



**REVISION
ENERGY**

Solar Plus: Electrifying our Lives Provides a Better ROI

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The Mission



To accelerate and lead
the transition to a
clean, renewable
energy economy in
New England.



New England's Energy Past, Present, Future





Past...

local, distributed, renewable

An aerial photograph of a nuclear power plant. The central feature is a large, rounded, metallic containment dome. To its left is a smaller, similar dome. The plant is surrounded by various industrial buildings, pipes, and storage tanks. In the background, there is a large parking lot filled with cars and a dense forest. The word "Present..." is overlaid in large white text across the upper middle of the image.

Present...

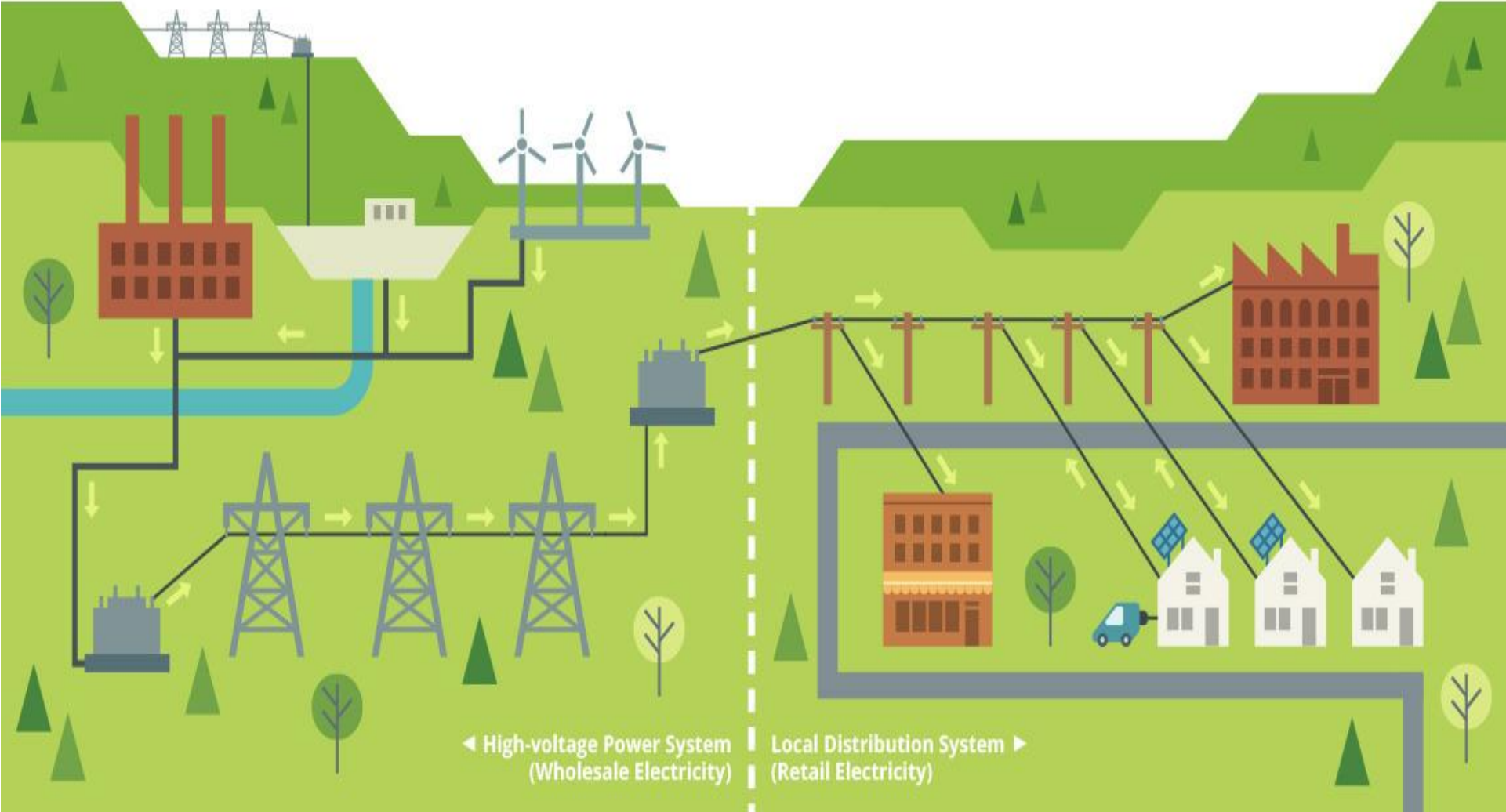
centralized, non-renewable

Future

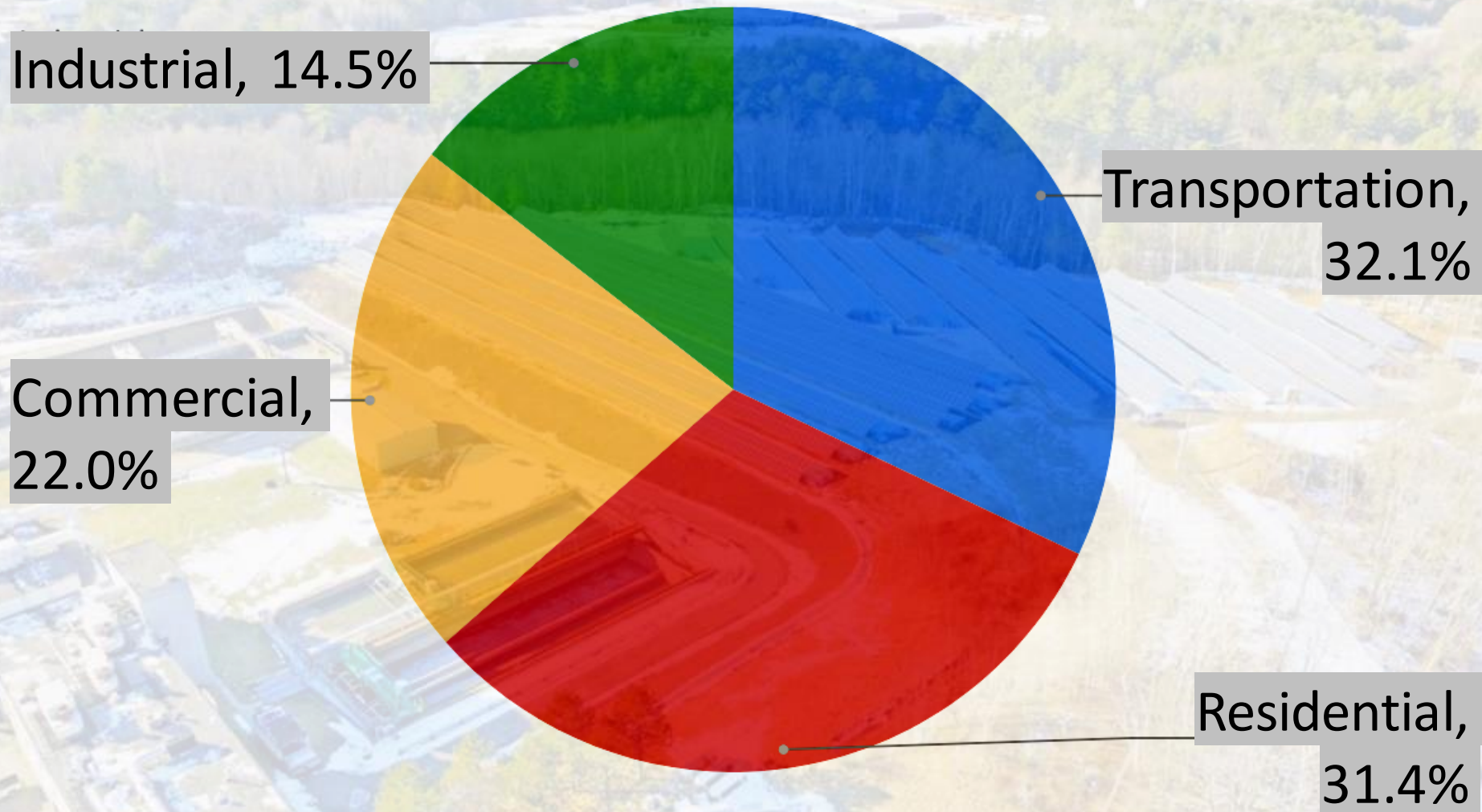
local, distributed, clean



How electricity is produced, transported, and delivered to consumers

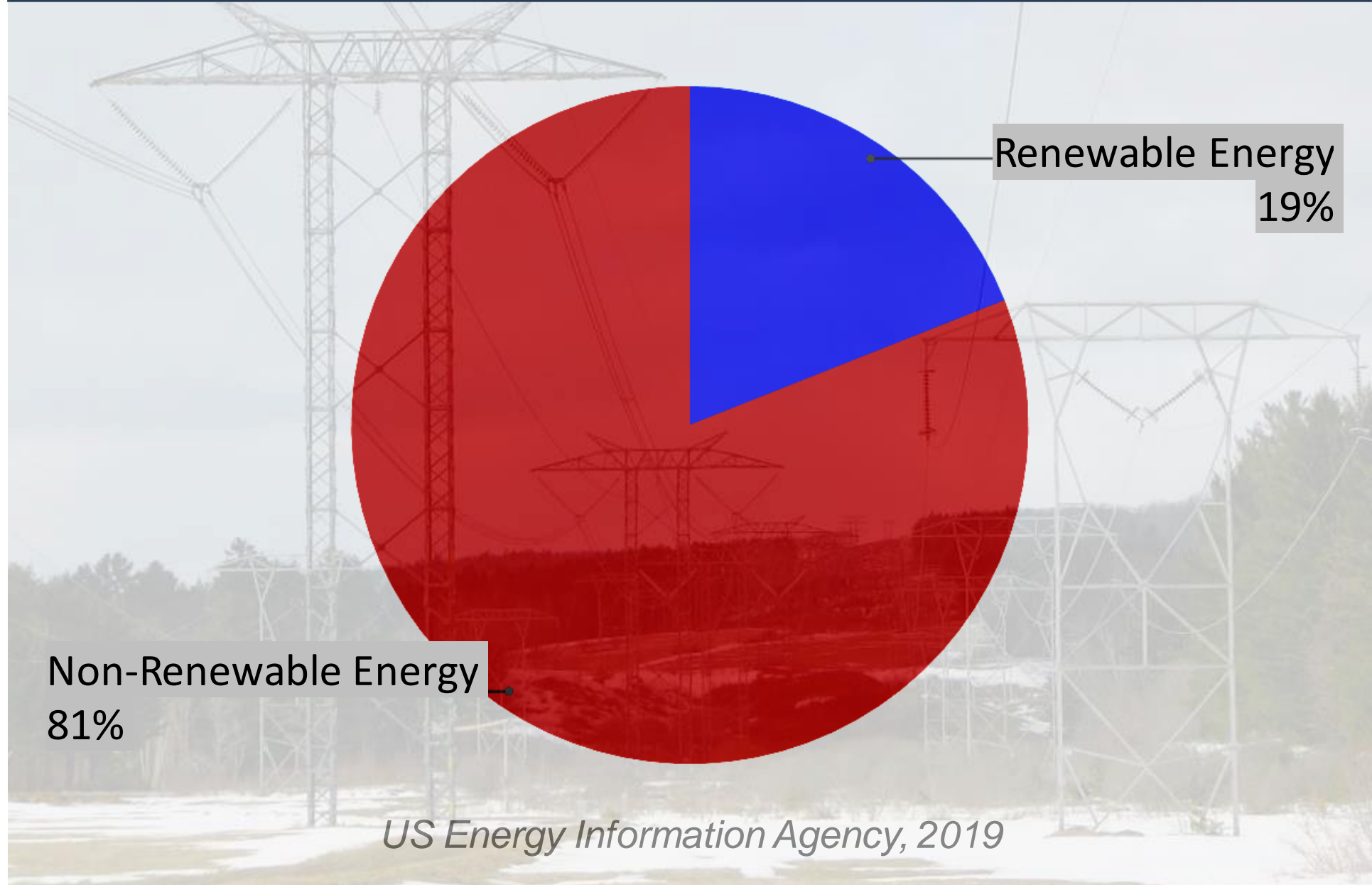


NE Energy Consumption by Sector



Total Annual Energy Needs: 317 trillion Btu (US EIA)

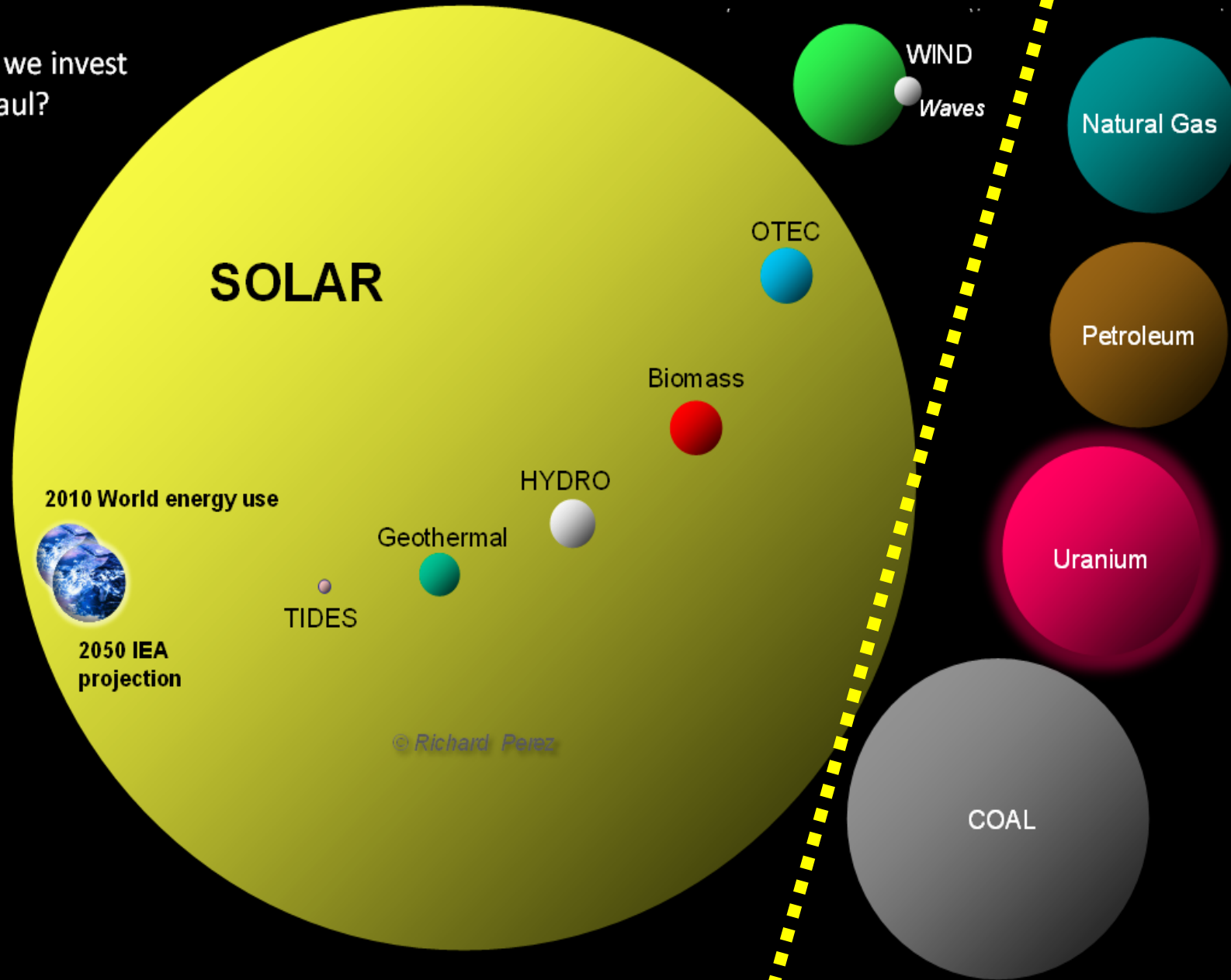
Renewable vs. Non-Renewable Energy



US Energy Information Agency, 2019

Comparing the world's energy resources*:

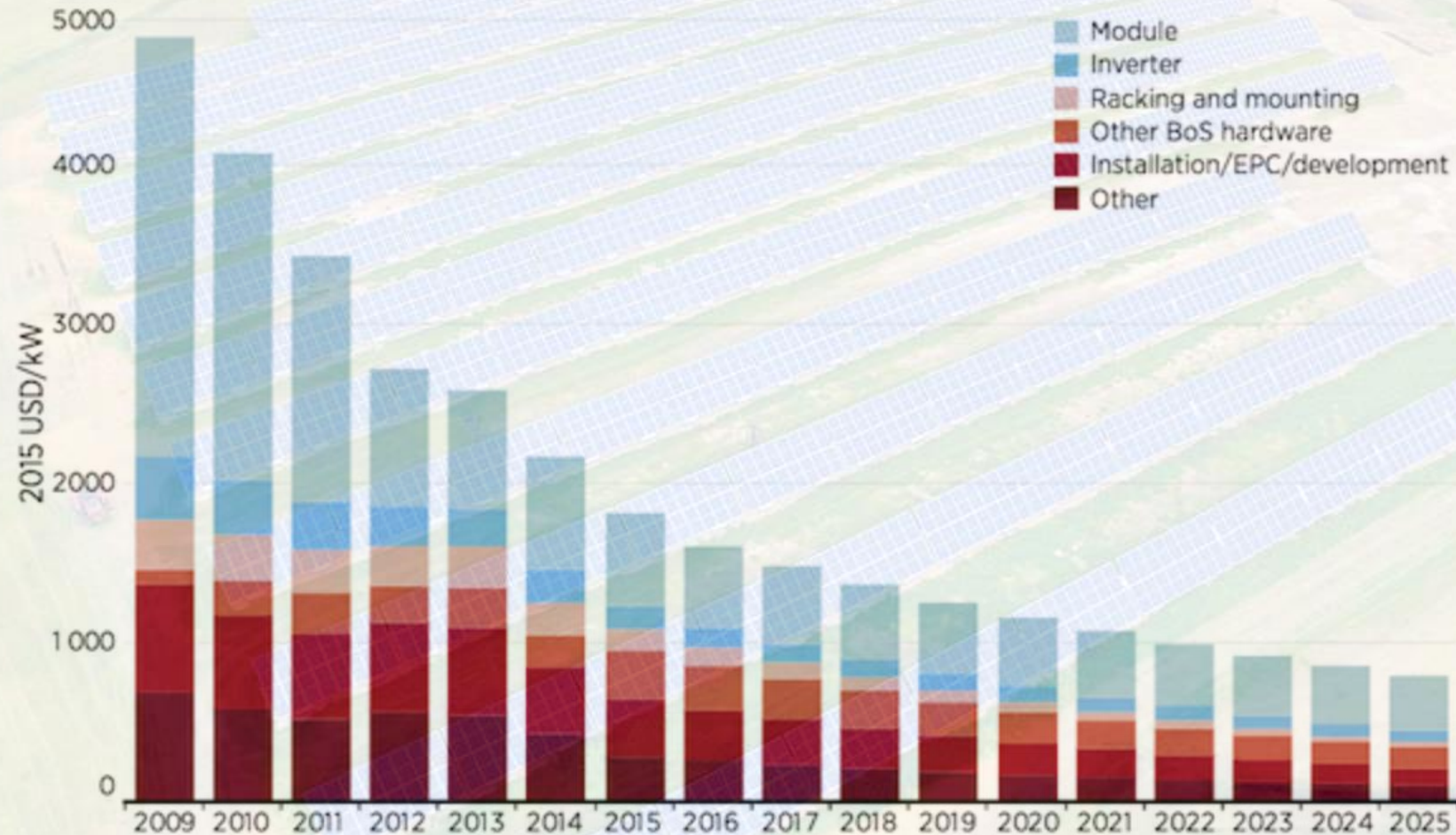
Where should we invest
For the long haul?



