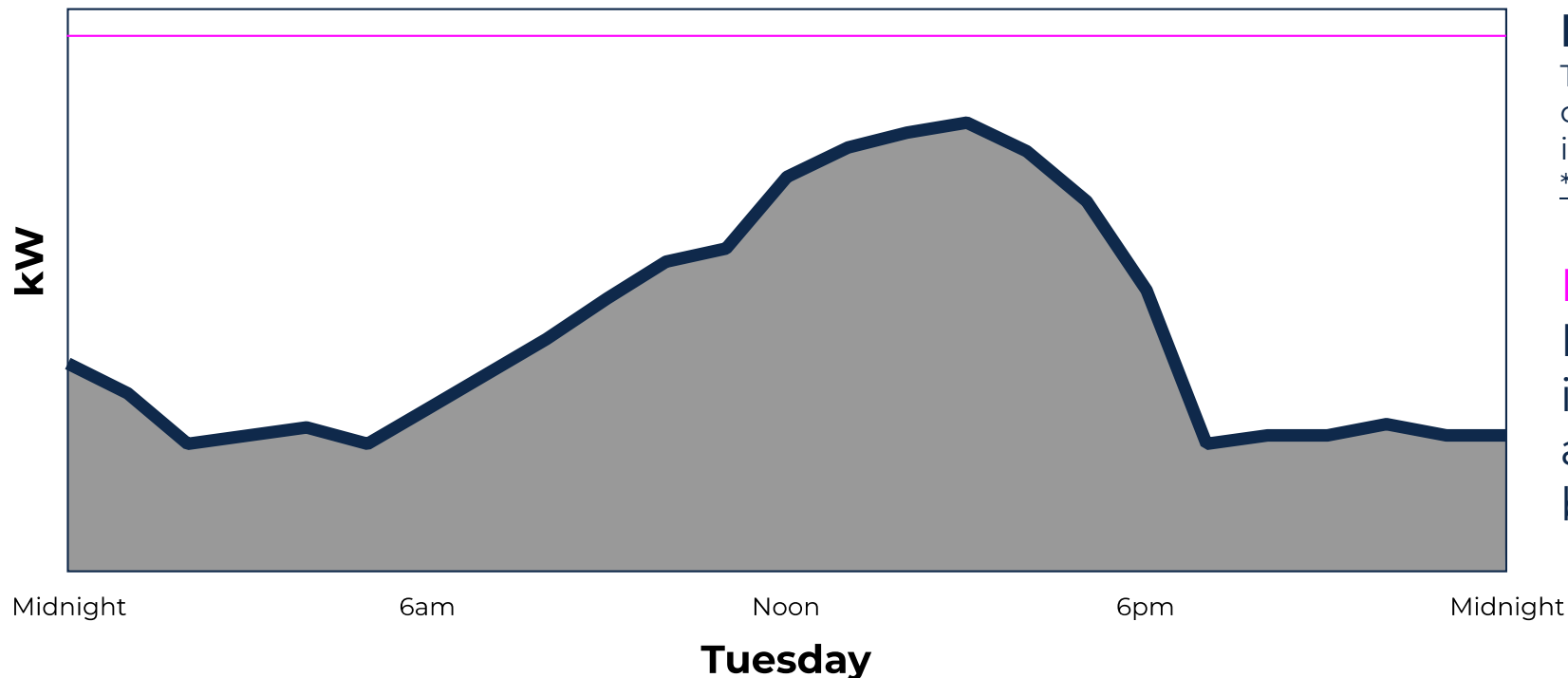
The highest average load during a peak demand interval in each billing cycle

*usually 15 mins

Teach Me How!

