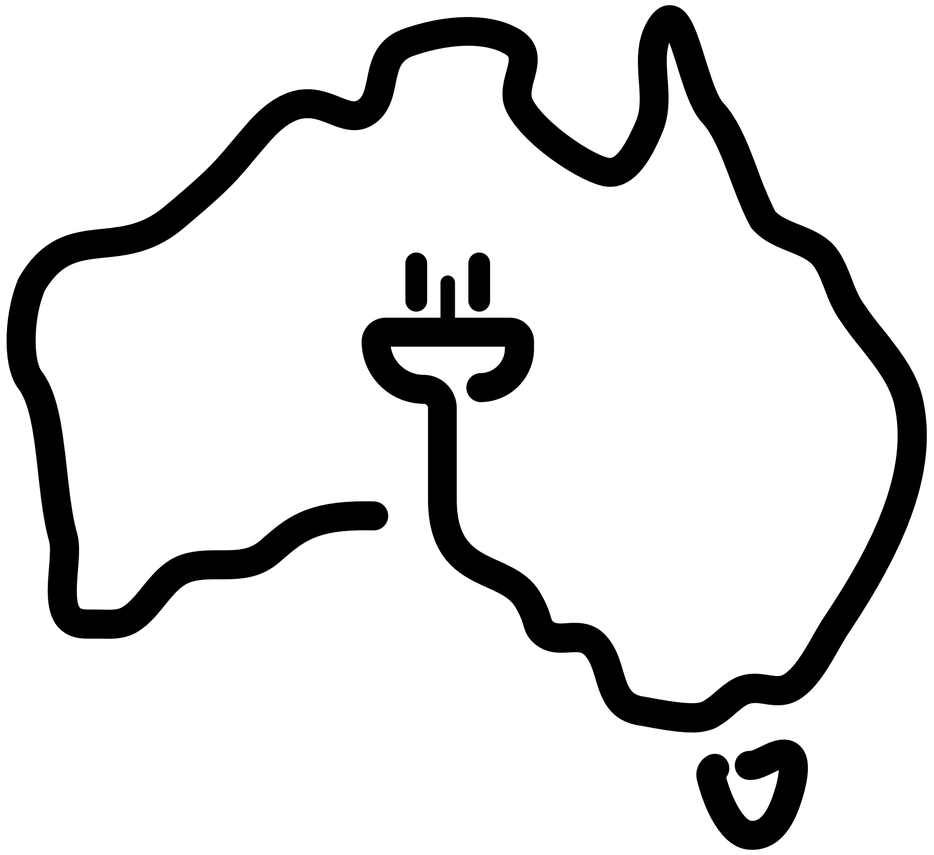


Rewiring Australia

"Required reading for an economy-wide green transition in the USA."

MARIANA MAZZUCATO, AUTHOR OF *MISSION ECONOMY*

ELECTRIFY

AN OPTIMIST'S PLAYBOOK FOR OUR CLEAN ENERGY FUTURE

SAUL GRIFFITH

Saul Griffith

'About f*cking time we have an actual plan written down that can be executed and financed. In a decarbonised world, Australia is a winner. The opportunity now is ours for the taking.'
Mike Cannon-Brookes

The Big Switch

With a new preface about turning on Australia

Australia's electric future

QUARTERLY ESSAY

ISSUE 89 2023
A$27.99 (NZ$30)
NEXT ISSUE:
MEGAN DAVIS
ON INDIGENOUS
RECOGNITION

THE WIRES THAT BIND

ELECTRIFICATION AND COMMUNITY RENEWAL

SAUL GRIFFITH

Correspondence
'LONE WOLF' Christopher Pyne, Michael Cooney, Nick Bryant, Frank Bongiorno, Simon Jackman, Carol Johnson, Luca Belgiorno-Nettis, Rachel Nolan, Katharine Murphy

1. BAD NEWS

2. GOOD NEWS

3. BETTER NEWS

4. INCREDIBLE NEWS

5. HARD NEWS

6. LOCAL NEWS

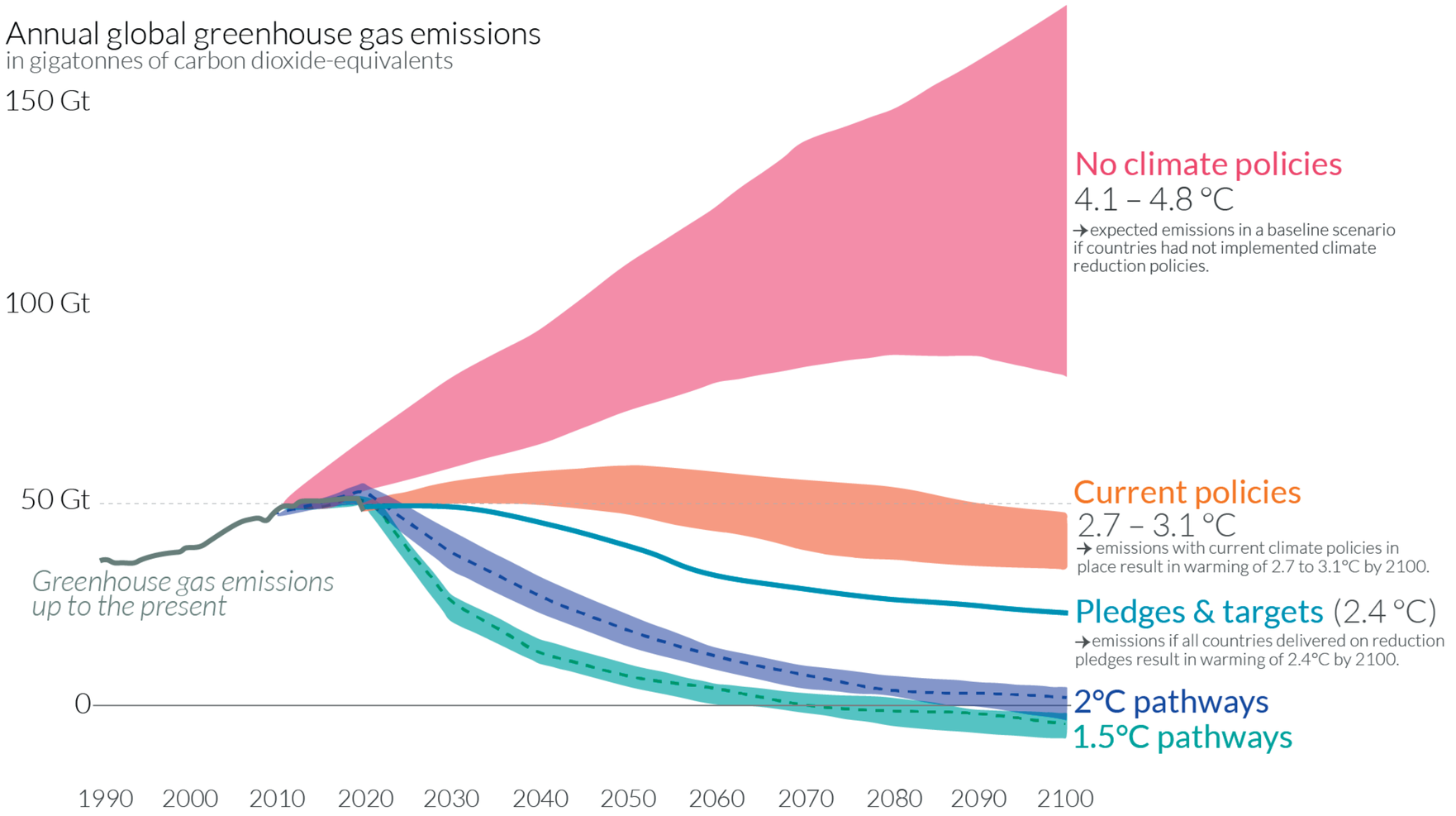
1. BAD NEWS

WE DECEIVED OURSELVES

Global greenhouse gas emissions and warming scenarios

– Each pathway comes with uncertainty, marked by the shading from low to high emissions under each scenario.
– Warming refers to the expected global temperature rise by 2100, relative to pre-industrial temperatures.

Our World in Data

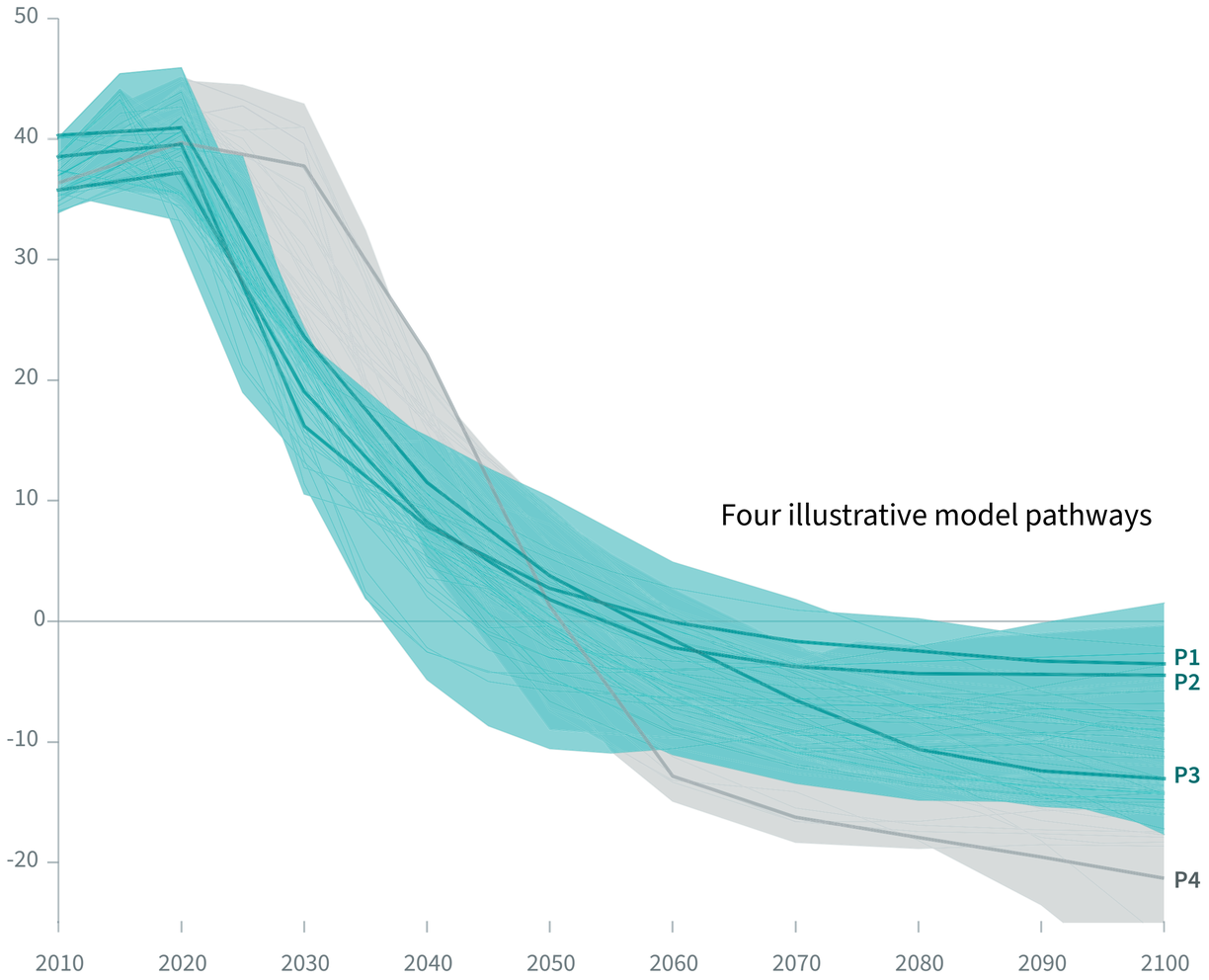


Data source: Climate Action Tracker (based on national policies and pledges as of May 2021).
OurWorldinData.org – Research and data to make progress against the world's largest problems.

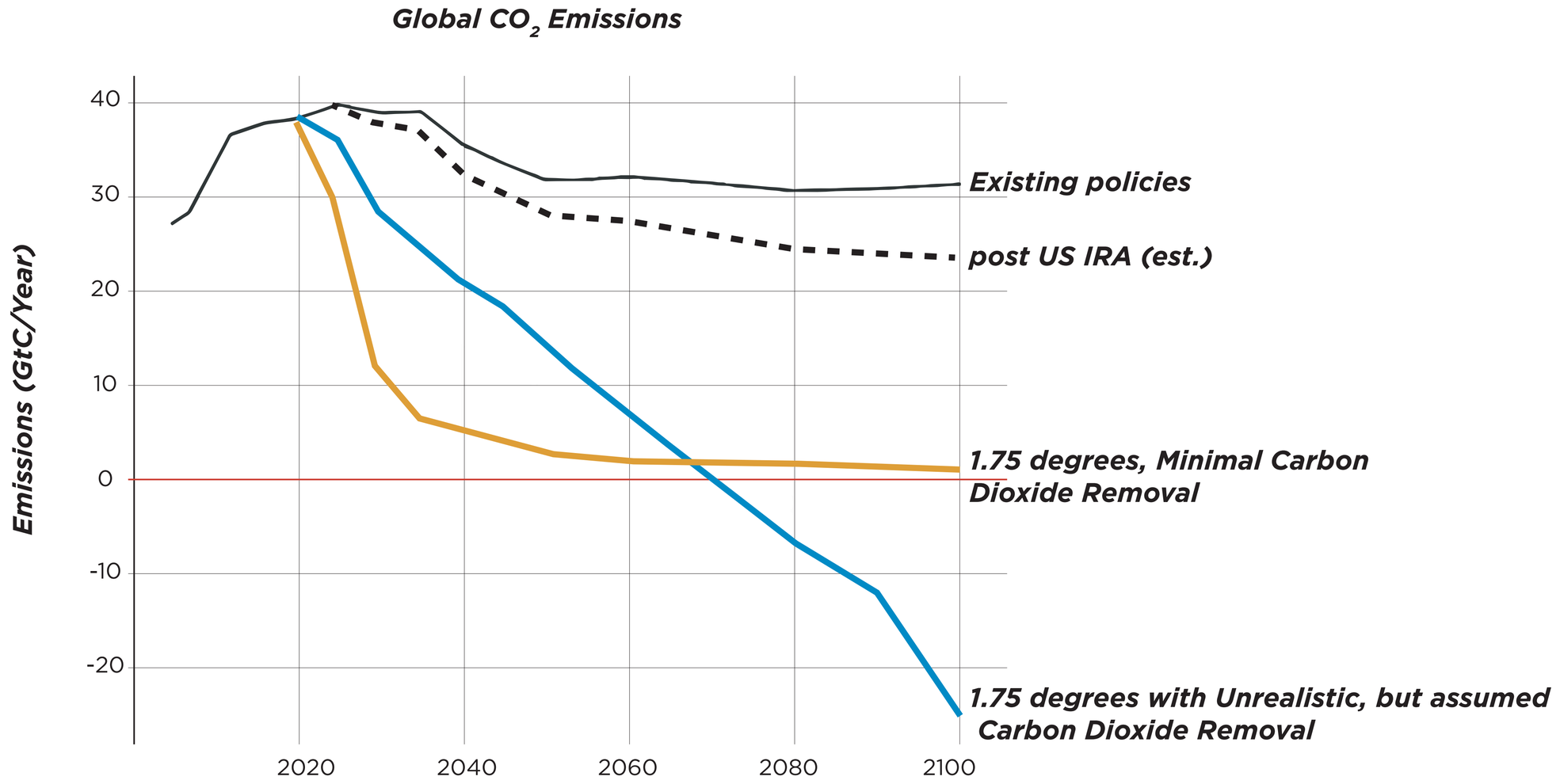
Last updated: July 2021.