*Yearly potential is shown for the renewable resources. Total "use it lose it" reserve is shown for the finite fossil and nuclear resources.
World energy use is annual*

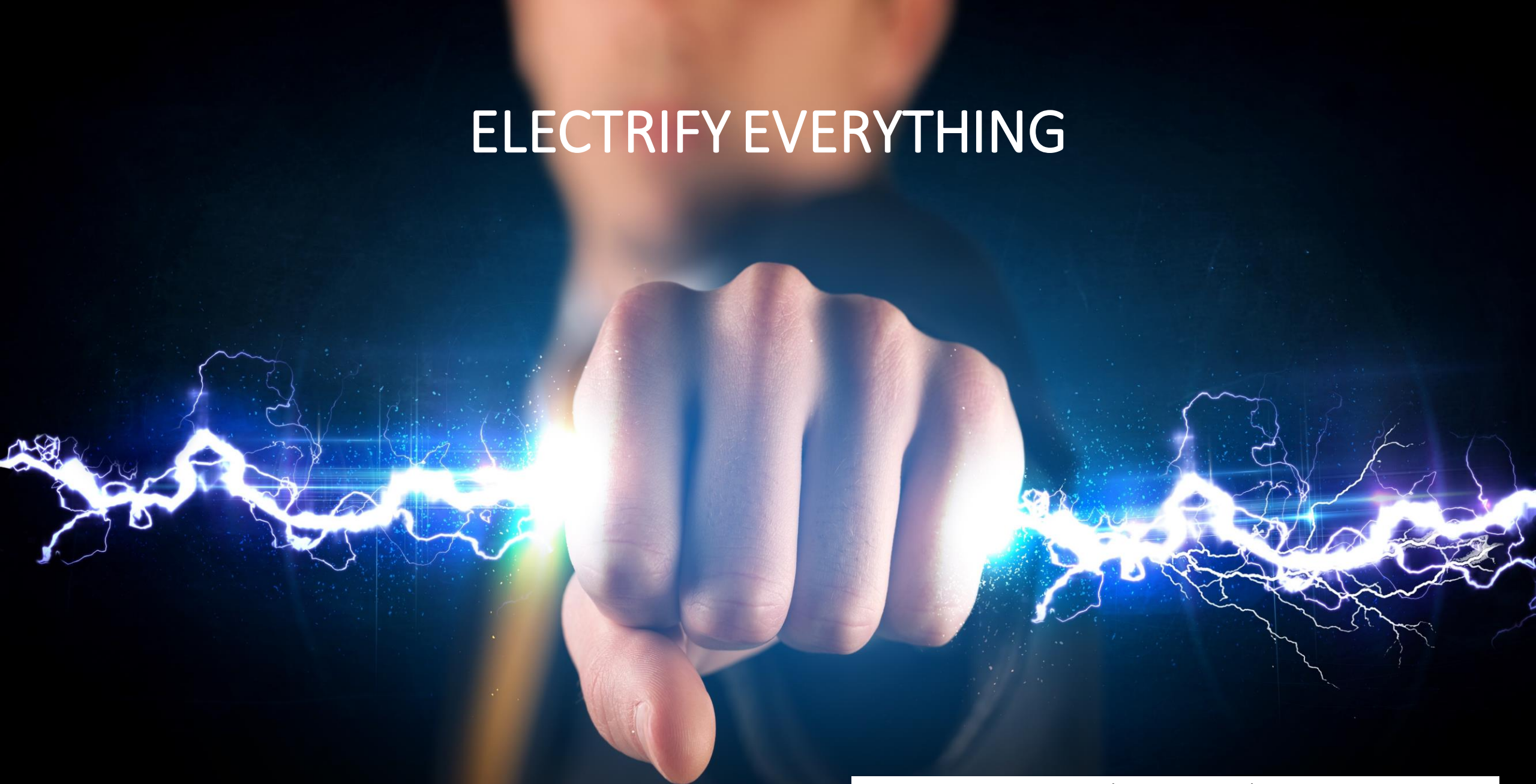
Cost of Solar Technology in US

PV System Costs Breakdown, 2009-2025



International Renewable Energy Agency (IRENA)

ELECTRIFY EVERYTHING



By David Roberts | @drvox | david@vox.com



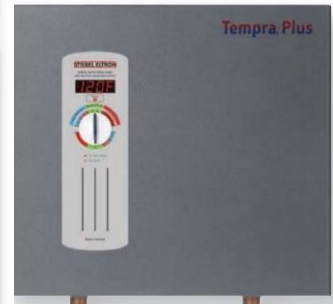
The 100% Solar House

Affordable Technology Replaces Fossil Fuels



Accelera® 220 E

Accelera® 300 E



Tempra® Plus

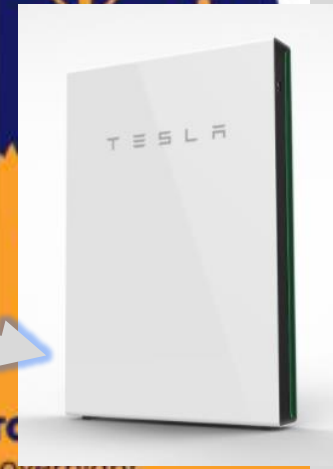


ELECTRIC CAR
by solar,
replaces gas

ELECTRIC HEAT PUMP
eliminates propane,
oil and gas

ELECTRIC WATER HEATING
provides solar-powered
hot water

BATTERY STORAGE
powers home overnight
and during outages



Return on Investment - ROI



Solar – Years to Payback



Dive into the Numbers

Status Quo:

Average Monthly Utility Bill	\$ 147	Average Annual Rate Hike	3%
Current Utility Rate (\$/kWh)	\$ 0.164	Average Rate Over 25 Years (\$/kWh)	\$ 0.240
Cost to Power Your Home	\$ 1,768	Utility Cost over 25 Years	\$ 64,500

Your Solarized Home:

Number of Panels	28	Estimated Annual Production (kWh)	10411
Watts Per Panel	325	Year 1 Utility Load Covered By Solar	97%
System Size (kW)	9.10	Total Savings Over 25 Years*	\$ 59,900

*Including RECS

Cash Discount Price:	\$ 27,100	Your Solar Array's Payback (Years):	10
Federal Income Tax Credit	\$ 7,000	25 Year Return on Investment	199%
State Rebate	\$ -	Average Annual Return on Investment	7.9%
Net Cost of System	\$ 20,100	Total Net Savings after 25 Years	\$ 39,900
25 Year Electric Rate (\$/kWh)	\$ 0.076		

Solar PV (s)

System Specificati

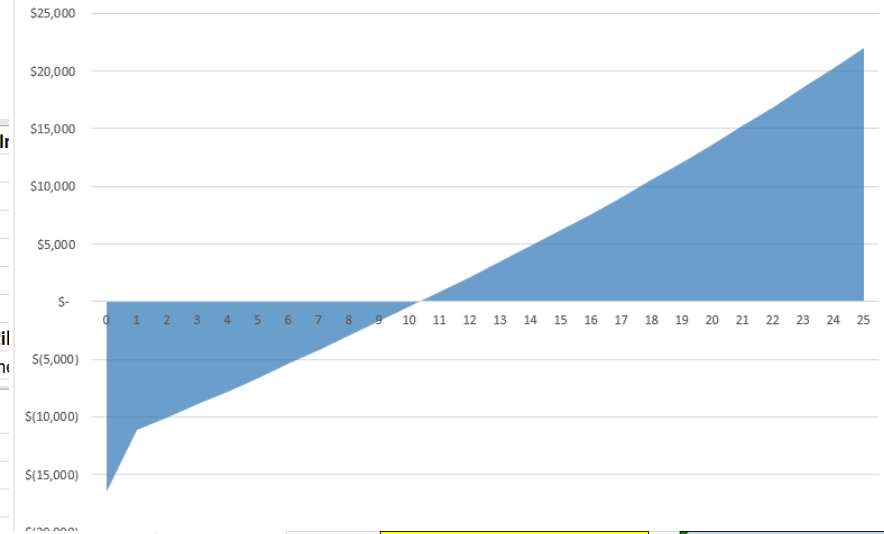
Project Type	Environmental Benefits:
Module Type	Annual CO ₂ Offset: 10,963 lbs
Module Wattage	Equivalent Miles Not Driven: 15,812 annually