Utility Rate Structure

A look into your utility bill



Peak Demand

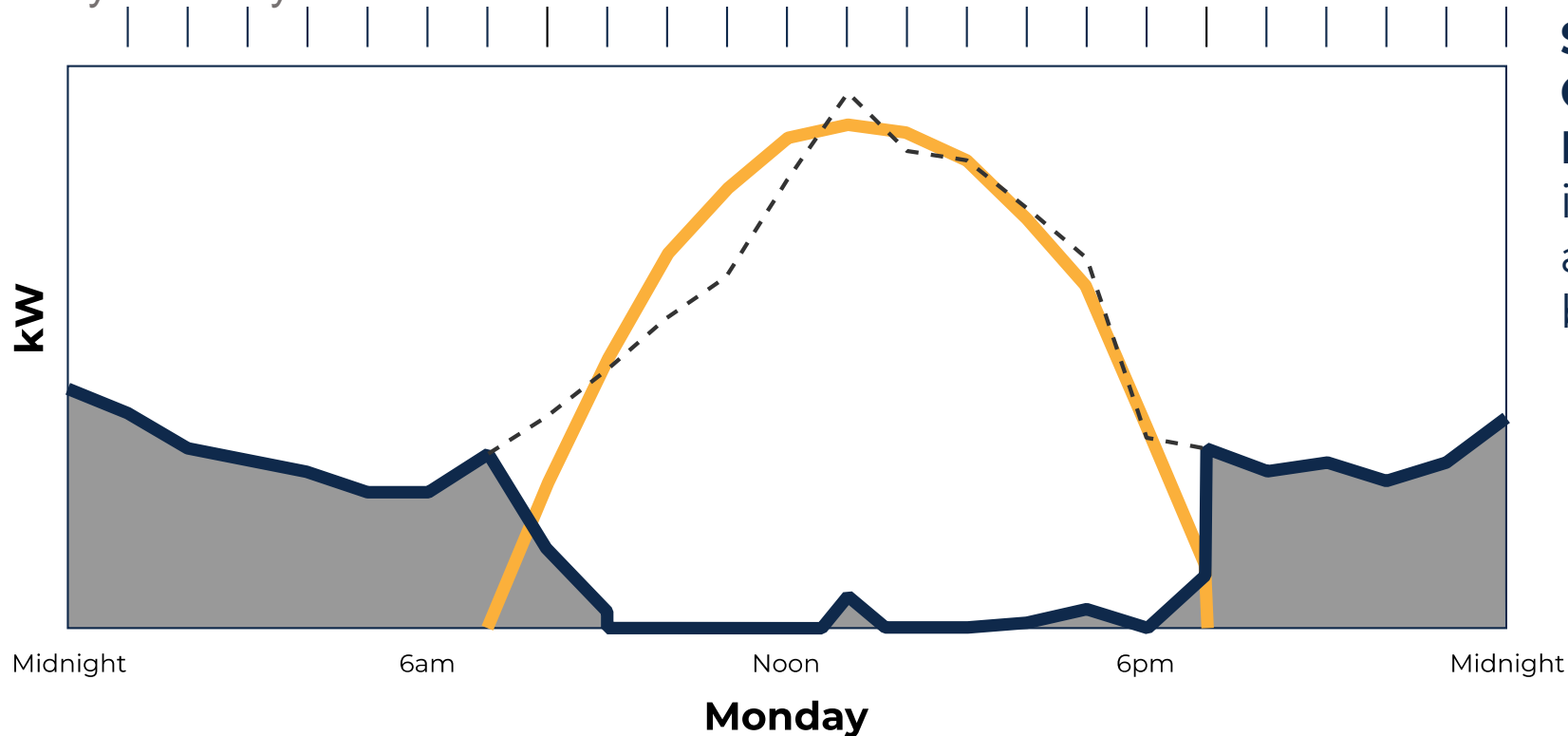
The highest average load during a peak demand interval in each billing cycle
**usually 15 mins*

Peak Demand on Monday has impacted Tuesday, and the rest of the billing cycle

Teach Me How!

Utility Rate Structure

A look into your utility bill



Solar Impact on Consumption & Demand
impacted Tuesday, and the rest of the billing cycle

Teach Me How!



EXAMPLE SYSTEM SAVINGS & ROI

Teach Me How!

System Savings (Consumption & Demand)