Global total net CO $_2$ emissions

Billion tonnes of CO_2/yr

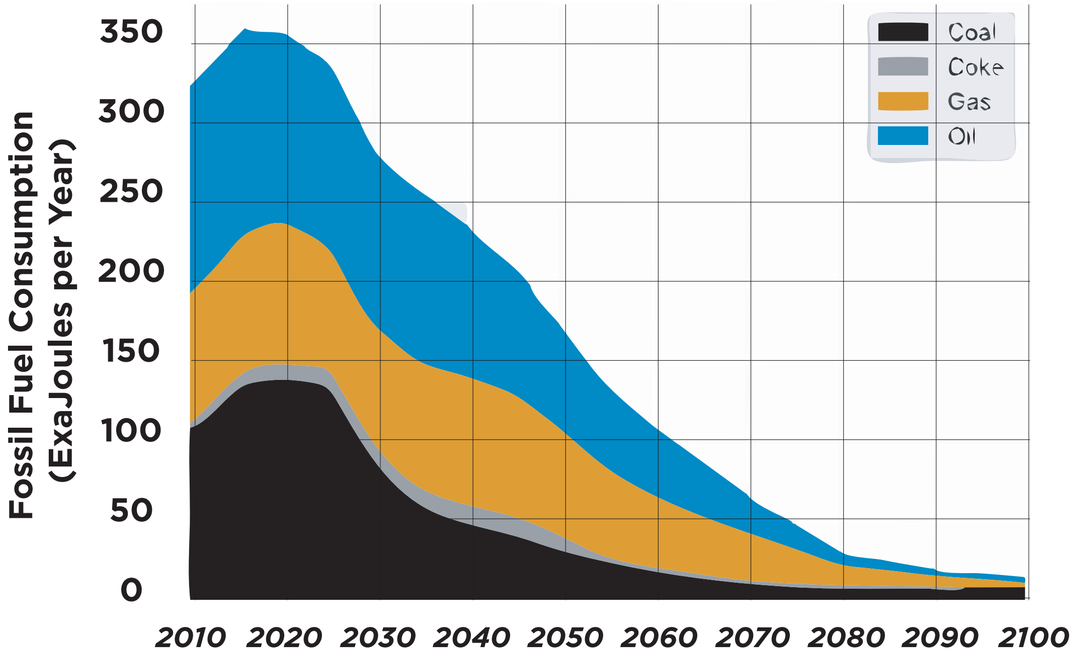


1. The (not so) little white lie of carbon dioxide removal...

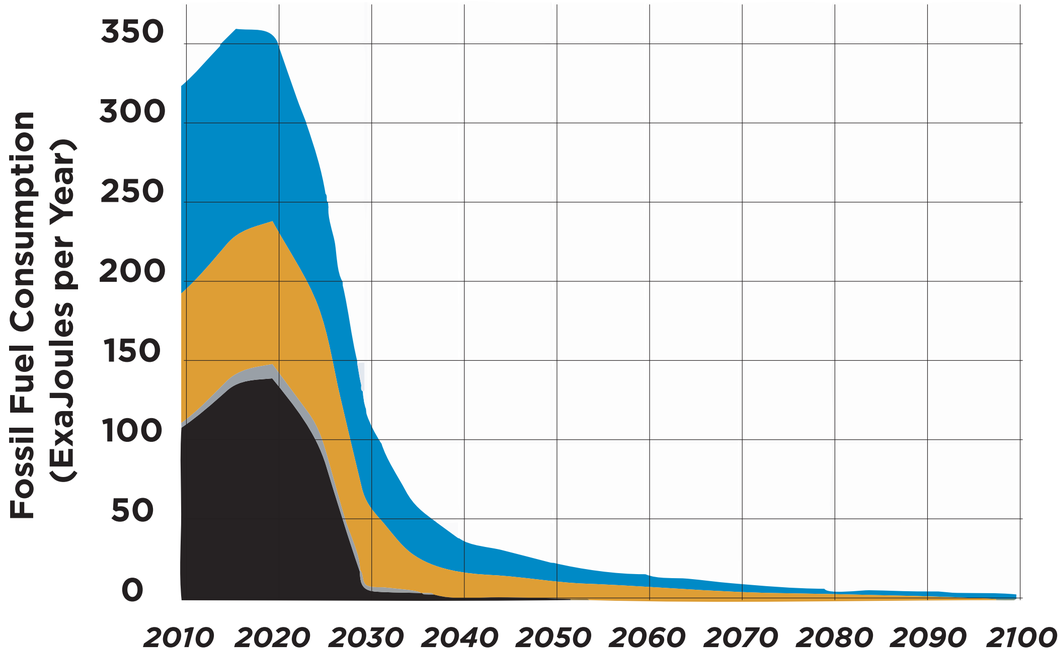


2. The (not so) little white lie of carbon dioxide removal...

Unabated Fossil Fuel Consumption
1.75C with massive Carbon Dioxide Removal



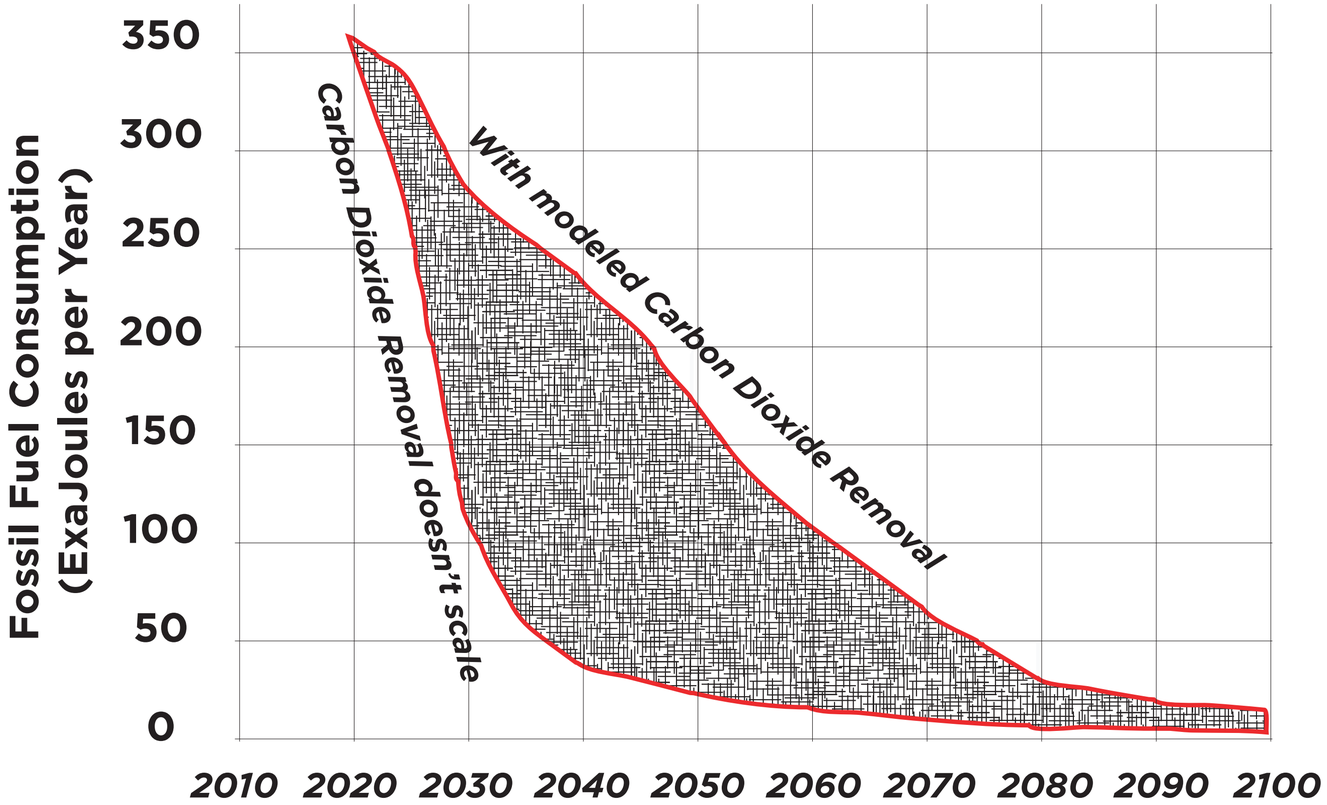
Unabated Fossil Fuel Consumption
1.75C with no Carbon Dioxide Removal



Environ. Res. Lett. 16 (2021) 064099 N Grant et al

3. Money : Why lie about carbon dioxide removal?

Fossil Fuels enabled by
Carbon Dioxide Removals per IPCC...
~7500 ExaJoules



WHOLESALE VALUE:
~$37,000,000,000,000
$37 Trillion
Oil@$50/barrel
Coal@$100/ton
Gas@$3/MMBtu

RETAIL VALUE:
~$300,000,000,000,000
$300 Trillion
Petroluem@$2/Litre
Electricity@30c/kWh
Gas@4c/MJ

~~2050~~

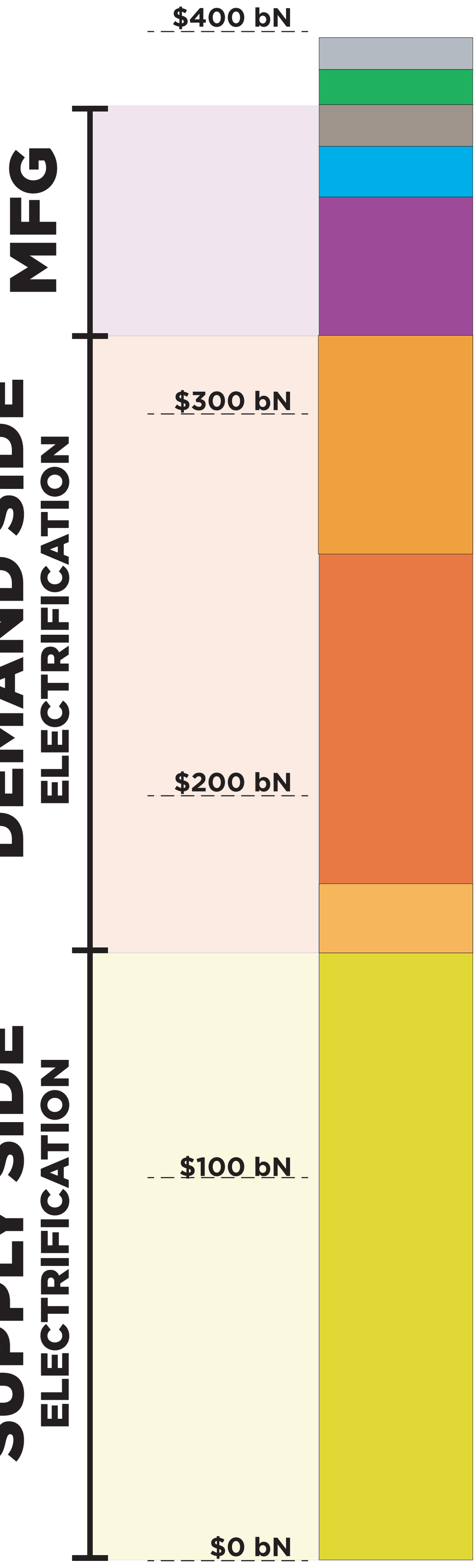
2040

2. GOOD NEWS

MARKET TRANSFORMATION

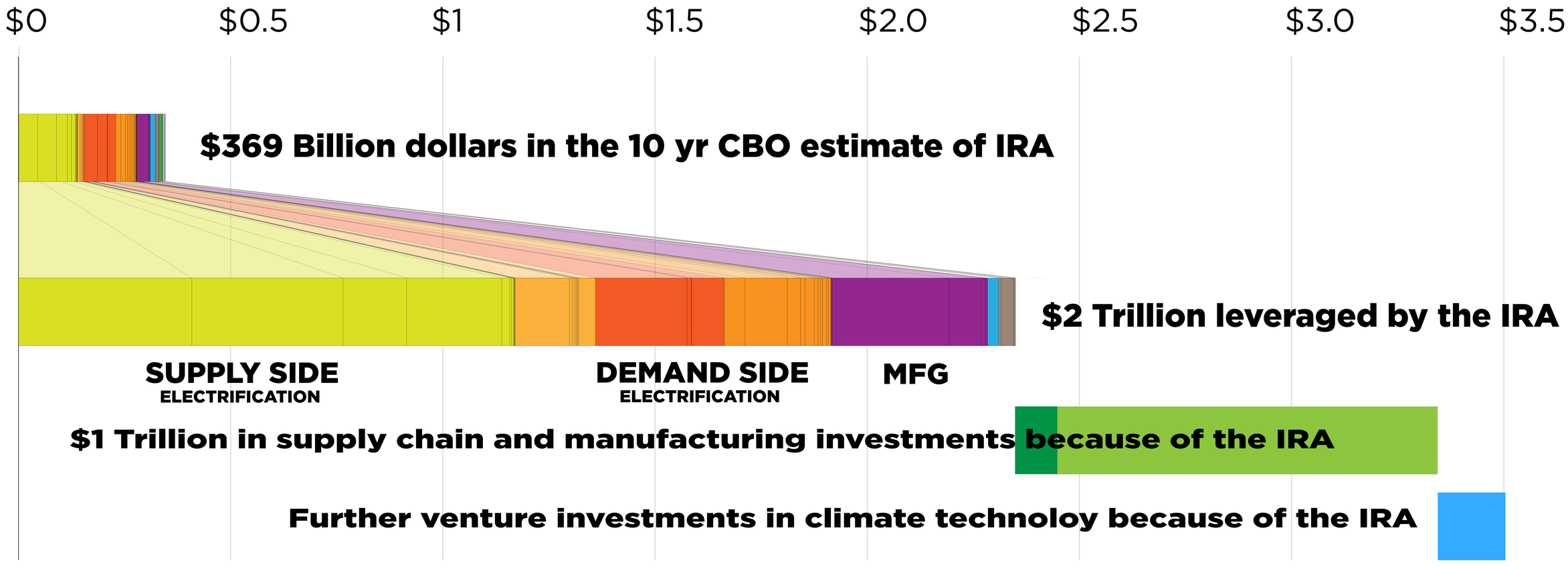
REWIRING AMERICA

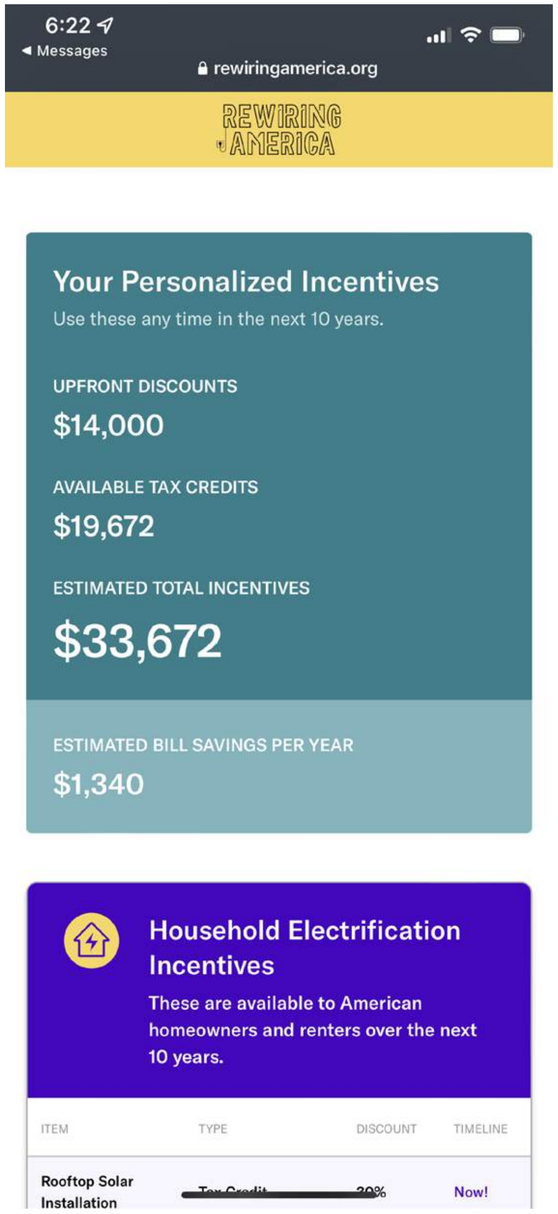
US. Inflation Reduction Act, 2022



Rewiring Australia

Trillions of dollars deployed *by* the IRA, *leveraged by* the IRA, and *because of* the IRA