	Array 1	Array 2	Array 3	Array 4
Number of Modules	16	0	0	0
Roof Orientation (True)	degrees 210	210	210	210
Pitch	degrees 35	35	35	35
Solar Access	% 95%	95%	95%	95%
Specific Yield	kWh/kW 1144	1144	1144	1144

Target Load Offset (kWh)	6,000	# of Panels Required	16
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Cumulative Cash Flow over 25 Years



Month	Production (kWh)	Load (kWh)
Feb	600	600
Mar	500	500
Apr	500	500
May	500	500
Jun	300	300
Jul	300	300
Aug	300	300
Sep	500	500
Oct	500	500
Nov	600	600
Dec	700	700
kWh	6,000	6,000

Example: Solar PV

- Goals
 - Offset electrical usage
 - Save some money
 - Understand the costs and benefits of solar



Solar PV



- Design Inputs

- Utility – GMP
- Rate – 16.4 cents/kWh
- Monthly usage
- Roof type – Asphalt Shingle
- Height of building – 1 story
- Tilt of roof – 35 degrees
- Solar access – 95%
- Interconnect – backfeed panel

System: 5.2kW array

\$16,500, \$11,900 after incentives

Solar Output, details

<i>Before Solar</i>				<i>Savings with Solar</i>			<i>Cash Purchase</i>	
<u>Year</u>	<u>Use (kWh)</u>	<u>Utility Rate</u>	<u>Utility Bill</u>	<u>Solar Generation (kWh)</u>	<u>Energy Savings</u>	<u>REC/Incentive Income</u>	<u>Annual Cashflow</u>	<u>Cumulative Cashflow</u>
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17	6000	\$0.264	\$1,583	5491	\$1,449	\$0	\$1,449	\$9,084

Solar Output, details

Before Solar

Savings with Solar

Cash Purchase

<u>Year</u>	<u>Use (kWh)</u>	<u>Utility Rate</u>	<u>Utility Bill</u>	<u>Solar Generation (kWh)</u>	<u>Energy Savings</u>	<u>REC/Incentive Income</u>	<u>Annual Cashflow</u>	<u>Cumulative Cashflow</u>
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Solar Output, details

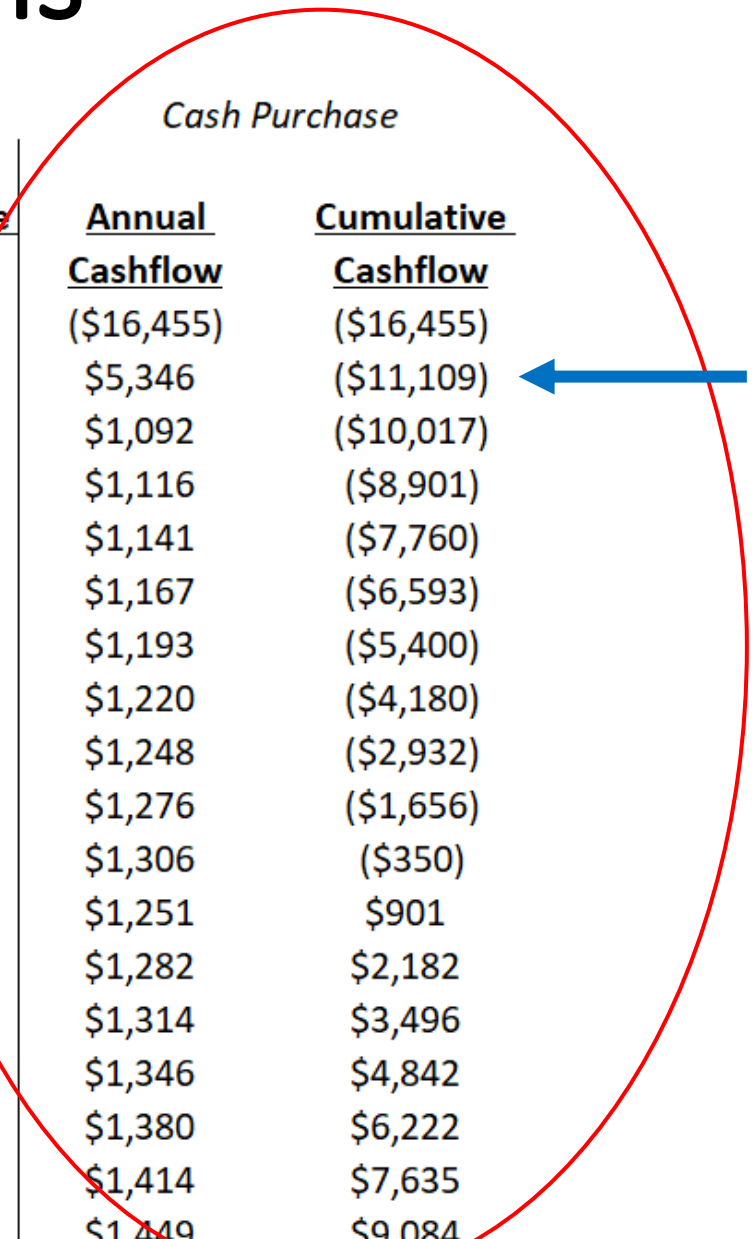
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Solar Output, details

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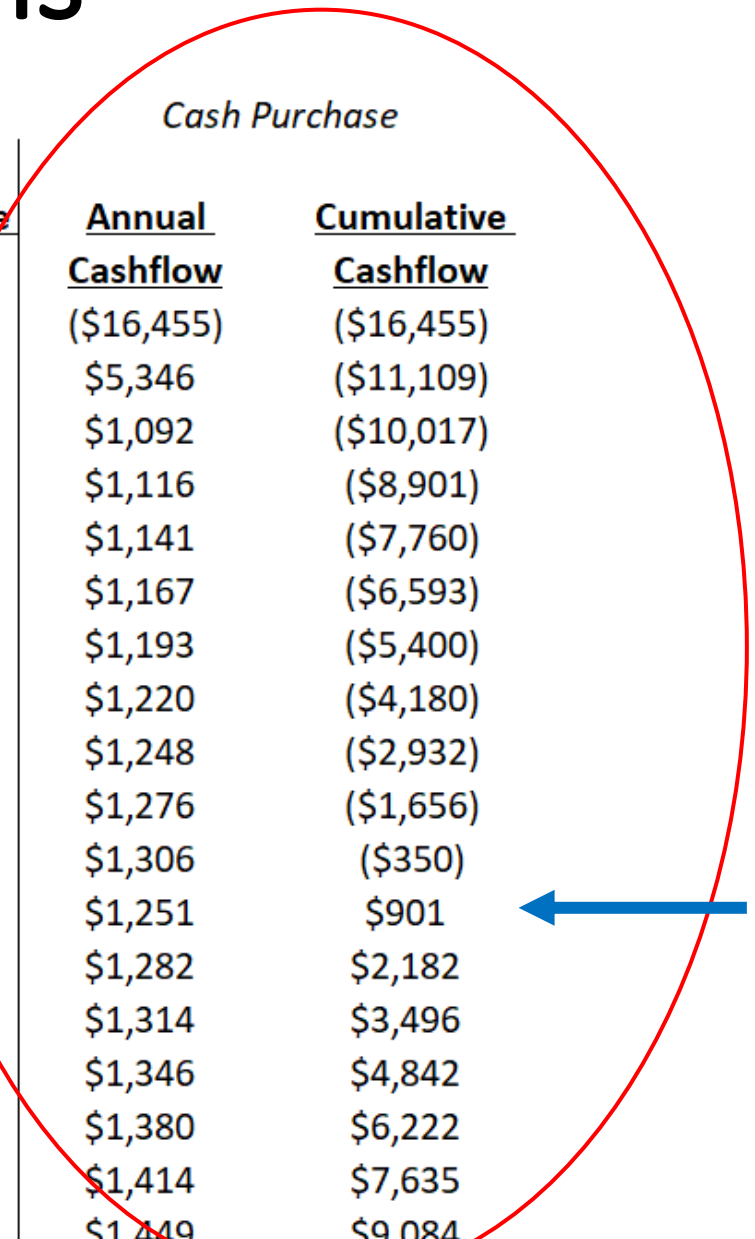
Solar Output, details