CURRENT ELECTRIC BILL

| Time Periods | Energy Use (kWh) | Max Demand (kW) | Charges | | | |
|--------------------------|------------------|-----------------|--------------|-----------------|-----------------|-----------------|
| Bill Ranges & Seasons | Total | NC / Max | Other | Energy | Demand | Total |
| 1/1/2023 - 2/1/2023 S1 | 34,900 | 207 | \$49 | \$2,641 | \$2,118 | \$4,808 |
| 2/1/2023 - 3/1/2023 S1 | 34,000 | 207 | \$49 | \$2,573 | \$2,118 | \$4,740 |
| 3/1/2023 - 4/1/2023 S1 | 32,000 | 207 | \$49 | \$2,422 | \$2,118 | \$4,589 |
| 4/1/2023 - 5/1/2023 S1 | 40,000 | 207 | \$49 | \$3,026 | \$2,118 | \$5,193 |
| 5/1/2023 - 6/1/2023 S1 | 29,000 | 207 | \$49 | \$2,196 | \$2,118 | \$4,363 |
| 6/1/2022 - 7/1/2022 S1 | 38,000 | 207 | \$49 | \$2,875 | \$2,118 | \$5,042 |
| 7/1/2022 - 8/1/2022 S1 | 39,000 | 207 | \$49 | \$2,950 | \$2,118 | \$5,117 |
| 8/1/2022 - 9/1/2022 S1 | 40,000 | 207 | \$49 | \$3,026 | \$2,118 | \$5,193 |
| 9/1/2022 - 10/1/2022 S1 | 33,900 | 207 | \$49 | \$2,566 | \$2,118 | \$4,733 |
| 10/1/2022 - 11/1/2022 S1 | 31,800 | 207 | \$49 | \$2,407 | \$2,118 | \$4,574 |
| 11/1/2022 - 12/1/2022 S1 | 29,800 | 207 | \$49 | \$2,257 | \$2,118 | \$4,423 |
| 12/1/2022 - 1/1/2023 S1 | 31,216 | 207 | \$49 | \$2,363 | \$2,118 | \$4,530 |
| Total | 413,616 | - | \$588 | \$31,303 | \$25,414 | \$57,305 |

Teach Me How!

System Savings (Consumption & Demand)

CURRENT ELECTRIC BILL

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NEW ELECTRIC BILL, YEAR ONE

| Time Periods | Energy Use (kWh) | Max Demand (kW) | Charges | | | |
|--------------------------|------------------|-----------------|--------------|----------------|-----------------|-----------------|
| Bill Ranges & Seasons | Total | NC / Max | Other | Energy | Demand | Total |
| 1/1/2023 - 2/1/2023 S1 | 20,925 | 198 | \$49 | \$1,587 | \$2,026 | \$3,662 |
| 2/1/2023 - 3/1/2023 S1 | 15,692 | 195 | \$49 | \$1,193 | \$1,995 | \$3,237 |
| 3/1/2023 - 4/1/2023 S1 | 3,729 | 173 | \$49 | \$284 | \$1,770 | \$2,103 |
| 4/1/2023 - 5/1/2023 S1 | 3,269 | 165 | \$49 | \$249 | \$1,688 | \$1,986 |
| 5/1/2023 - 6/1/2023 S1 | -12,390 | 167 | \$49 | -\$942 | \$1,709 | \$815 |
| 6/1/2022 - 7/1/2022 S1 | -6,435 | 168 | \$49 | -\$490 | \$1,719 | \$1,278 |
| 7/1/2022 - 8/1/2022 S1 | -5,652 | 144 | \$49 | -\$430 | \$1,551 | \$1,169 |
| 8/1/2022 - 9/1/2022 S1 | -1,736 | 175 | \$49 | -\$133 | \$1,790 | \$1,707 |
| 9/1/2022 - 10/1/2022 S1 | 504 | 178 | \$49 | \$39 | \$1,821 | \$1,909 |
| 10/1/2022 - 11/1/2022 S1 | 5,848 | 186 | \$49 | \$445 | \$1,903 | \$2,397 |
| 11/1/2022 - 12/1/2022 S1 | 12,941 | 189 | \$49 | \$984 | \$1,934 | \$2,967 |
| 12/1/2022 - 1/1/2023 S1 | 18,043 | 197 | \$49 | \$1,370 | \$2,016 | \$3,434 |
| Total | 54,738 | - | \$588 | \$4,156 | \$21,921 | \$26,665 |

Savings -87% -14% -53%

B |

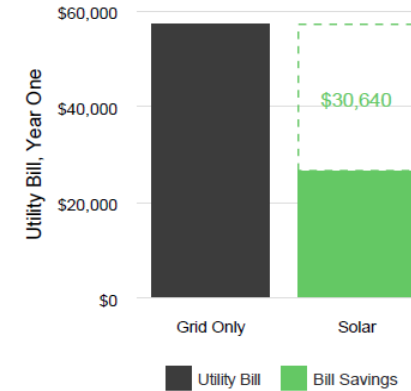
Teach Me How!

System Savings (Consumption & Demand)

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ELECTRIC BILL

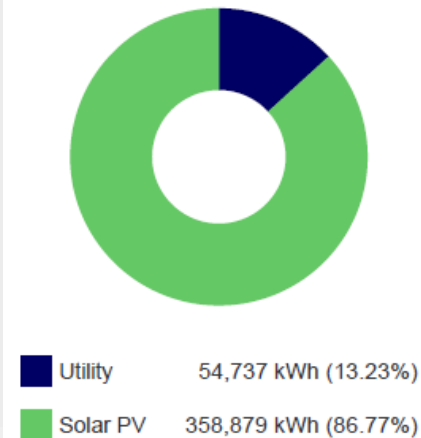


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Savings -87% -14% -53%

Energy Mix



Teach Me How!