Rooftop Solar Installation	Tax Credit	30%	Now!
Geothermal Heating Installation	Tax Credit	30%	Now!
Battery Storage Installation	Tax Credit	30%	Now!
Community Solar Subscription	Tax Credit	30%	Now!
New Electric Vehicle	Tax Credit	$7,500	2023
Heat Pump Air Conditioner/Heater	Tax Credit	$2,000	2023
Heat Pump Water Heater	Tax Credit	$2,000	2023
Electric Panel	Tax Credit	$600	2023
Basic Weatherization	Tax Credit	$1,200	2023
Heat Pump Water Heater	Upfront Discount	$1,750	2023
Heat Pump Air Conditioner/Heater	Upfront Discount	$8,000	2023
Electric Stove	Upfront Discount	$840	2023
Heat Pump Clothes Dryer	Upfront Discount	$840	2023
Electric Panel	Upfront Discount	$4,000	2023
Basic Weatherization	Upfront Discount	$1,600	2023
Electric Wiring	Upfront Discount	$2,500	2023
Whole Home Energy Reduction	Performance Rebate	$4,000	2023

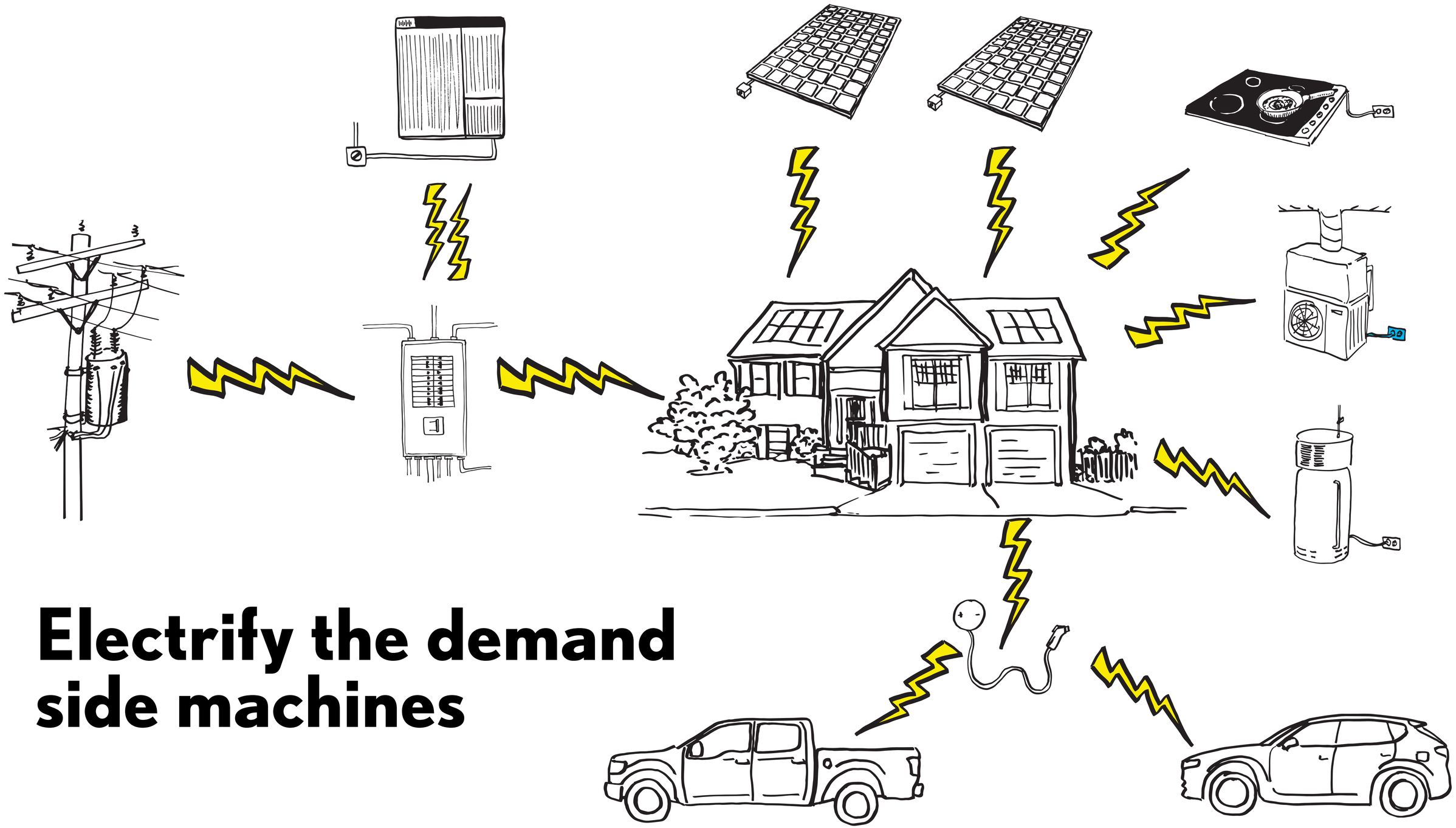
3. HAPPY NEWS

HOUSEHOLDS SAVE

~42% of our domestic emissions emanate from decisions made around the kitchen table...

What fuels our cars ?
What heats our home ?
Where does our electricity come from ?
How are our fuels made?

https://www.rewiringamerica.org/handbook



Electrify the demand side machines

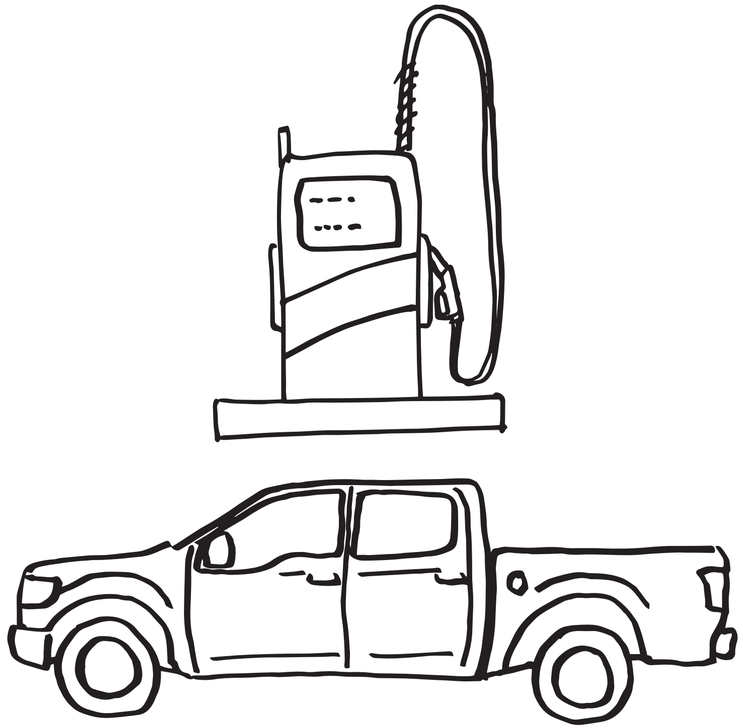
This electrification will cut your energy use by more than half !

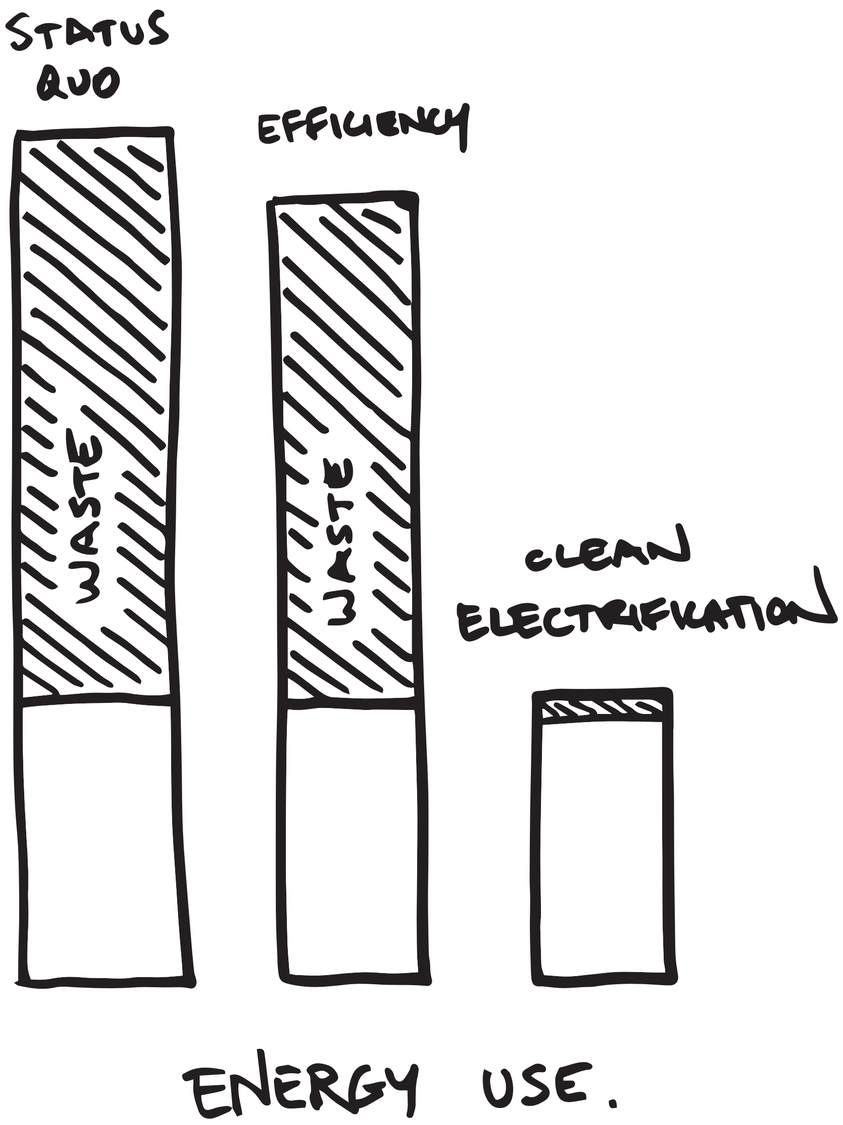
While improving your health,
Your quality of life,
And lowering your energy bills.

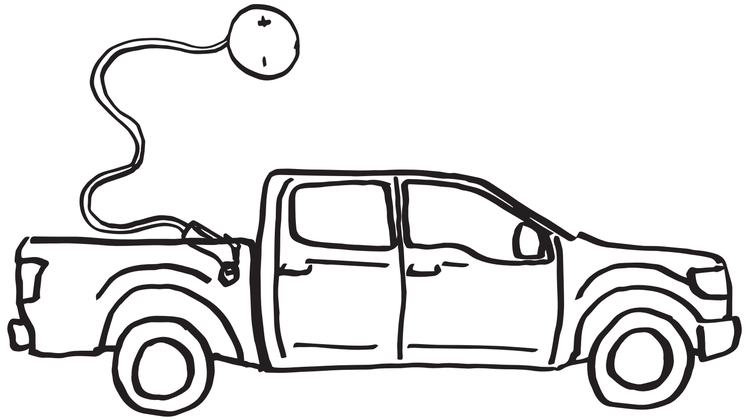
How ?