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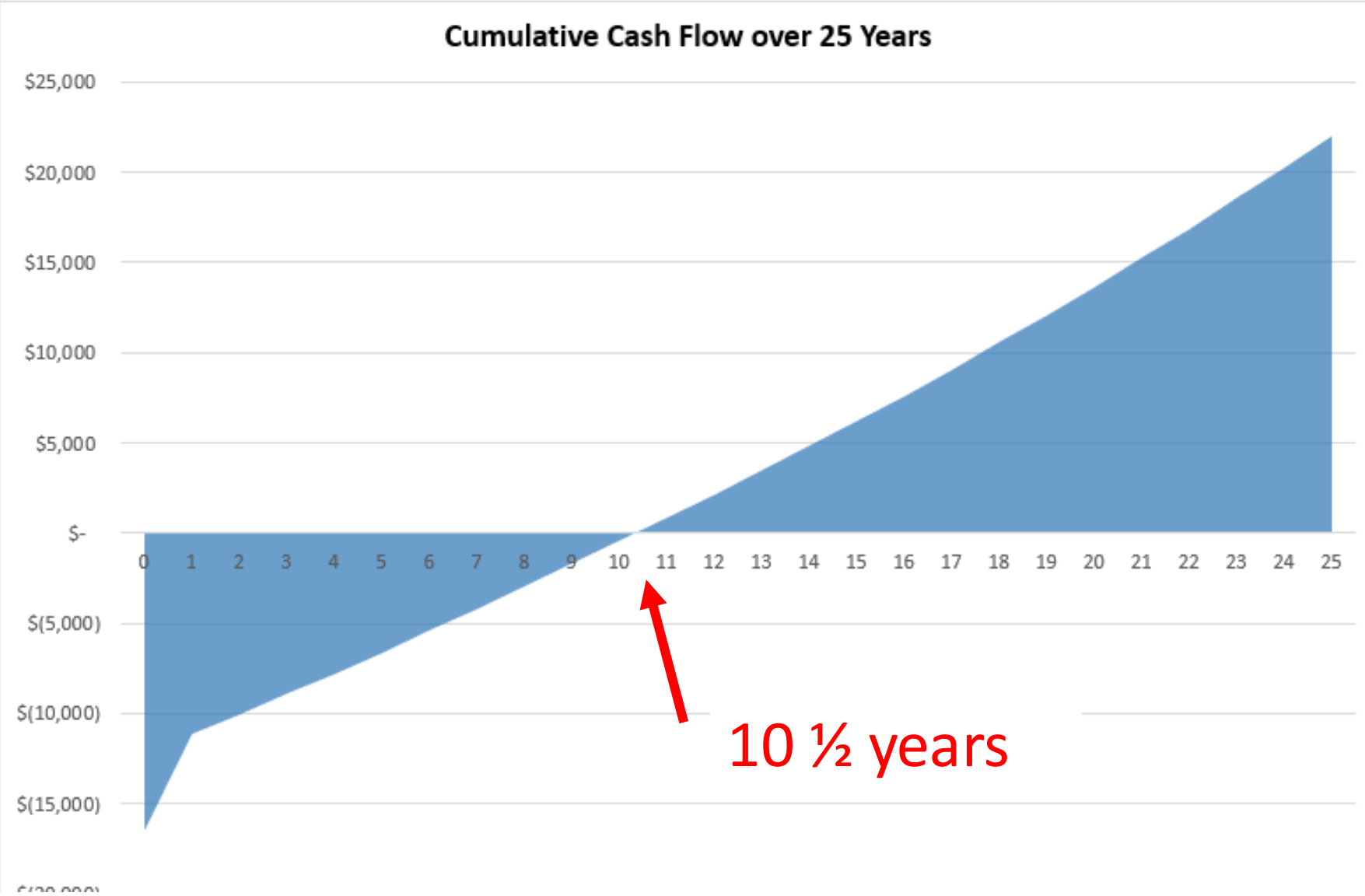


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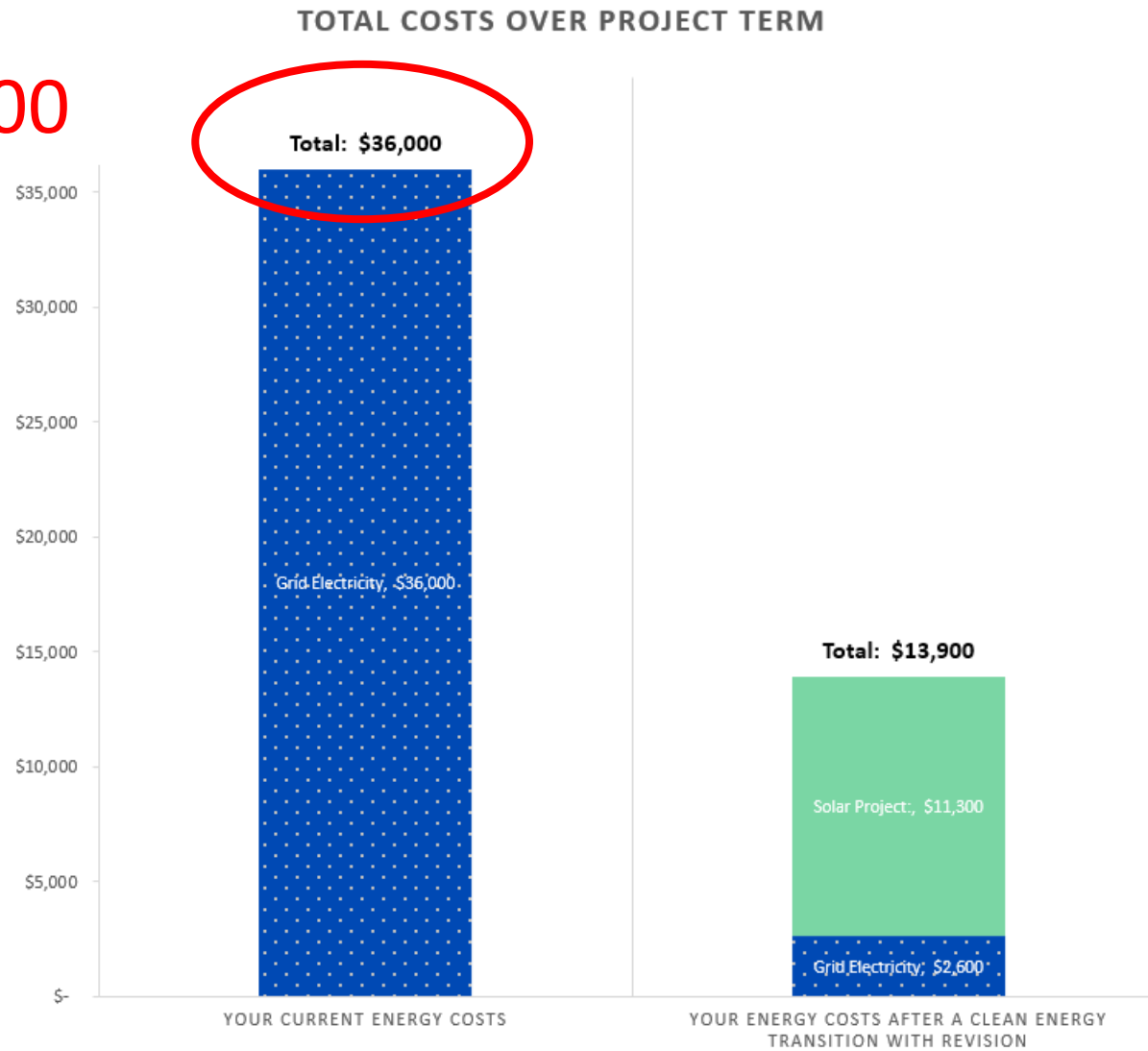