System Savings (IRA & Tax Depreciation)

Investment Tax Credit (ITC) = 30% of System Value

= \$180,350

- The Inflation Reduction Act (IRA) of 2022 establishes and extends the federal Investment Tax Credit (ITC) for solar photovoltaic (PV) systems at a rate of 30% of the total PV system cost.
- Unlike tax deductions, this tax credit can be used to directly offset your tax liability.
- The IRA extended the carryback period to 3 years, and the carryforward period to 22 years, in cases where the tax credit exceeds a customer's tax liability in the 'placed-in-service' year.
- For PV projects greater than 1 MW AC in size, the IRA established prevailing wage and apprenticeship requirements in order to qualify for the full 30% "increased rate", rather than a "base rate" which would only qualify for a 6% ITC. Projects with an output of less than 1 megawatt qualify for the "increased rate" irrespective of if prevailing wage or apprenticeship requirements are met.

Teach Me How!

System Savings (IRA & Tax Depreciation)

Investment Tax Credit (ITC) = 30% of System Value

= \$180,350

- The Inflation Reduction Act (IRA) of 2022 establishes and extends the federal Investment Tax Credit (ITC) for solar photovoltaic (PV) systems at a rate of 30% of the total PV system cost.
- Unlike tax deductions, this tax credit can be used to directly offset your tax liability.
- The IRA extended the carryback period to 3 years, and the carryforward period to 22 years, in cases where the tax credit exceeds a customer's tax liability in the 'placed-in-service' year.
- For PV projects greater than 1 MW AC in size, the IRA established prevailing wage and apprenticeship requirements in order to qualify for the full 30% "increased rate", rather than a "base rate" which would only qualify for a 6% ITC. Projects with an output of less than 1 megawatt qualify for the "increased rate" irrespective of if prevailing wage or apprenticeship requirements are met.

Federal MACRS, Bonus Depreciation Value

= \$189,066

- Under the federal Modified Cost Recovery System (MACRS), businesses may recover investments in solar PV property through depreciation deductions over a 5-year established lifespan.
- For PV systems, the taxable basis of the equipment must be reduced by 50% of any federal tax credits associated with the system.
- Projects placed in service in 2023 qualify for 80% bonus depreciation, which means in the first year of service, companies can elect to depreciate 80% of the basis while the remaining 20% is depreciated under the normal MACRS schedule.

Teach Me How!

System Savings (IRA & Tax Depreciation)

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State (OH) Modified Accelerated Value

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Teach Me How!

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System Price

Solar PV System Cost and Incentives

| | | |
|------------------------------------|------------------|------------|
| Solar PV System Cost | \$601,165 | |
| Federal Tax Credit | (\$180,350) | -30% |
| Federal - MACRS Bonus Depreciation | (\$189,066) | -31% |
| State (OH) Depreciation | (\$30,058) | -5% |
| Net Solar PV System Cost | \$201,691 | 34% |

Teach Me How!