FOSSILIZED

ELECTRIFIED

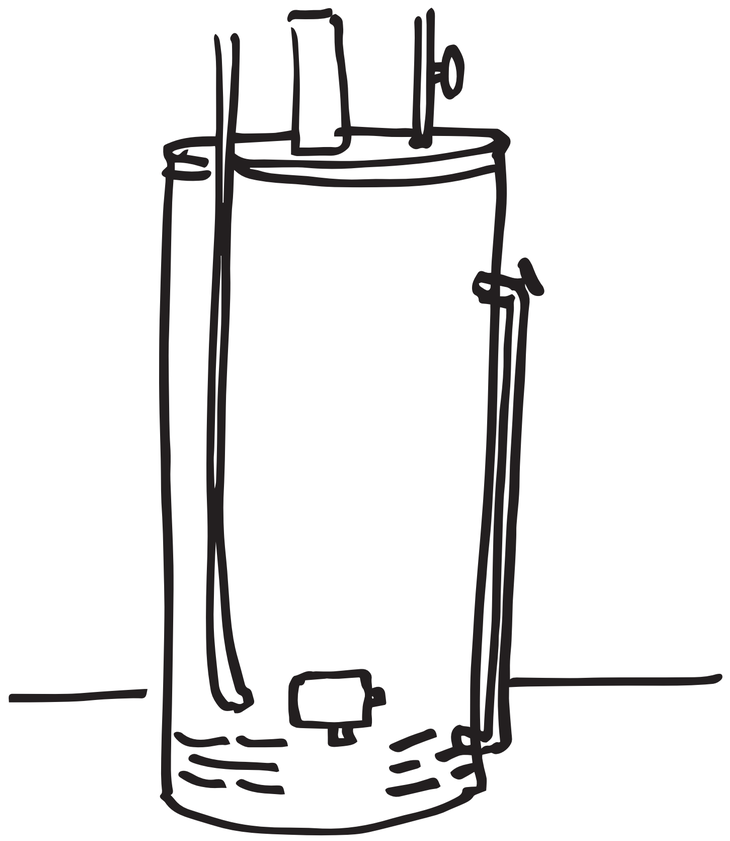


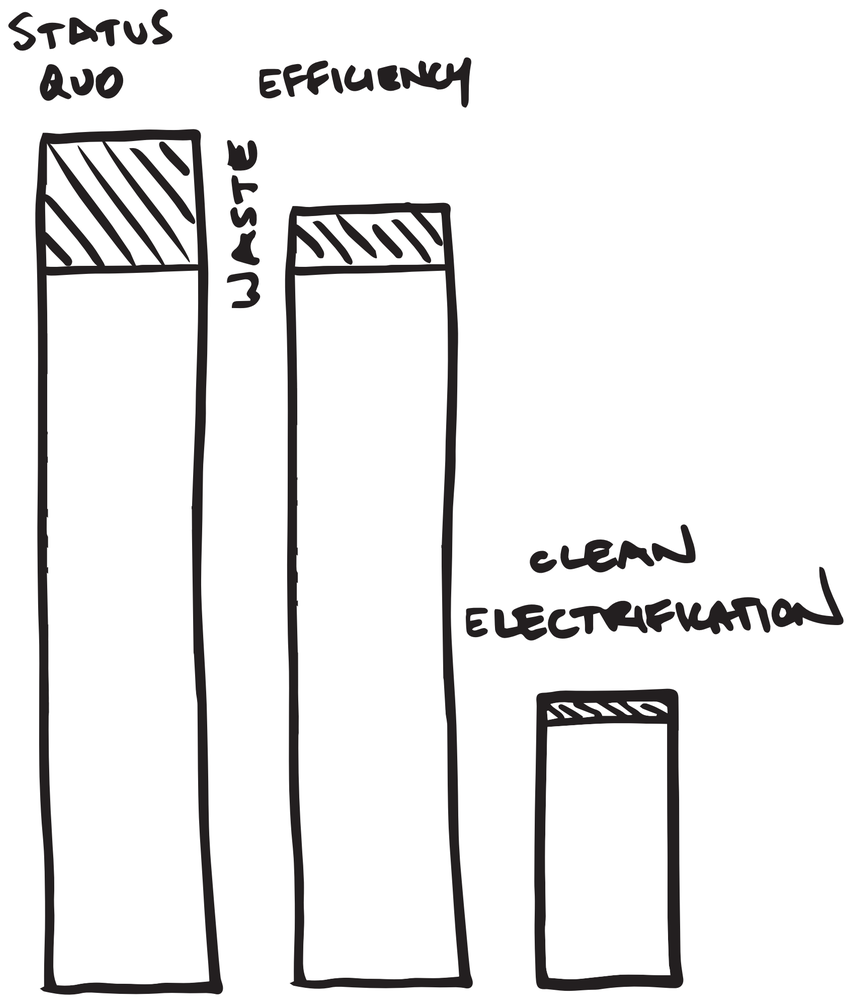




Electric vehicles use less than 1/3rd of the energy per km

FOSSILIZED

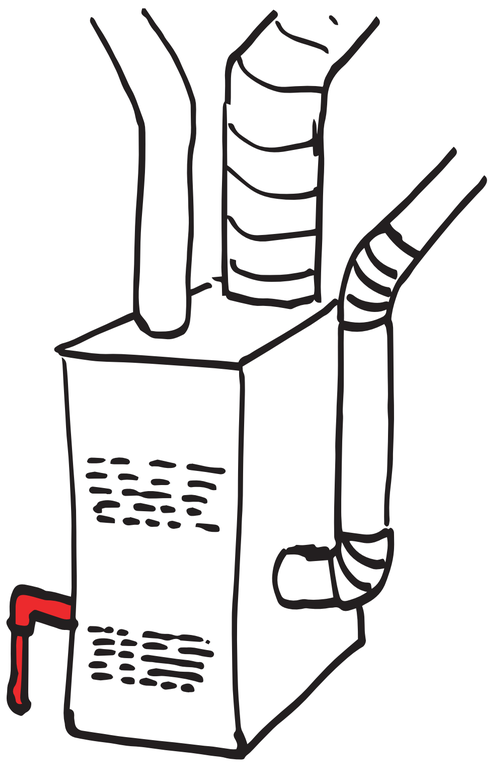


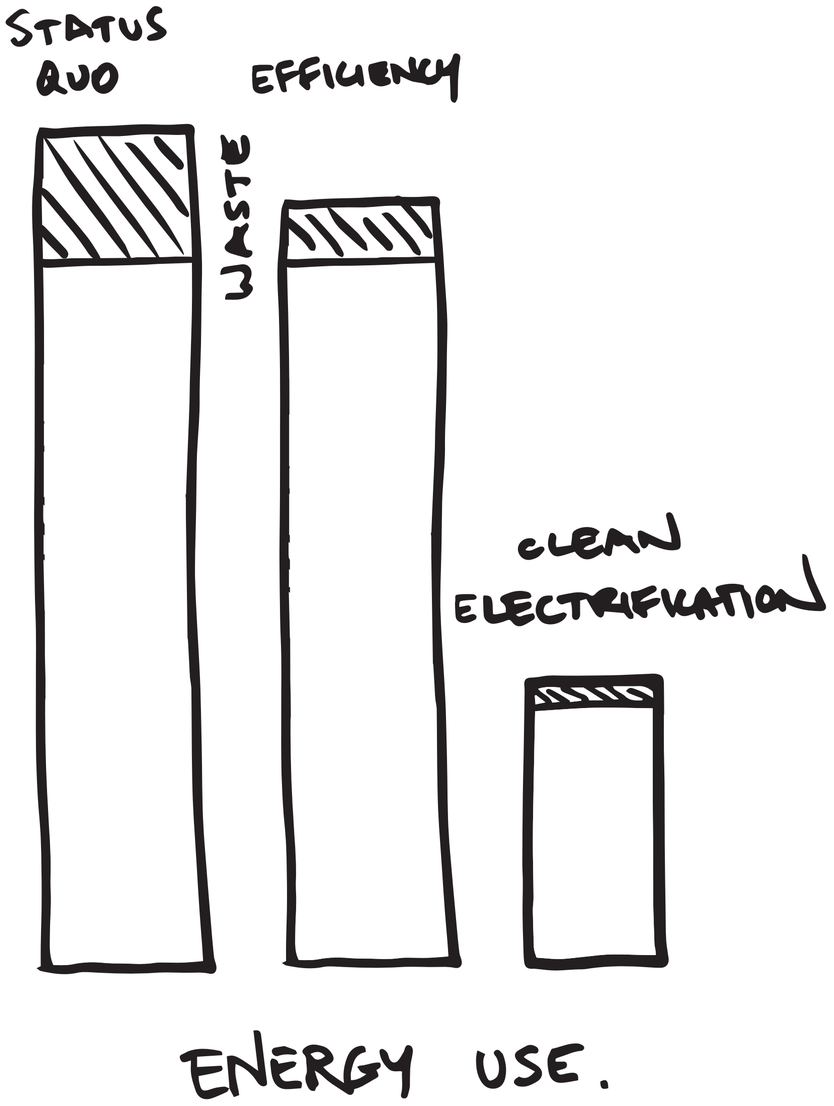


ELECTRIFIED

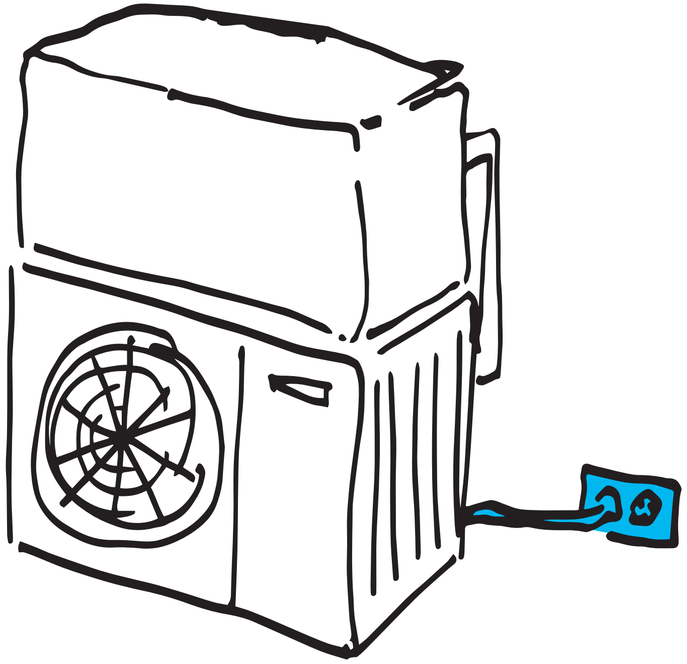
Electric heat pump water heaters use 1/3 the energy of gas.

FOSSILIZED



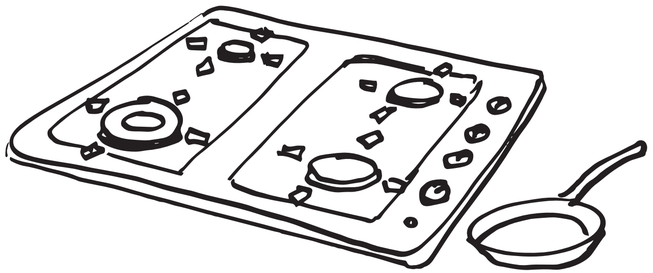


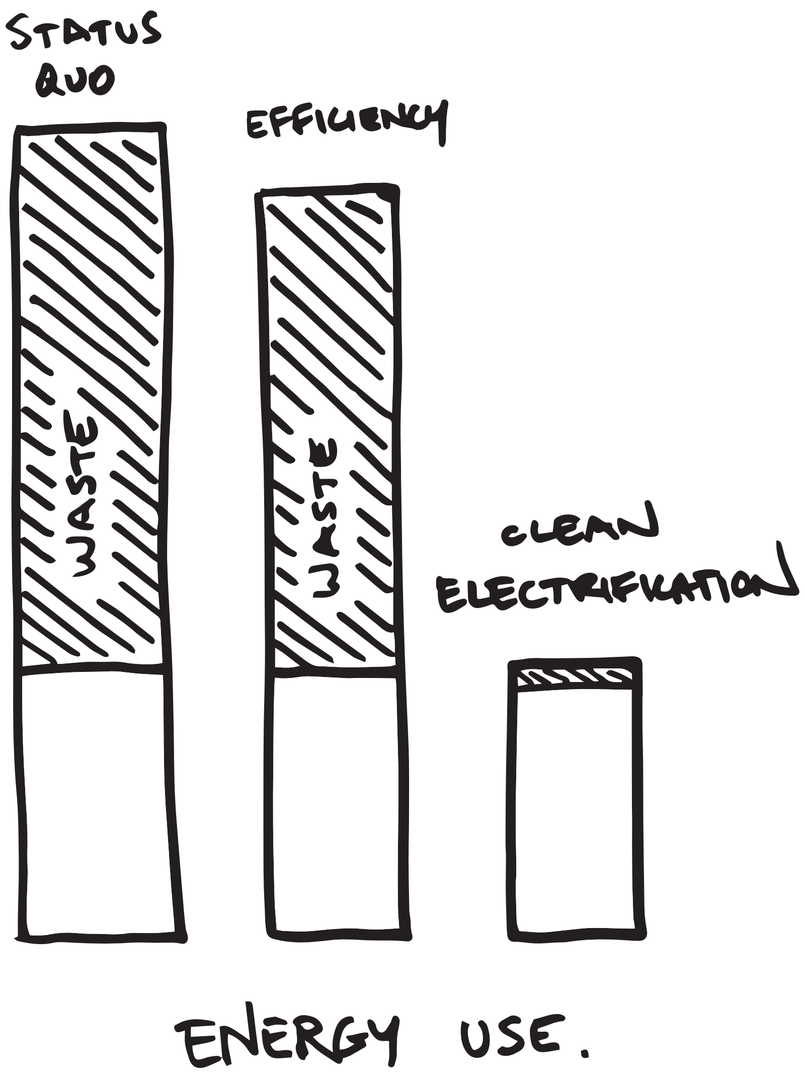
ELECTRIFIED



Electric heat pumps "reverse-cycle" use 1/3 the energy of gas.

FOSSILIZED

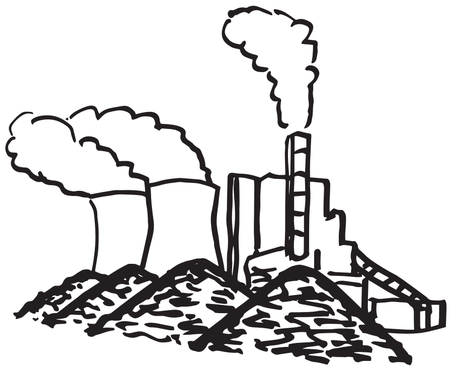


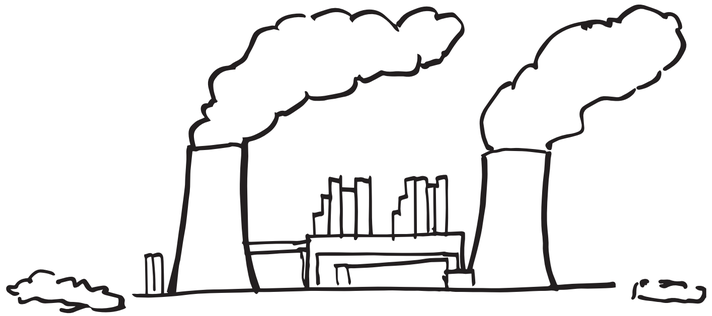


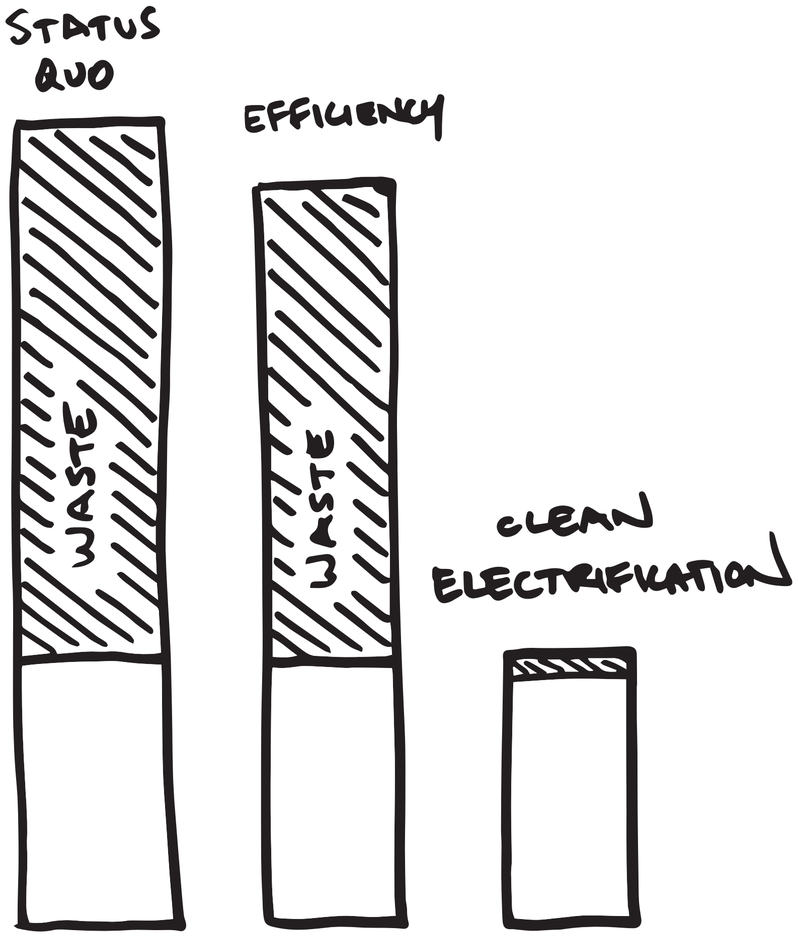
ELECTRIFIED

Electric cooking uses about half the energy of gas.