Solar Cash Flow

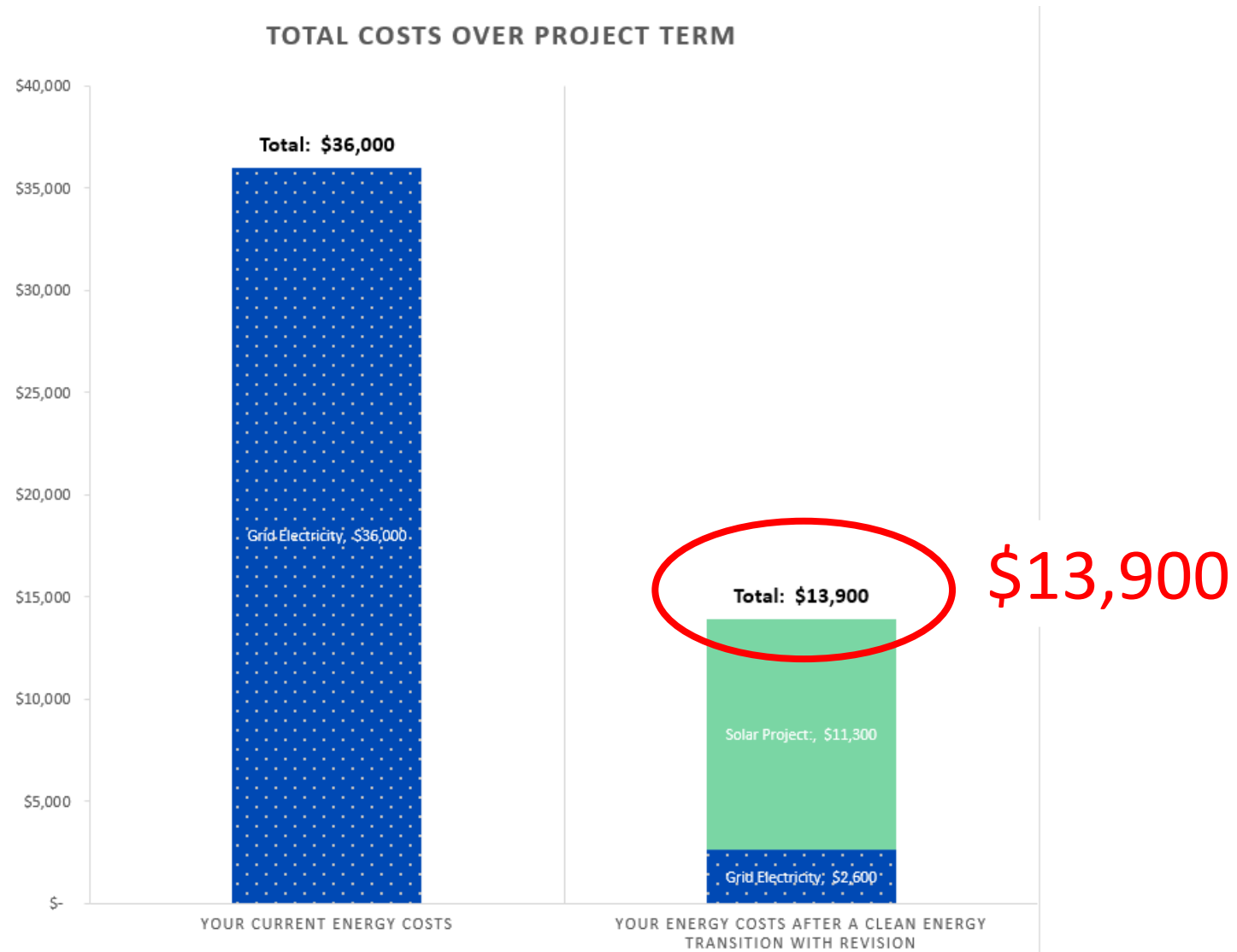


Solar Savings

\$36,000



Solar Savings



Air Source HeatPump

- Goals
 - Convert some of oil usage to electric for heating
 - Save some money
 - Get air conditioning as well as heat



Air Source HeatPump



- Design Inputs
 - Number of Occupants: 4
 - Current fuel: Oil
 - Gallons used today: 700
 - Area of home: 2000 sf
 - Percentage of heat load to convert to electric: 50% (1000sf for heating)

System: 15kBTU minisplit

Cost: \$6,200; \$5,800 after rebate

Projected electrical: 3100 kWh/yr

Expand Solar PV

Base load: 6000 kWh

ASHP added load: 3100 kWh

New Total: 9100 kWh/year

Number of modules: 24

Array size: 7.8 kW

Est production output: 8924 kWh

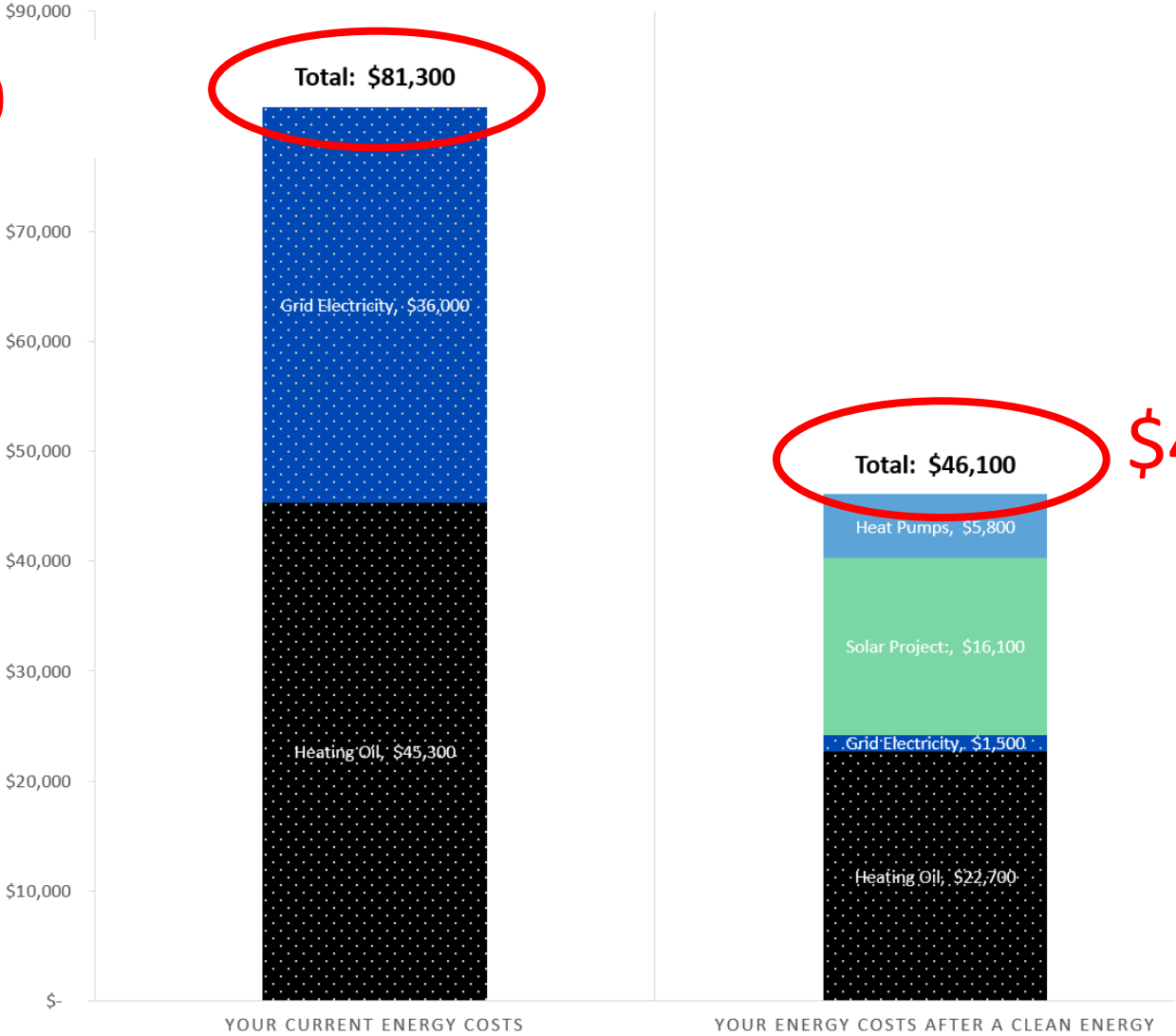
PV Cost: \$23,500, \$16,100 after incentives



Solar + ASHP Savings

TOTAL COSTS OVER PROJECT TERM

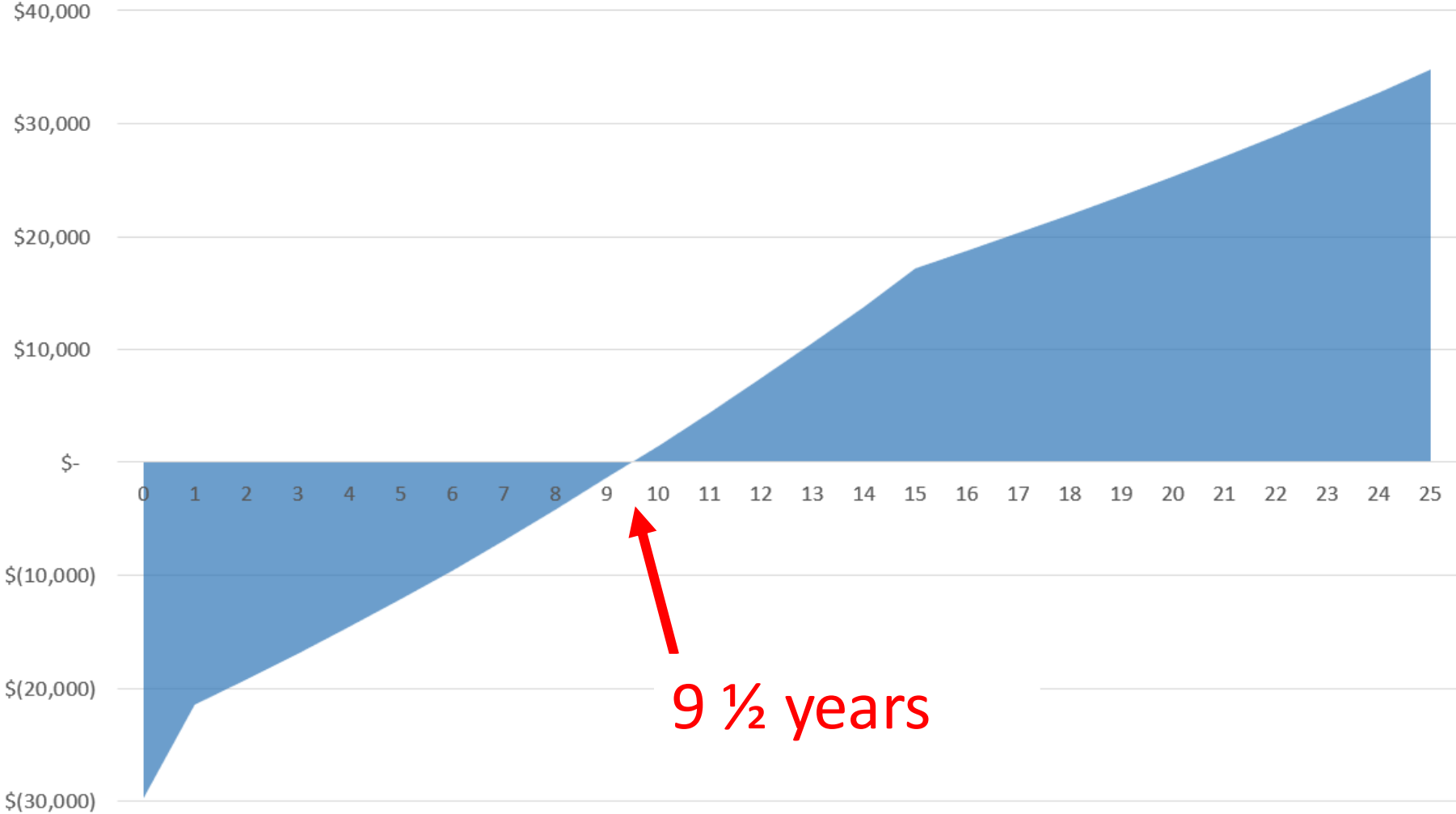
\$81,300



\$46,100

Solar + ASHP

Cumulative Cash Flow over 25 Years



9 ½ years

Heat Pump Hot Water ROI

- Goals
 - Replace fossil fuel for hot water heating
 - Save money
 - Turn off central boiler in the summer