Return on Investment & Payback

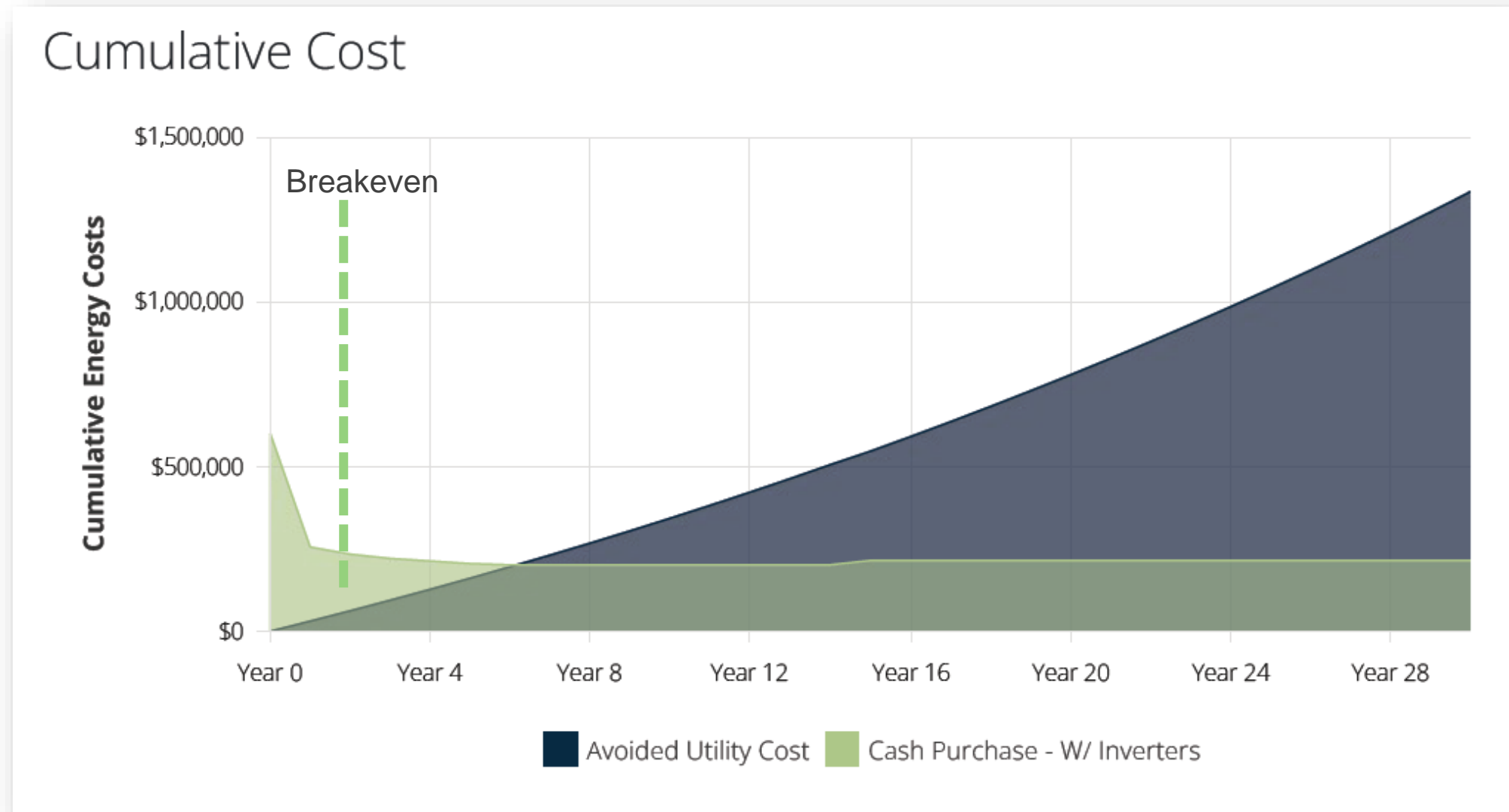
| | |
|--------------------------------|-------------|
| Total Project Costs | \$601,165 |
| Lifetime Electric Bill Savings | \$1,336,106 |
| Payback Period | 6.2 Years |

| | |
|-----------------------------|-----------|
| Net Present Value (@ 5.50%) | \$354,313 |
| ROI | 186% |
| Internal Rate of Return | 13.6% |