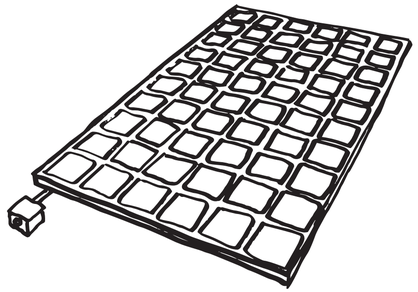
FOSSILIZED







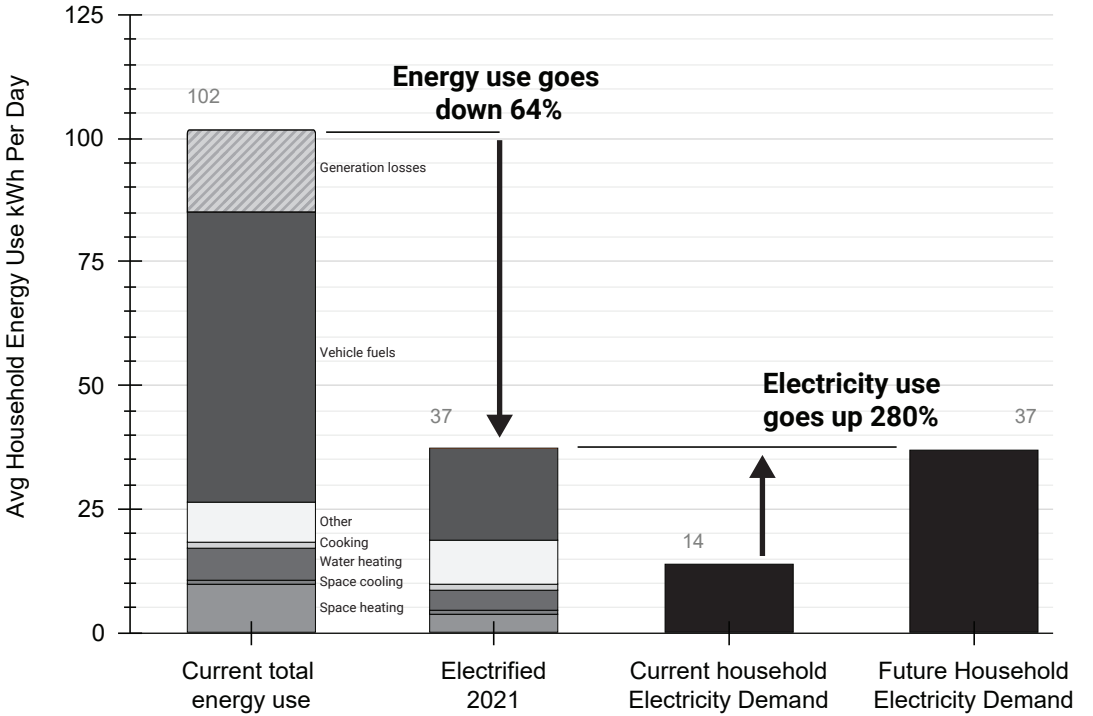
RENEWABLE



Renewables generate electricity without wasting 2/3 of the energy.

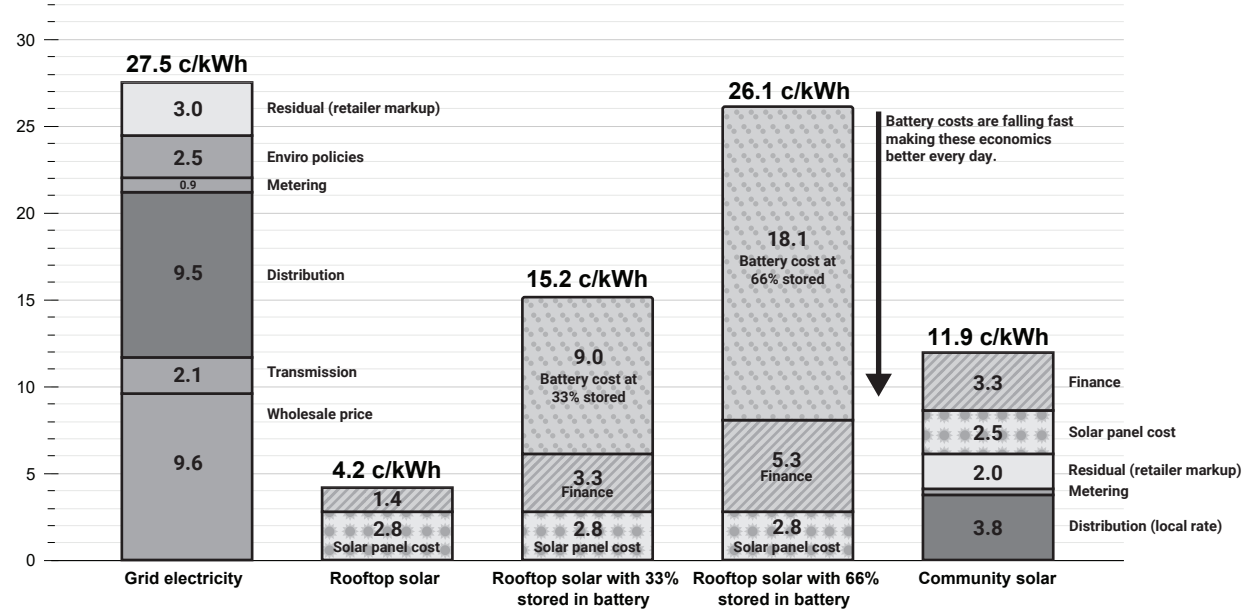
Australian household energy use - current fossil fuel mix versus electrified household.

Average household energy use including vehicles compared to electrified household with solar, battery, and electric vehicles.

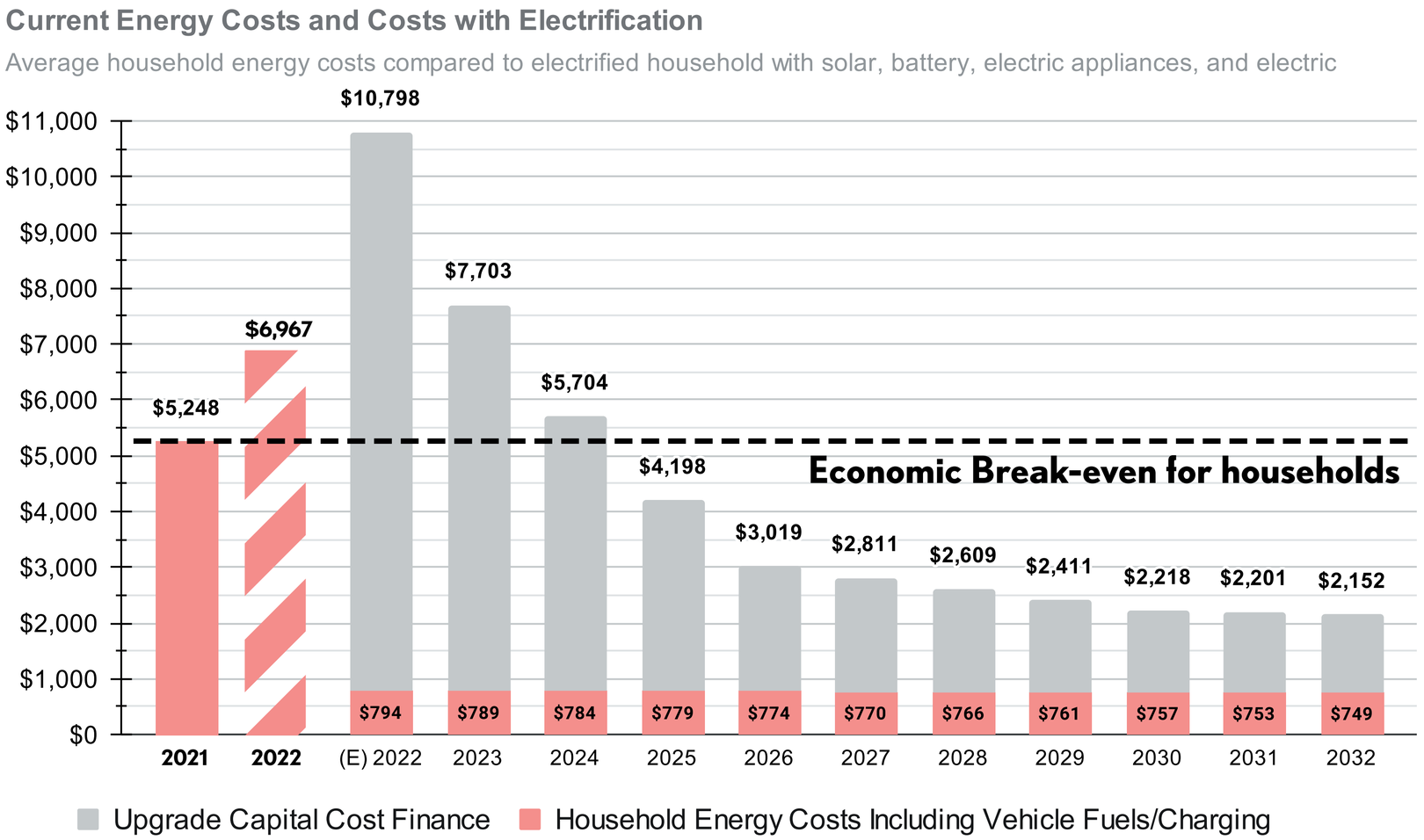


Source: Castles and Cars technical study 2021, Rewiring Australia.

Grid electricity price breakdown versus financed rooftop solar and community solar

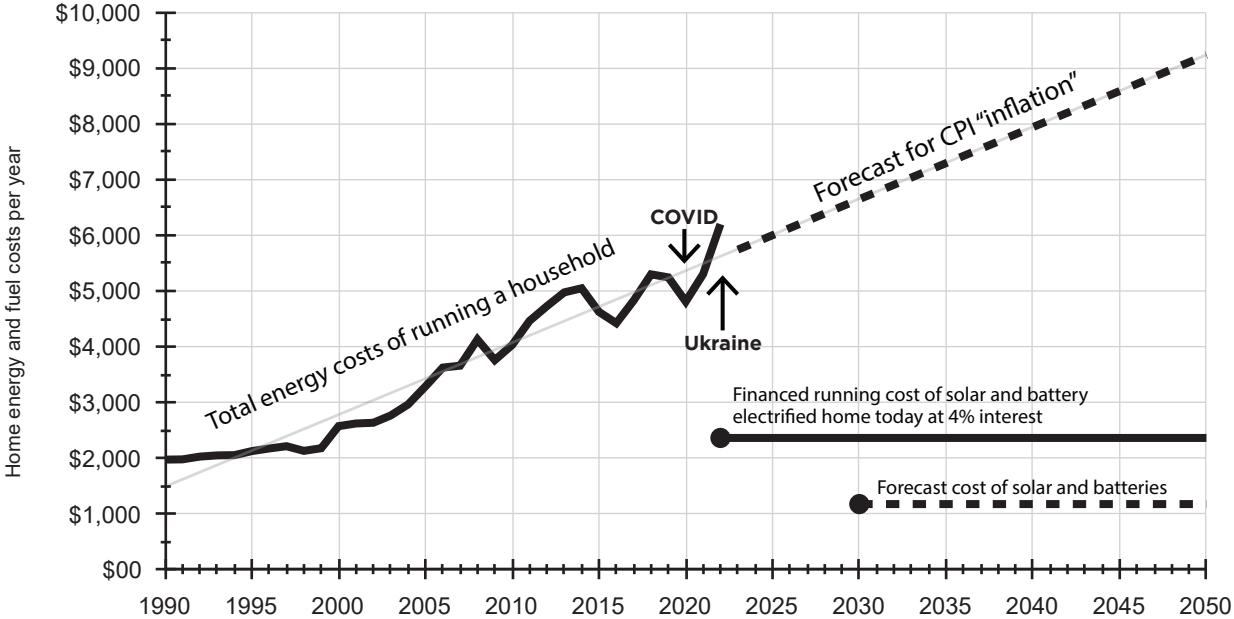


Source: AEMC Price Trends 2021. SolarChoice. SolarAnalytics. Capacity Factor 17.14%. Finance 4% over lifetime.



Which has us on the cusp of a windfall for households. Which we can accelerate through pilot suburbs.

Australian home running costs with CPI trend | Gas and petrol home vs Electrified financed

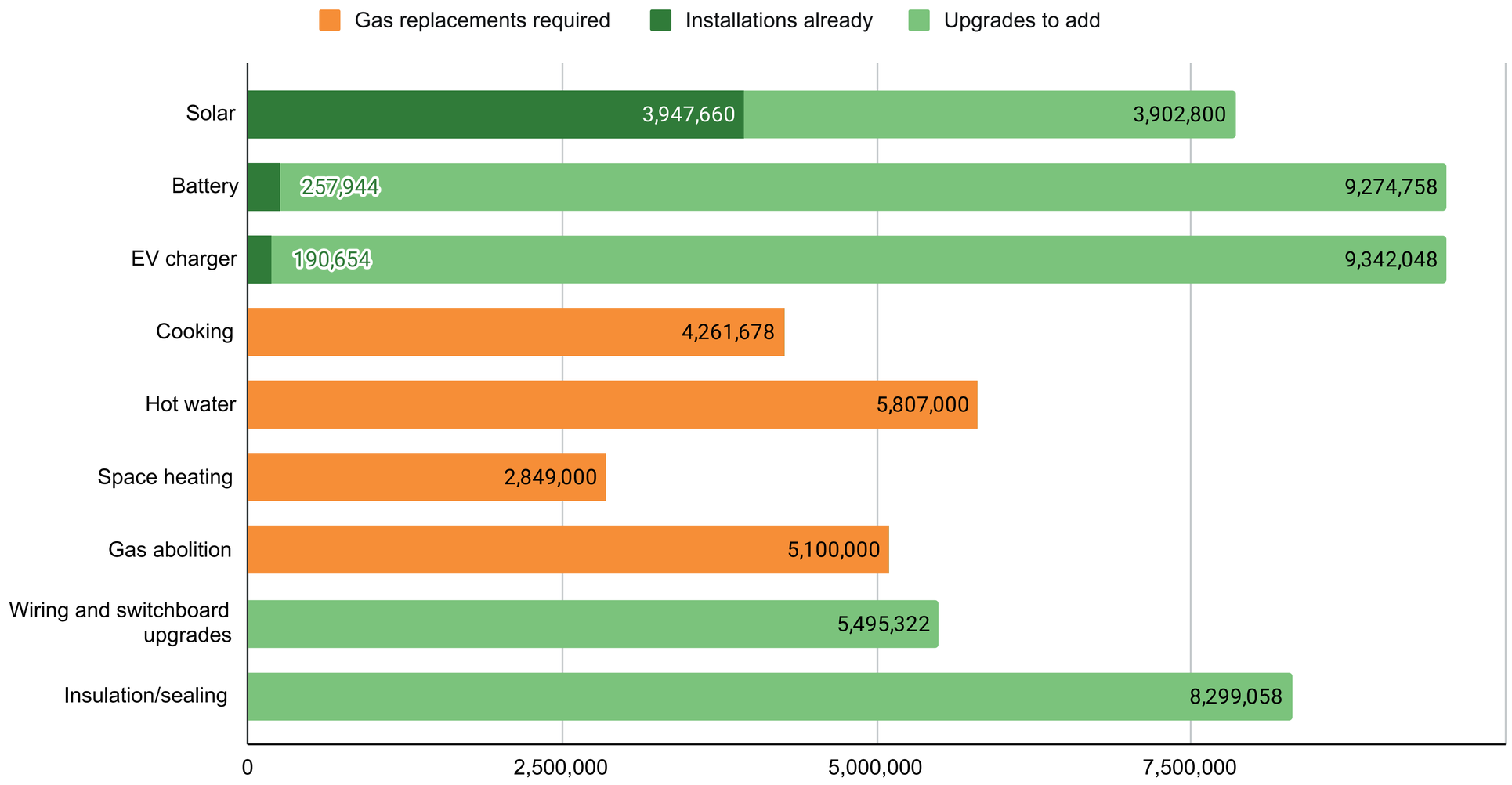


Source: ABS CPI June 2022, AEMC Price Trends 2020, Gas Price Trends Review 2017 Oakley Greenwood, Australian Petroleum Institute, Rewiring Australia. Based on running costs of average gas home energy use. Average home uses petrol, gas, and grid electricity. Future prices based on linear trend from historic CPI. Electrified home costs include financed cost of solar and battery at 4% over their warrantied lifetime of 25 years and 10 years respectively, excludes cost of appliances and vehicles in both. Battery storage used is 50% of total home energy use.