Heat Pump Hot Water ROI



- Design Inputs
 - Current fuel: Propane
 - Number of Occupants: 4
 - Gallons used today: 440
 - Estimated life of system: 15 years

System: 80 Gal, Heatpump HW

Cost: \$4,800; \$4,300 after rebate

Projected electrical: 1650 kWh/yr

Expand Solar PV

Base load: 6000 kWh

ASHP added load: 3100 kWh

HPHW added load: 1650 kWh

New Total: 10,750 kWh/year

Number of modules: 28

Array size: 9.1 kW

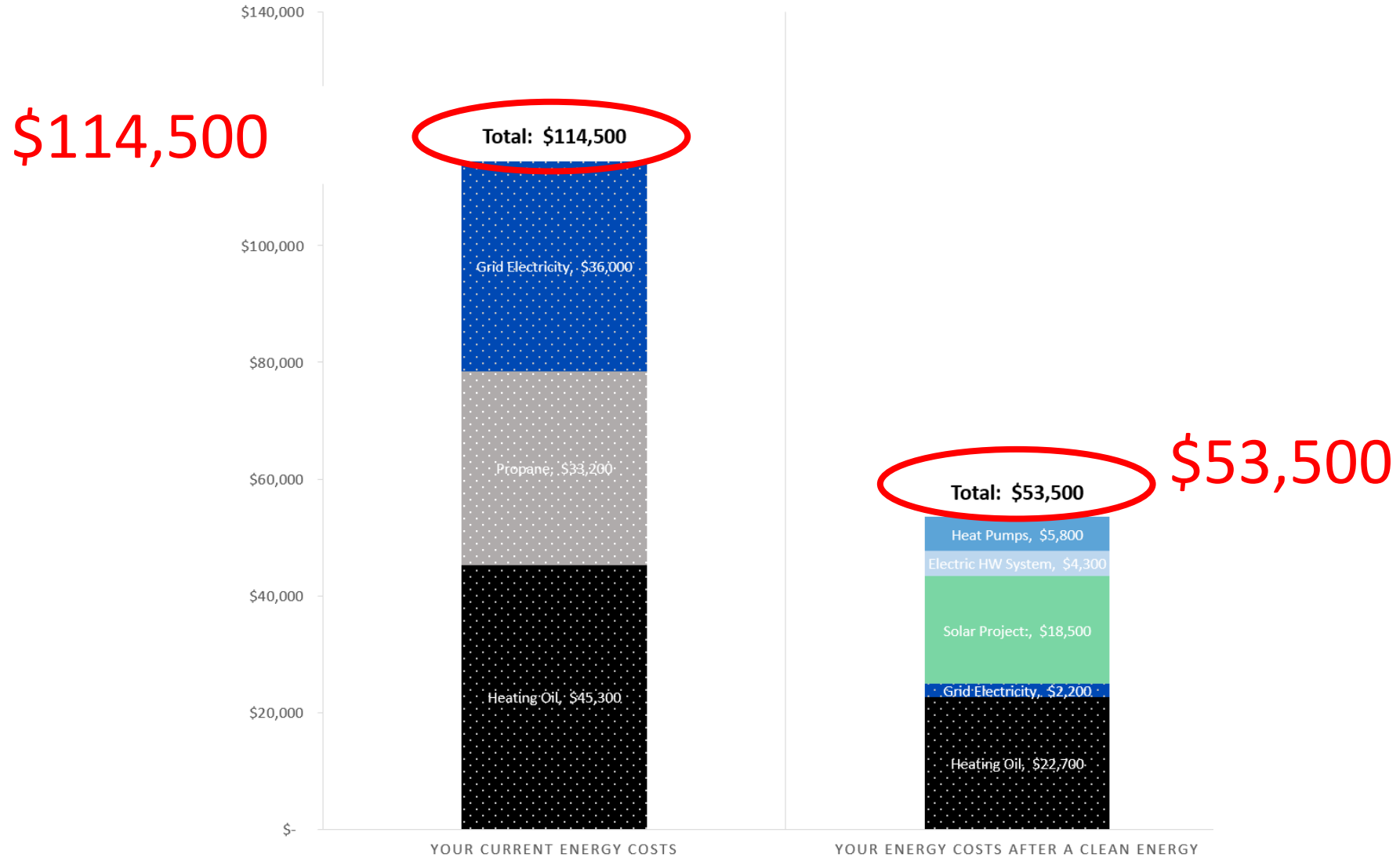
Est production output: 10,411 kWh

**PV Cost: \$27,100, \$18,500 after
incentives**



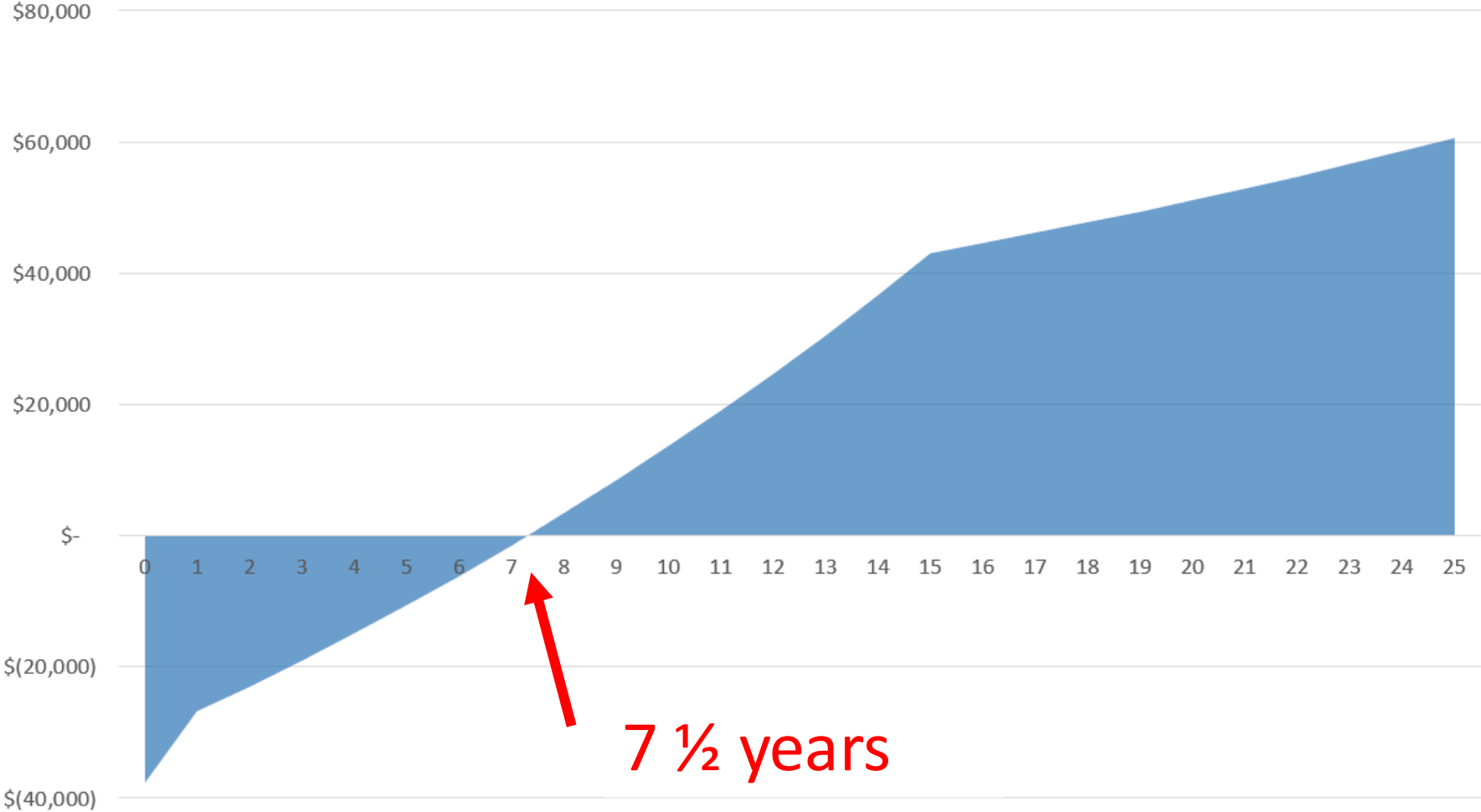
Solar + ASHP + HPHW Savings

TOTAL COSTS OVER PROJECT TERM



Solar + ASHP + HPHW

Cumulative Cash Flow over 25 Years



Electric Vehicle ROI

- Goals
 - Eliminate gasoline
 - Charge with LII (level 2) charger at home – 98% of the time
 - Significantly reduce maintenance
 - Eliminate emissions