| Years | Project Costs / Bill Savings | | | Reduction to Tax Liability | | | Federal Tax Credit | Annual Cash Flow | Cumulative Cash Flow |
|---------|------------------------------|---------------|-----------------------|----------------------------|---------------------------------------|--|--------------------|------------------|----------------------|
| | Project Costs | New Inverters | Electric Bill Savings | PV Generation (kWh) | OH Income Decrease (Tax Depreciation) | FED Income Decrease (MACRS Tax Depreciation) | | | |
| Upfront | \$ (601,165) | \$ - | \$ - | - | \$ - | \$ - | \$ - | \$ (601,165) | \$ (601,165) |
| 1 | \$ - | \$ - | \$ 30,640 | 358,878 | \$ 6,012 | \$ 158,816 | \$ 180,350 | \$ 375,818 | \$ (225,347) |
| 2 | \$ - | \$ - | \$ 31,402 | 357,083 | \$ 9,619 | \$ 12,100 | \$ - | \$ 53,121 | \$ (172,226) |
| 3 | \$ - | \$ - | \$ 32,181 | 355,289 | \$ 5,771 | \$ 7,260 | \$ - | \$ 45,212 | \$ (127,014) |
| 4 | \$ - | \$ - | \$ 32,979 | 353,495 | \$ 3,463 | \$ 4,356 | \$ - | \$ 40,798 | \$ (86,216) |
| 5 | \$ - | \$ - | \$ 33,796 | 351,700 | \$ 3,463 | \$ 4,356 | \$ - | \$ 41,615 | \$ (44,601) |
| 6 | \$ - | \$ - | \$ 34,632 | 349,906 | \$ 1,731 | \$ 2,178 | \$ - | \$ 38,541 | \$ (6,060) |
| 7 | \$ - | \$ - | \$ 35,488 | 348,111 | \$ - | \$ - | \$ - | \$ 35,488 | \$ 29,428 |
| 8 | \$ - | \$ - | \$ 36,365 | 346,317 | \$ - | \$ - | \$ - | \$ 36,365 | \$ 65,793 |
| 9 | \$ - | \$ - | \$ 37,262 | 344,523 | \$ - | \$ - | \$ - | \$ 37,262 | \$ 103,055 |
| 10 | \$ - | \$ - | \$ 38,180 | 342,718 | \$ - | \$ - | \$ - | \$ 38,180 | \$ 141,235 |
| 11 | \$ - | \$ - | \$ 39,119 | 340,934 | \$ - | \$ - | \$ - | \$ 39,119 | \$ 180,354 |
| 12 | \$ - | \$ - | \$ 40,081 | 339,139 | \$ - | \$ - | \$ - | \$ 40,081 | \$ 220,435 |
| 13 | \$ - | \$ - | \$ 41,065 | 337,345 | \$ - | \$ - | \$ - | \$ 41,065 | \$ 261,500 |
| 14 | \$ - | \$ - | \$ 42,071 | 335,551 | \$ - | \$ - | \$ - | \$ 42,071 | \$ 303,571 |
| 15 | \$ - | \$ (13,800) | \$ 43,102 | 333,756 | \$ - | \$ - | \$ - | \$ 29,302 | \$ 332,873 |
| 16 | \$ - | \$ - | \$ 44,156 | 331,962 | \$ - | \$ - | \$ - | \$ 44,156 | \$ 377,029 |
| 17 | \$ - | \$ - | \$ 45,235 | 330,167 | \$ - | \$ - | \$ - | \$ 45,235 | \$ 422,264 |
| 18 | \$ - | \$ - | \$ 46,339 | 328,373 | \$ - | \$ - | \$ - | \$ 46,339 | \$ 468,603 |
| 19 | \$ - | \$ - | \$ 47,468 | 326,579 | \$ - | \$ - | \$ - | \$ 47,468 | \$ 516,071 |
| 20 | \$ - | \$ - | \$ 48,624 | 324,784 | \$ - | \$ - | \$ - | \$ 48,624 | \$ 564,695 |
| 21 | \$ - | \$ - | \$ 49,806 | 322,990 | \$ - | \$ - | \$ - | \$ 49,806 | \$ 614,501 |
| 22 | \$ - | \$ - | \$ 51,015 | 321,196 | \$ - | \$ - | \$ - | \$ 51,015 | \$ 665,516 |
| 23 | \$ - | \$ - | \$ 52,252 | 319,401 | \$ - | \$ - | \$ - | \$ 52,252 | \$ 717,768 |
| 24 | \$ - | \$ - | \$ 53,517 | 317,607 | \$ - | \$ - | \$ - | \$ 53,517 | \$ 771,285 |
| 25 | \$ - | \$ - | \$ 54,811 | 315,812 | \$ - | \$ - | \$ - | \$ 54,811 | \$ 826,096 |
| 26 | \$ - | \$ - | \$ 56,135 | 314,018 | \$ - | \$ - | \$ - | \$ 56,135 | \$ 882,231 |
| 27 | \$ - | \$ - | \$ 57,488 | 312,224 | \$ - | \$ - | \$ - | \$ 57,488 | \$ 939,719 |
| 28 | \$ - | \$ - | \$ 58,873 | 310,429 | \$ - | \$ - | \$ - | \$ 58,873 | \$ 998,592 |
| 29 | \$ - | \$ - | \$ 60,288 | 308,635 | \$ - | \$ - | \$ - | \$ 60,288 | \$ 1,058,880 |
| 30 | \$ - | \$ - | \$ 61,736 | 306,840 | \$ - | \$ - | \$ - | \$ 61,736 | \$ 1,120,616 |
| Totals | \$ (601,165) | \$ (13,800) | \$ 1,336,106 | 9,985,762 | \$ 30,059 | \$ 189,066 | \$ 180,350 | \$ 1,120,616 | |

Teach Me How!

Return on Investment & Payback (Graph)



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BHDP +  **HEAPY** +  **Melink Solar**