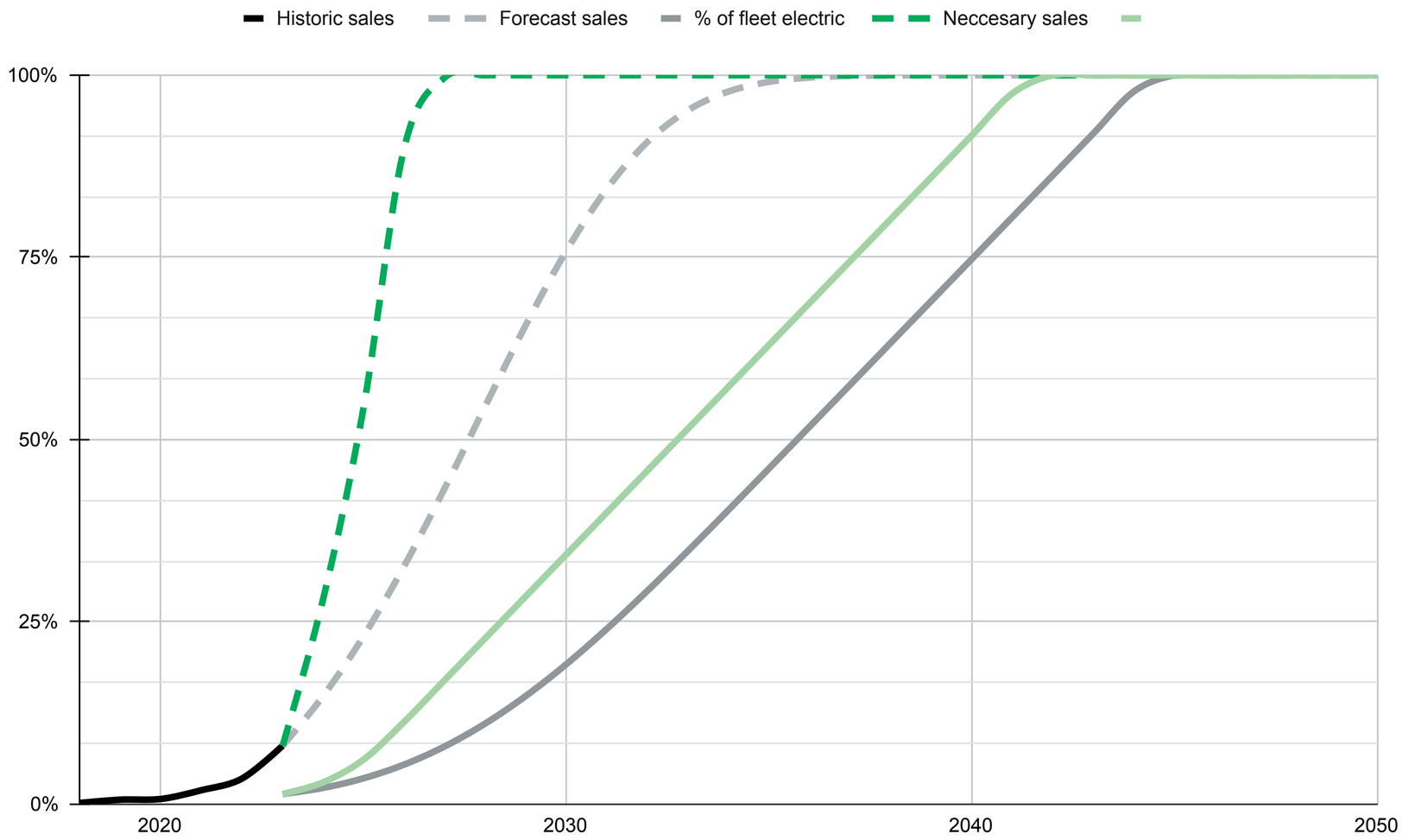
4. INCREDIBLE NEWS

AUSTRALIA WINS

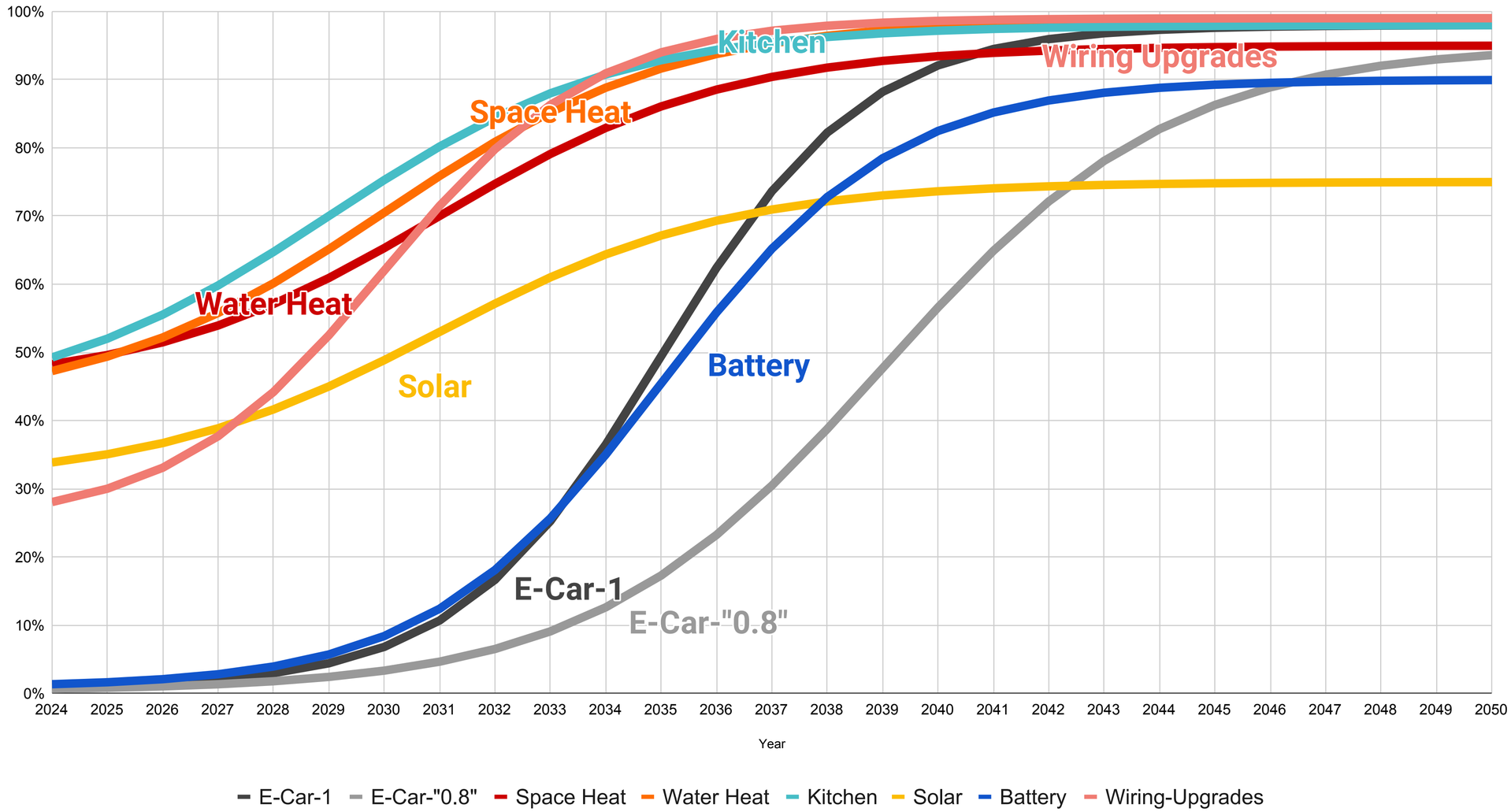
Electrification installations to do

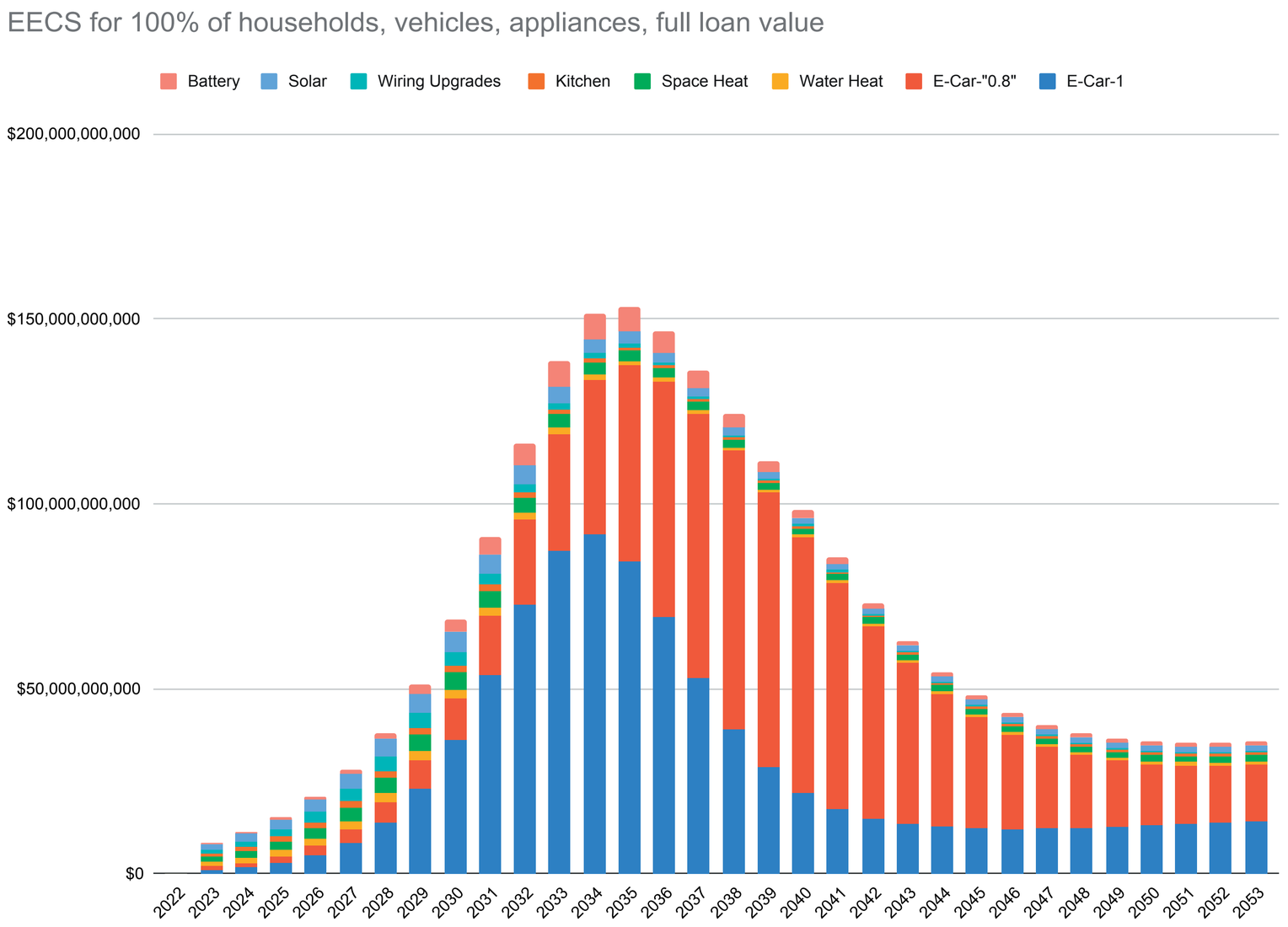


Sales Adoption versus Market Penetration - THE DELAY



Penetration curves for household electrification kit.