Electric Vehicle ROI



- Design Inputs
 - Miles per year: 15,000
 - Yearly Maintenance: \$300
 - Equivalent gas car: \$30,000
 - MGP for gas car: 22
 - Yearly maintenance gas: \$900
 - Lifespan for either vehicle: 10 yrs

System: Chevy Bolt + LII Charger

Cost: \$38,500; \$32,000 after rebate

Projected electrical: 4200 kWh/yr

Expand Solar PV

Base load: 6000 kWh/yr

ASHP added load: 3100 kWh/yr

HPHW added load: 1650 kWh/yr

EV added load: 4200 kWh/yr

New Total: 14,950 kWh/yr

Number of modules: 40

Array size: 13 kW

Est production output: 14,873 kWh

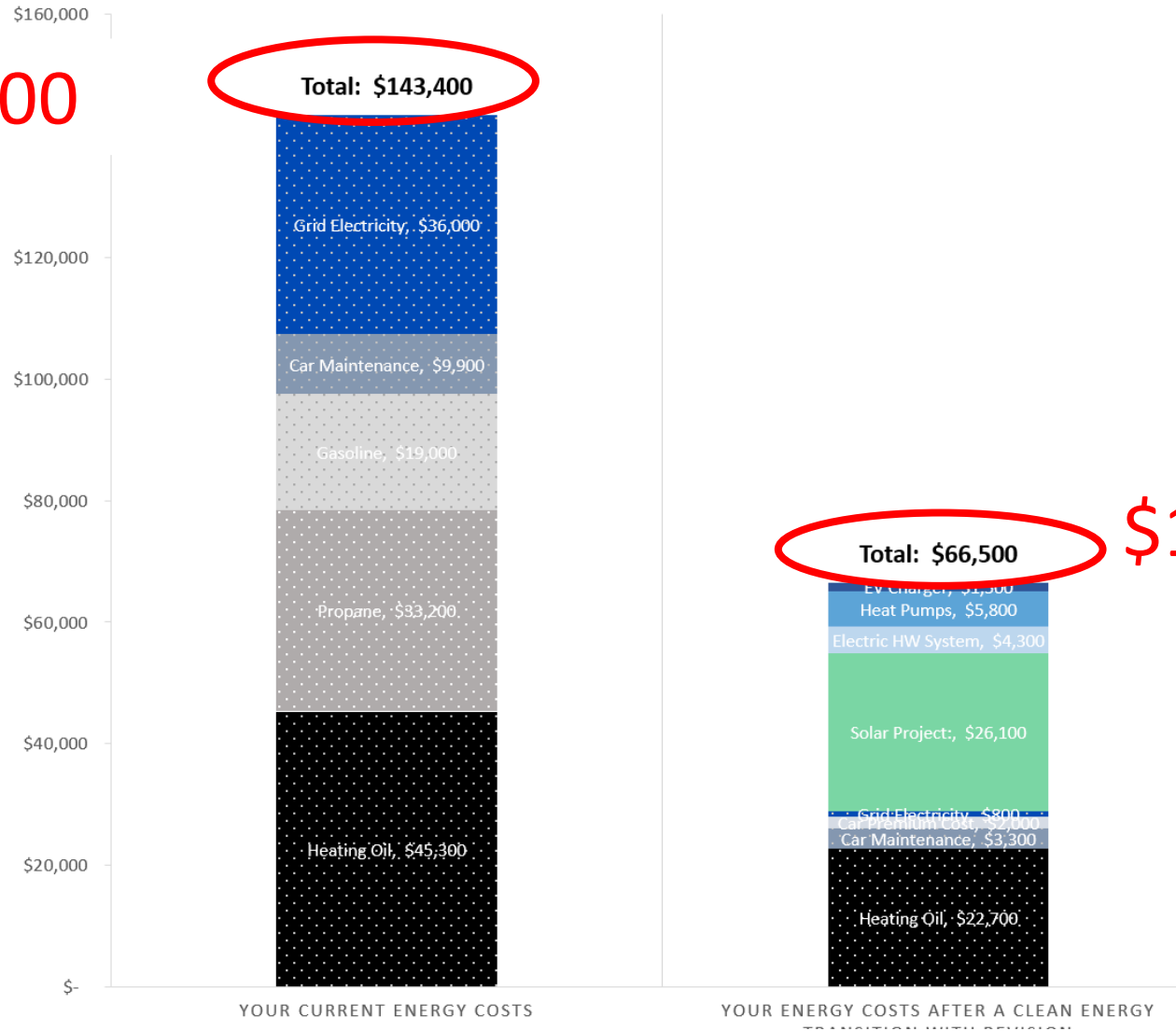
**PV Cost: \$28,500, \$26,100 after
incentives**



Solar + ASHP + HPHW + EV Savings

TOTAL COSTS OVER PROJECT TERM

\$143,400

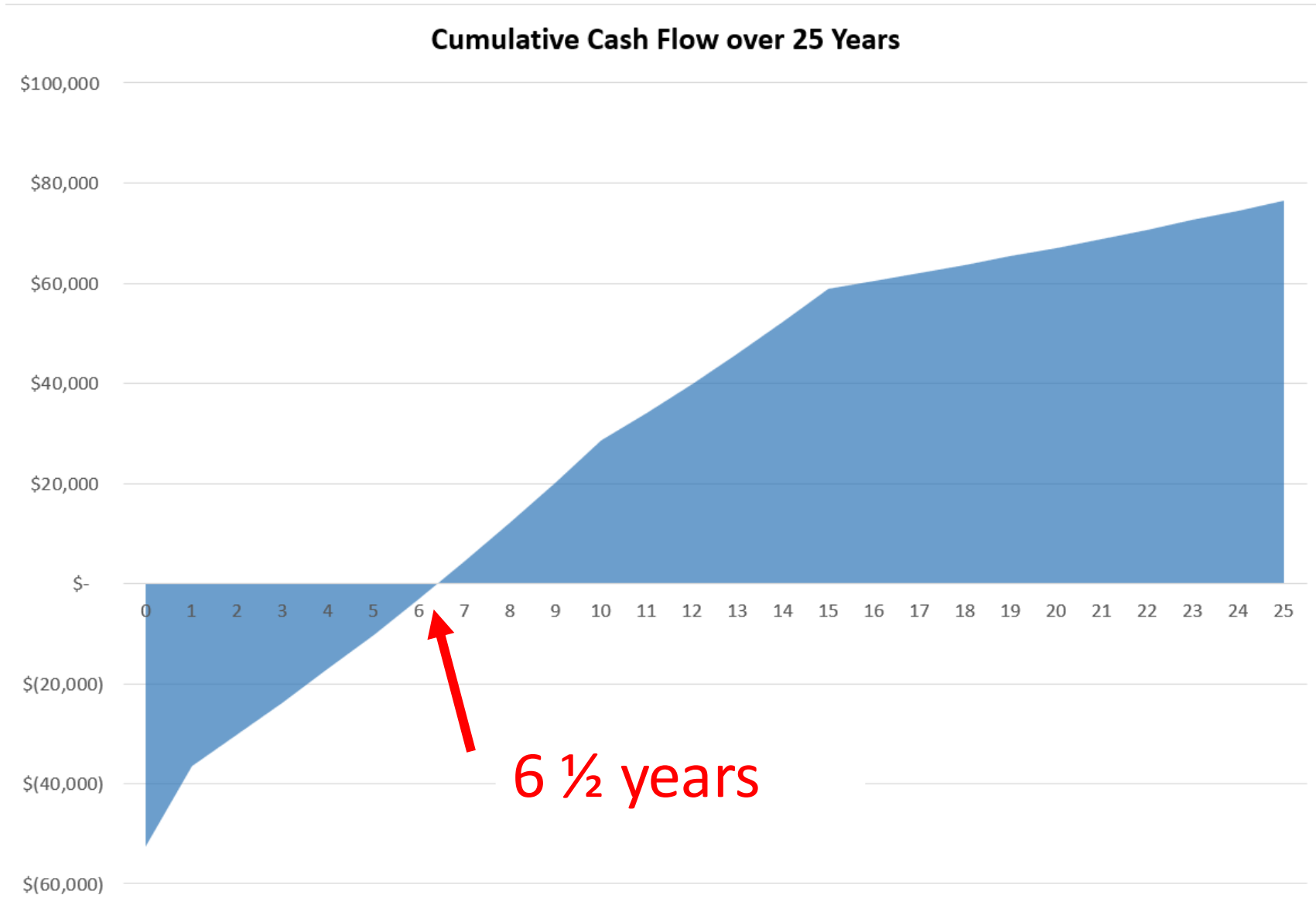


Total: \$143,400

Total: \$66,500

\$143,400

Solar + ASHP + HPHW + EV



Electrifying Everything



Electrifying Everything Makes \$ense



Questions and Answers:
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