EECS for 100% of households, vehicles, appliances, full loan value
Battery
Solar
Wiring Upgrades
Kitchen
Space Heat
Water Heat
E-Car-"0.8"
E-Car-1
$200,000,000,000
$150,000,000,000
$100,000,000,000
$50,000,000,000
$0
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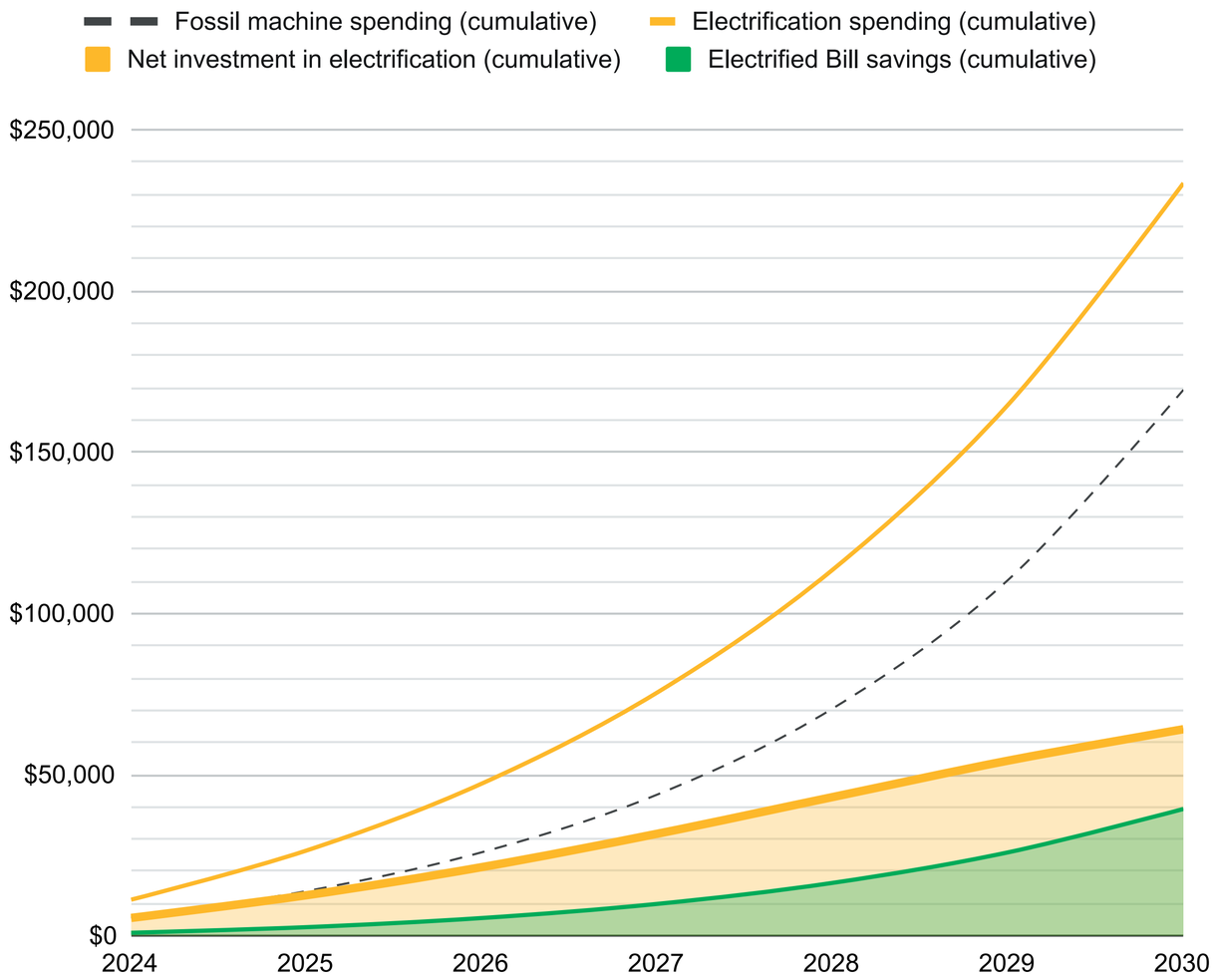
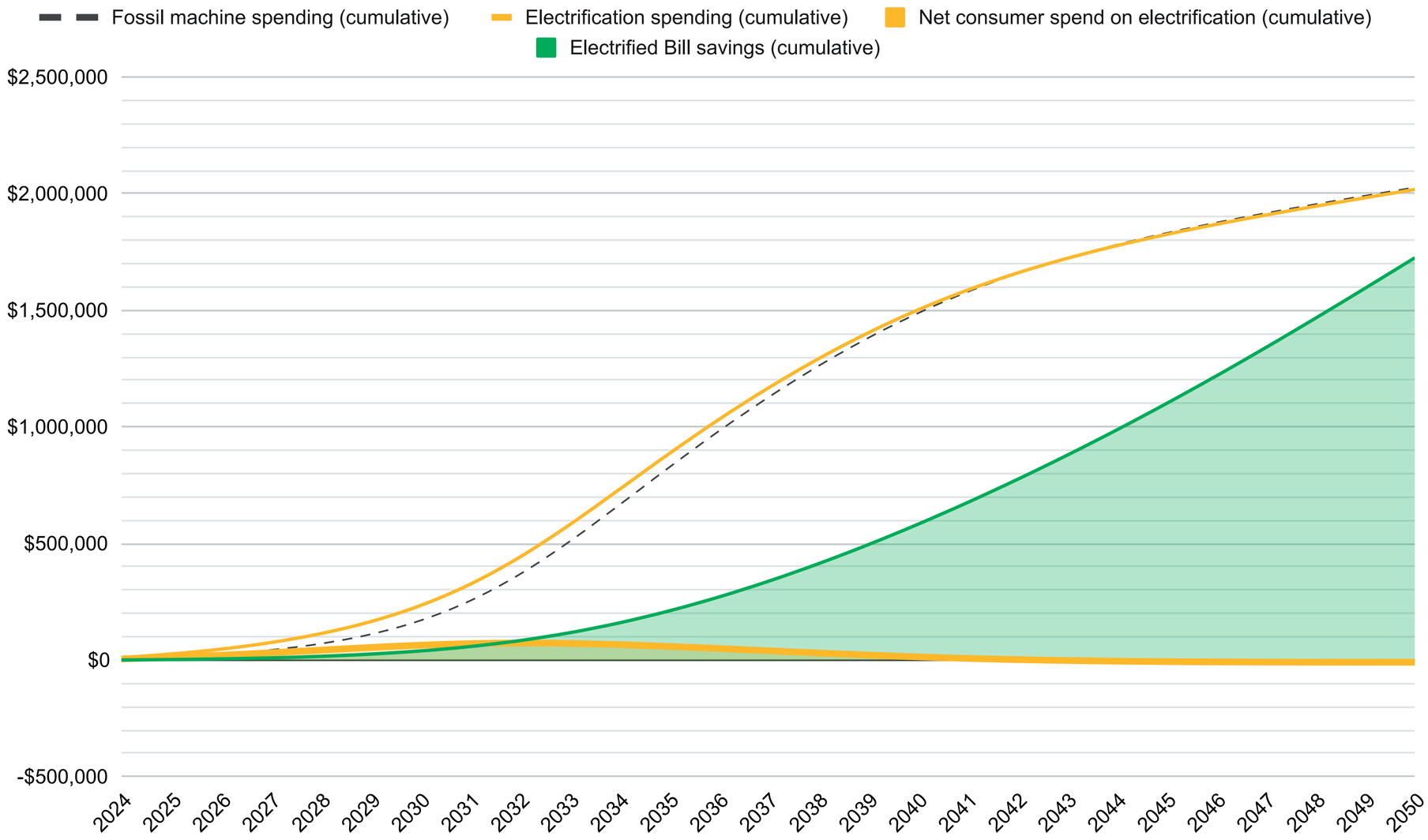
Electrify everything rollout to 2030 vs fossil purchases instead - cumulative $m



Electrify everything rollout vs fossil purchases instead - cumulative $m



$1.7 TRILLION

$154,000 per household.

5. DIFFICULT NEWS

INDUSTRY IS STILL HARD

Total counted emissions 554 Mt

2019 total reported emissions to the United Nations.
Excludes LULUCF.

Domestic emissions 331 Mt

Emissions created for our domestic economy.

Trade emissions 224 Mt

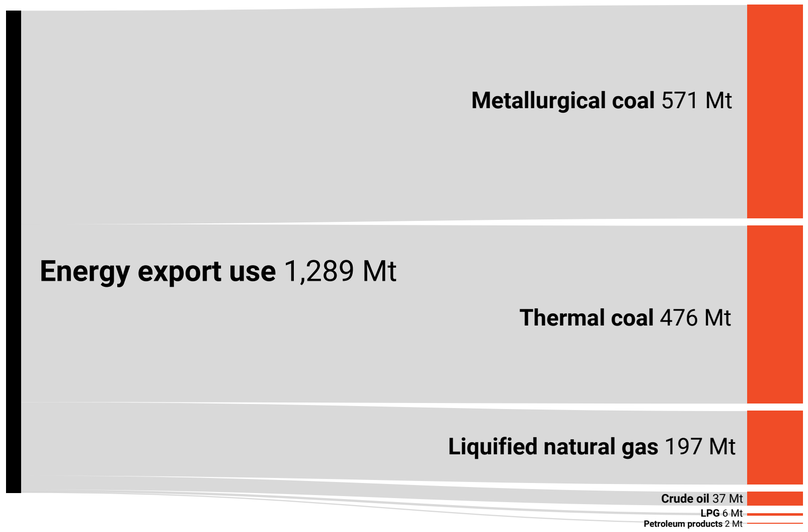
Emissions created for products we export.

2020's:
Things we can do now.

2030's:
Things under development.

Not counted exported emissions 1,289 Mt

We enable other nations to make these emissions by exporting them our fossil fuels. These emissions do not count against us in the IPCC's formal reports



Can only be eliminated by eliminating our fossil exports businesses

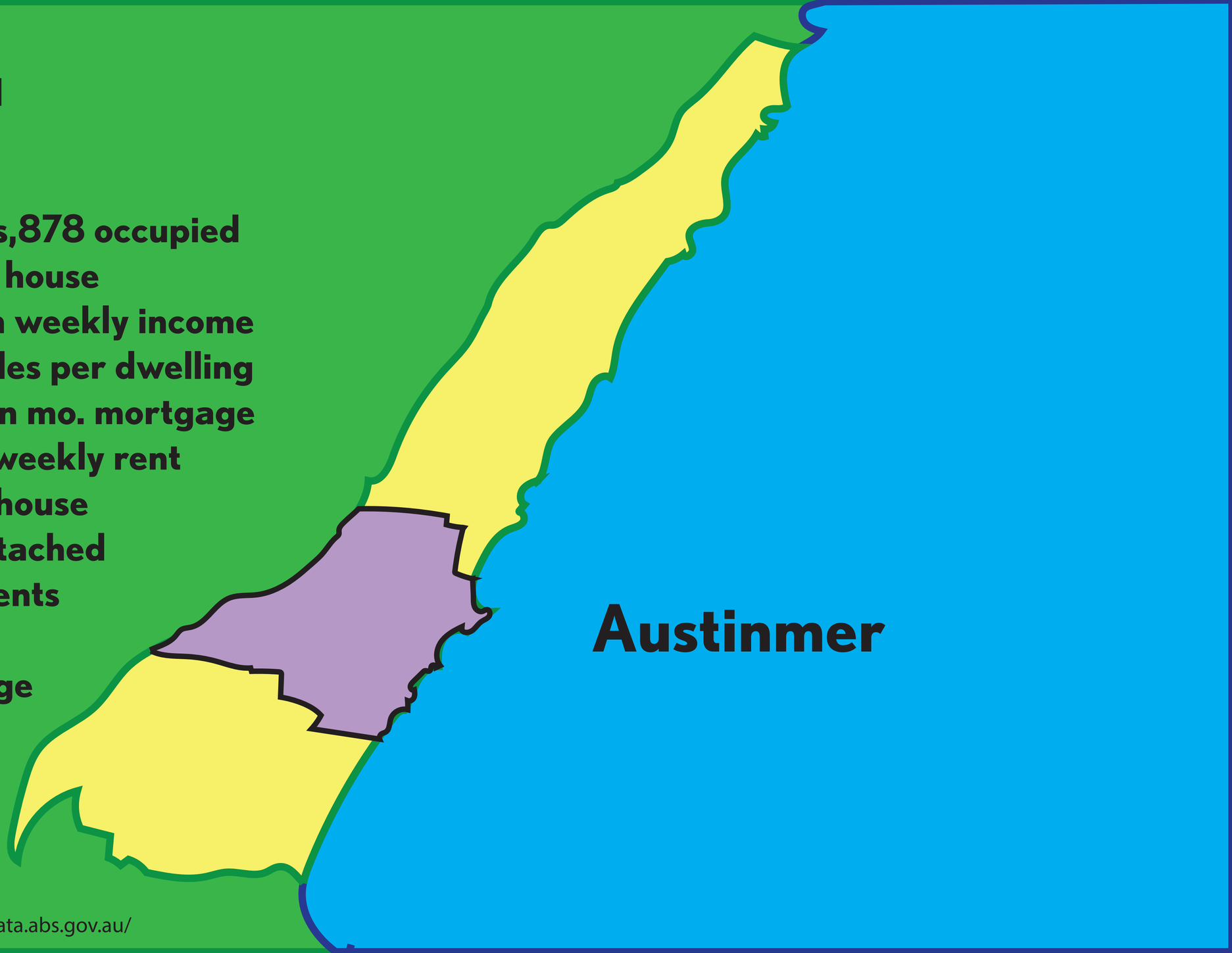
NEED REPLACEMENT EXPORTS :
(eg. Green Metals)

6. LOCAL NEWS

COMMUNITIES WIN

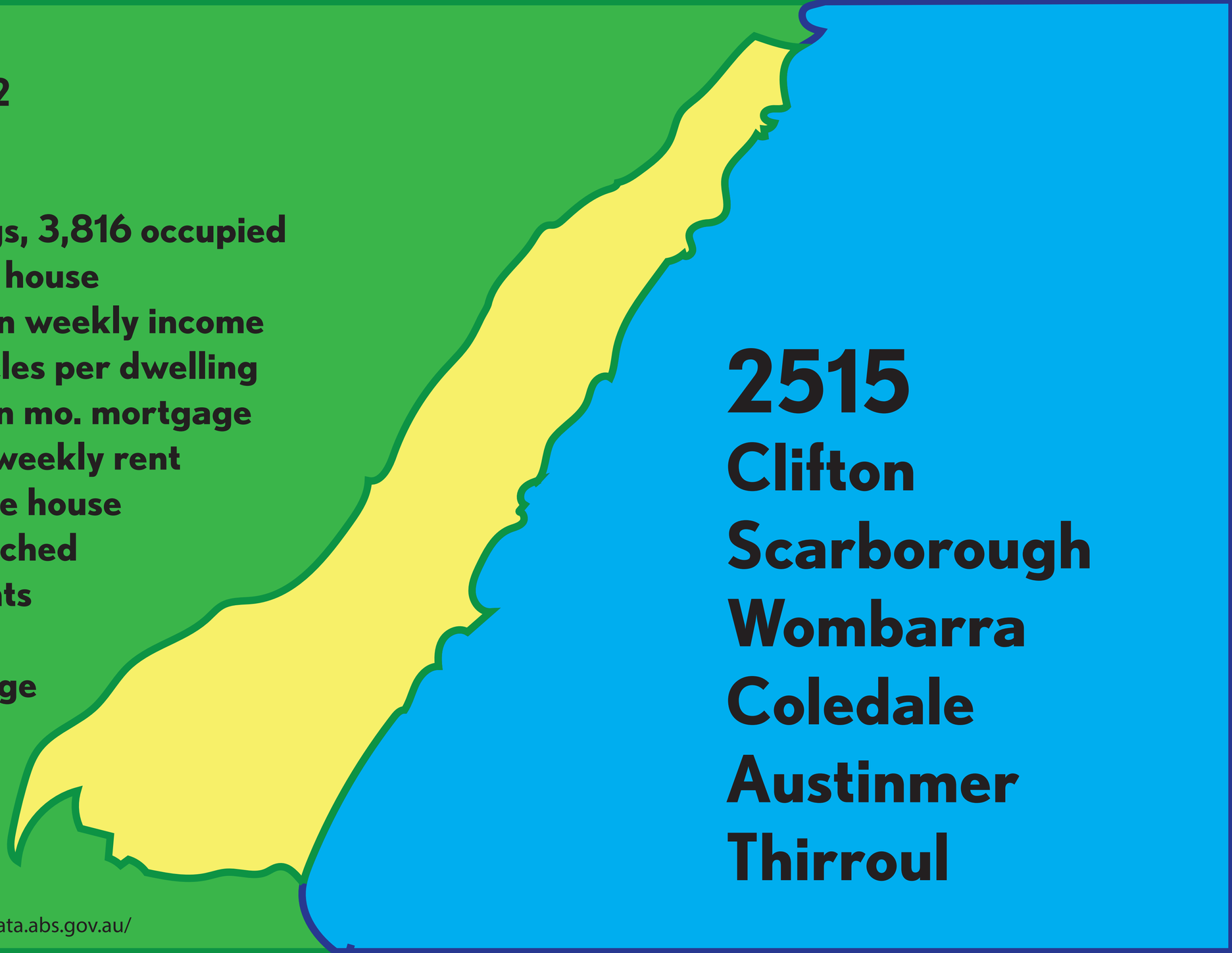
What does it look like in an example community ?

2,560 people
Median Age 41
678 families
1,288 children
1,016 dwellings,878 occupied
2.7 people per house
$2,031 median weekly income
1.9 motorvehicles per dwelling
$2,383 Median mo. mortgage
$473 median weekly rent
79% separate house
10.4% semi-detached
9.7% appartments
41.7% owned
35.6% mortgage
20% rented



https://quickstats.censusdata.abs.gov.au/

11,112 people
Median Age 42
3,060 families
5,814 children
4,496 dwellings, 3,816 occupied
2.7 people per house
$2,006 median weekly income
1.8 motorvehicles per dwelling
$2,362 Median mo. mortgage
$452 median weekly rent
80.6% separate house
10% semi-detached
8% appartments
39.4% owned
38.3% mortgage
19.3% rented



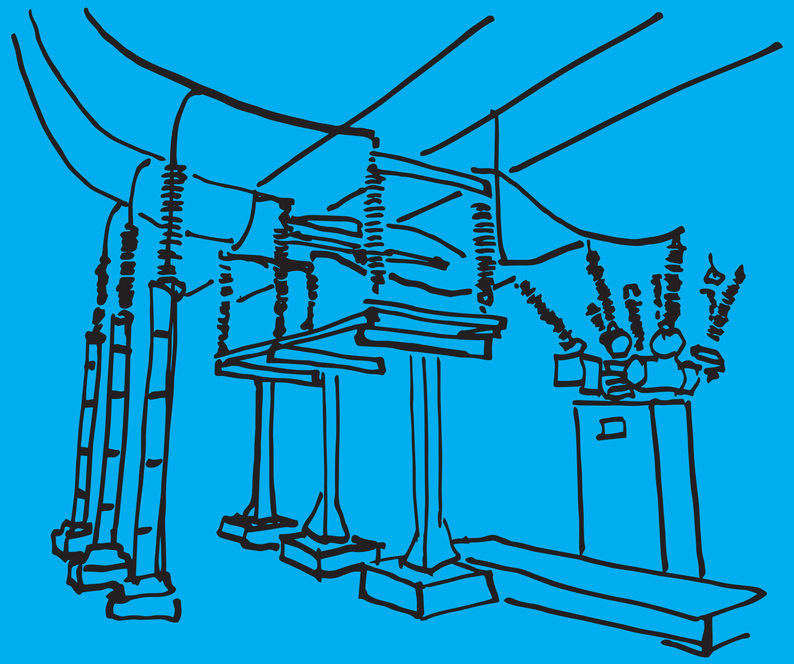
2515

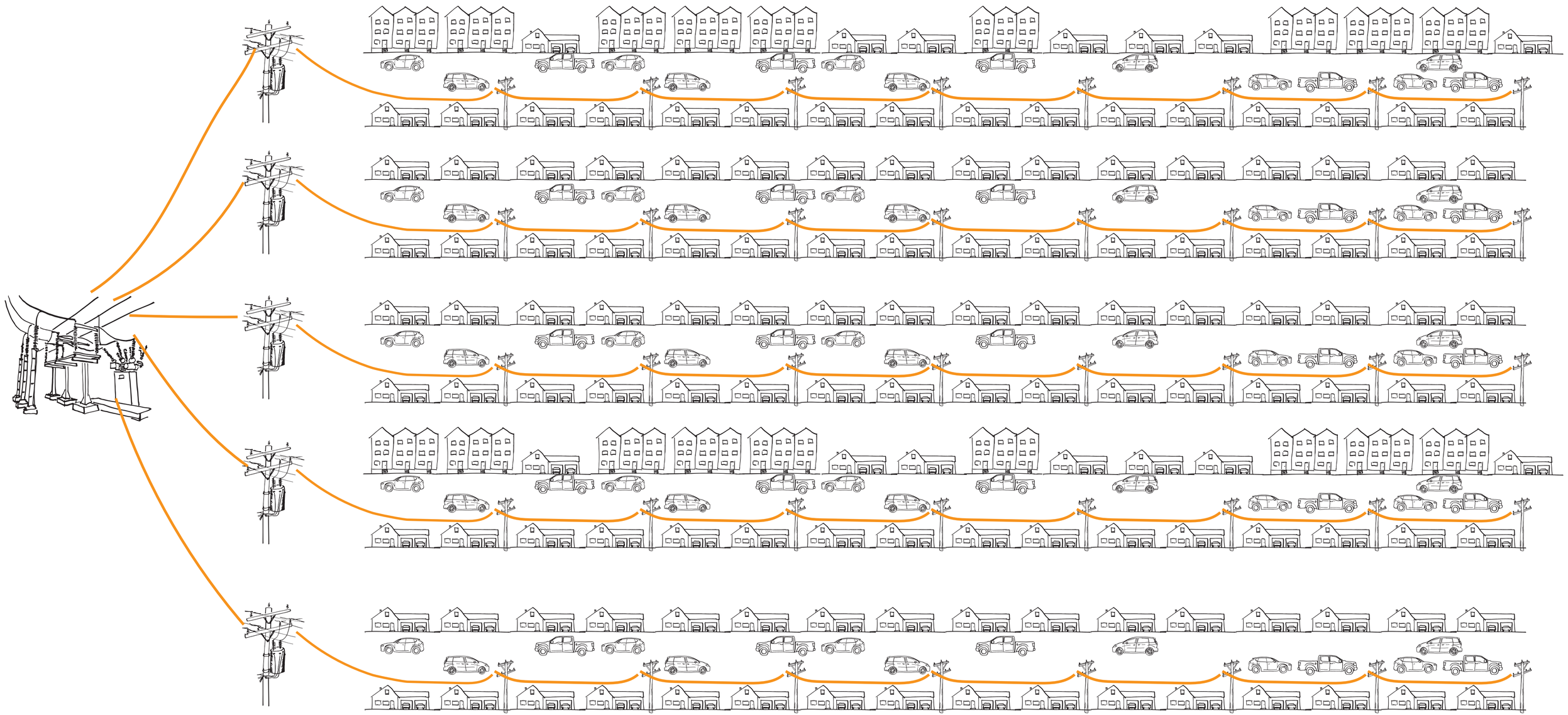
Clifton
Scarborough
Wombarra
Coledale
Austinmer
Thirroul

https://quickstats.censusdata.abs.gov.au/

11kV
Distribution Network
(Endeavour Energy)

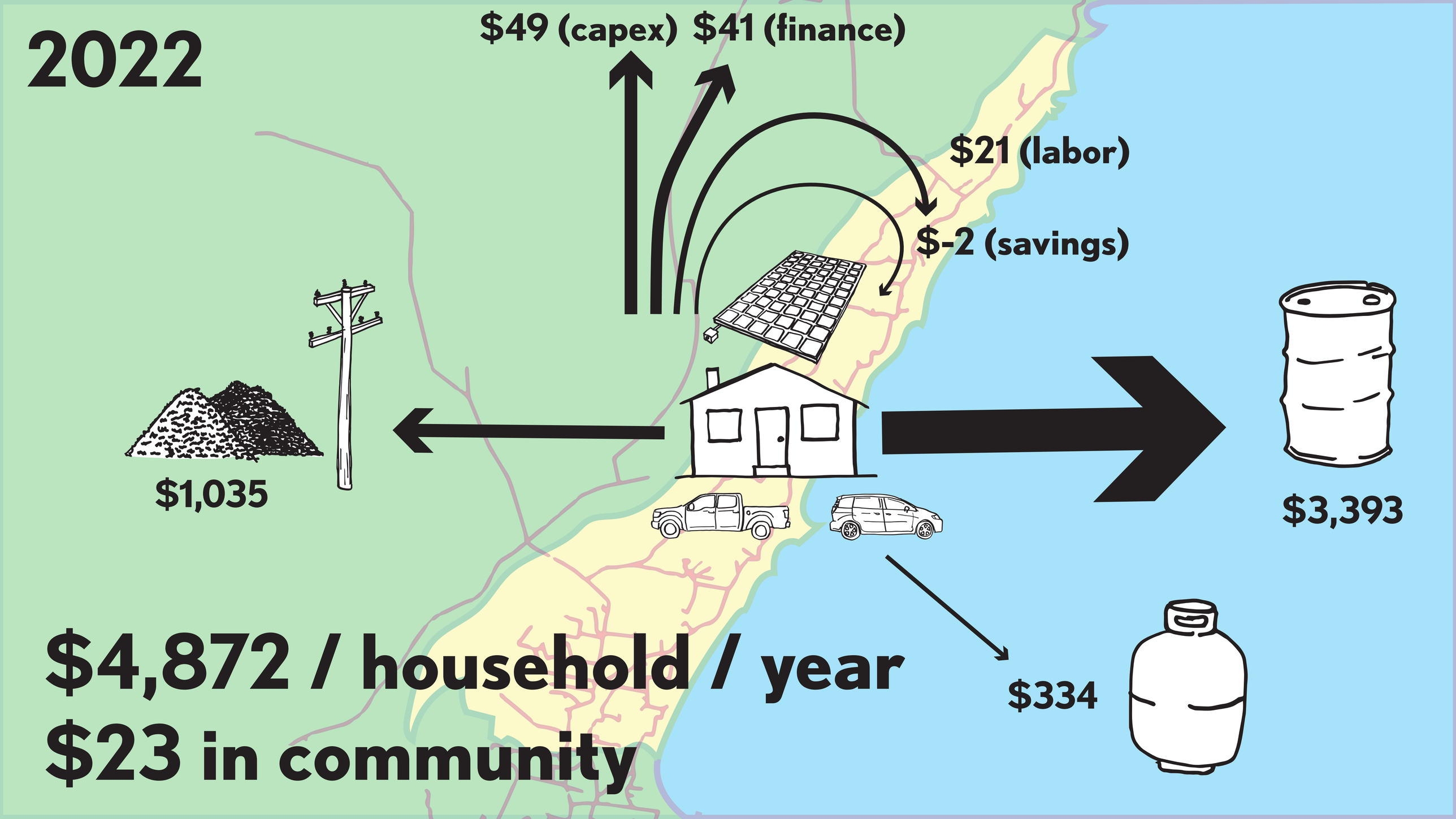
Wombarra
Zone Substation





Fairly typical substation serving 4,400 households on 4 - 5 “strings”

What do we do today ?


2022
$49 (capex)
$41 (finance)
$21 (labor)
$-2 (savings)
$1,035
$3,393
$334
$4,872 / household / year
$23 in community

What could we do tomorrow ?

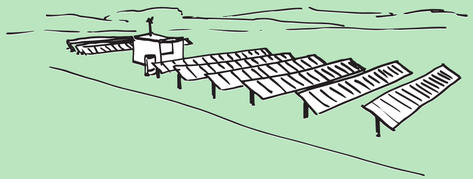
2030

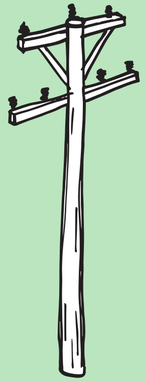
$-1,165 (capex)

$-119 (finance)

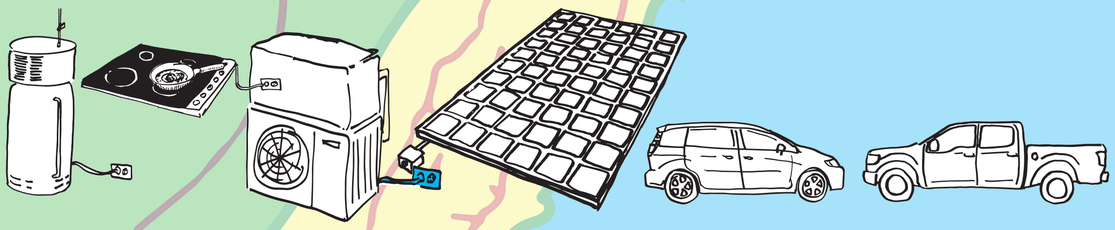
$336 (labor)

$-4,351 (saved on energy)





$1,044



$0

$0

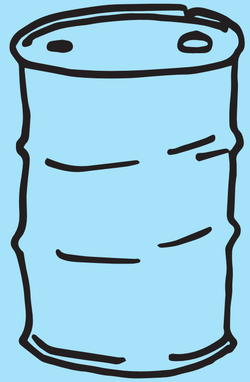
$(-5,299) / household / year

$5,635 in community spending

Which is great for the household...

but even better for the community.

2022 (2515 spending)



$14,856,167 fossil fuel spend.

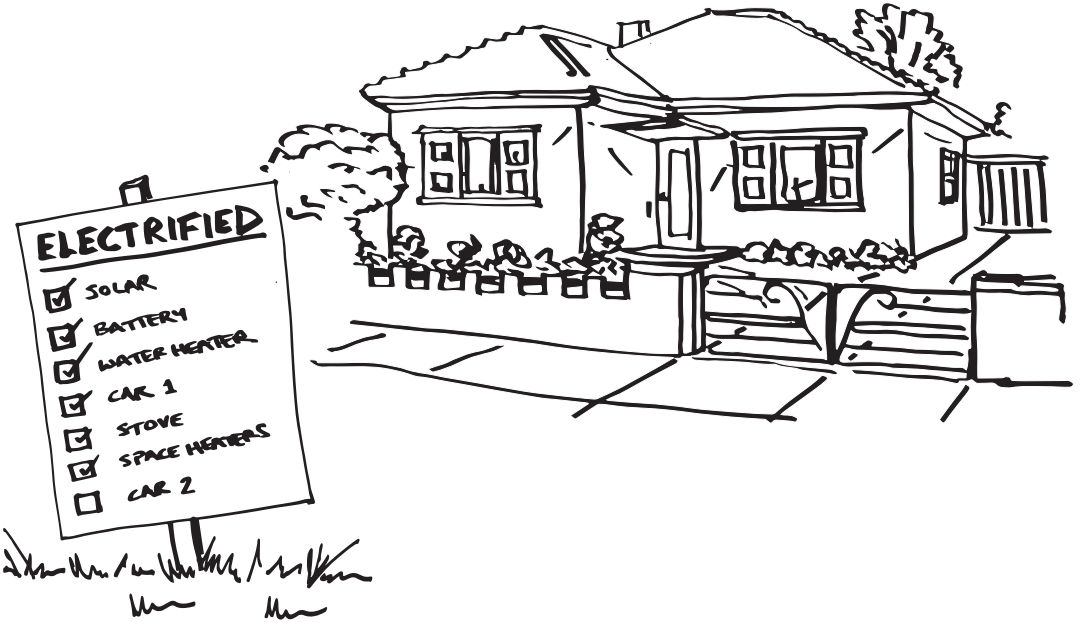
$4,124,527 grid electricity spend.

2030 (2515 spending)

$4,162,673 grid electricity spend

$1,339,910 local electrification labor (~25 jobs)

$21,122,377 community savings (~400 jobs)


ELECTRIFIED
SOLAR
BATTERY
WATER HEATER
CAR 1
STOVE
SPACE HEATERS
CAR 2

REWIRING AUSTRALIA

ELECTRIFY EVERYTHING

POLICY. REGULATORY.

COMMUNITY. FINANCE.

Advocating for the largest possible investment by the government in money-saving demand side electrification.

Low cost loans.
Tax reform.

Agitating for wholesale reform of our electricity market and regulatory bodies.

Australian households deserve a seat at the head of the table. Successful regulatory reform will prioritise lowering the cost of energy for Australian households while increasing system reliability and resilience and incentivising electrification.

Accelerating work on our first pilot community, 2515. Support 10 new communities to follow along while building support and leadership in every community in Australia.

Deliver this energy transition with the fewest headaches, more local support, and the best ideas.

Modelling the national energy system, both supply and demand, to build optimised models of decarbonisation and electricity networks. Unconstrained by vested interests we will be able to model and share what success would look like. We will be looking at households, the commercial sector, and industry.

Demonstrating that Australia has now passed through an economic transition whereby full-speed electrification is the best economic and climate pathway for the country.

The investment pays for itself and in fact lowers the cost of energy and saves us trillions of dollars as a nation.