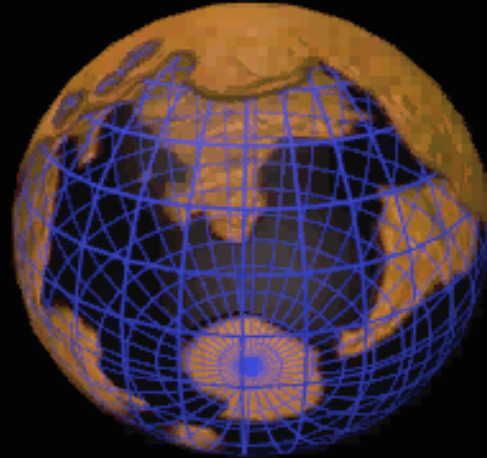


Presbyterians For Earth Care, January 11, 2025



**Breaking Down the Silos:
Connecting the Dots between
Waste Crisis and the Climate Crisis**

Presentation by: Chris Burger



Earth Day –April 22, 1970

- Celebrated the richness and beauty of our planet.
- Raised awareness about the need to protect the planet and preserve its ability to sustain life.



Earth Day –April 22, 1970

Many used the opportunity to protest and demand that:

- Government enact legislation to protect the environment,
- Business act more responsibly.



Earth Day – Our Own Reflections

- Shouldn't we be taking responsibility for our own actions?
- What was the biggest personal impact we had on the environment?

Answer: The waste we produced and the non-renewable energy we consumed.



Earth Day – Commitment

**We will not buy anything
that we are unwilling
to take Responsibility for**

Disposal is not an option

(Disposal shifts consequences to someone else)



Reducing Our Waste Production

- **We Reuse, Recycle,
and Compost, and**
- **Avoid what we cannot
Reuse, Recycle or
Compost**



32 Years of Waste

(10 of those years as family of 4)



Last time we took our trash to the landfill – Spring 1992

15 pounds



Earth Day – Commitment

**We will strive to become
more energy efficient and
use renewable energy
whenever possible.**



Reducing Our Energy Consumption

- **Designed and built home for energy efficiency**
built 1978, 2500 sq. ft.
- **Powered with renewables**
(heating/cooling/lights/electronics/hot water)
passive geothermal, wind, hydro,
passive & active solar,
(NO wood)

Built in 1978

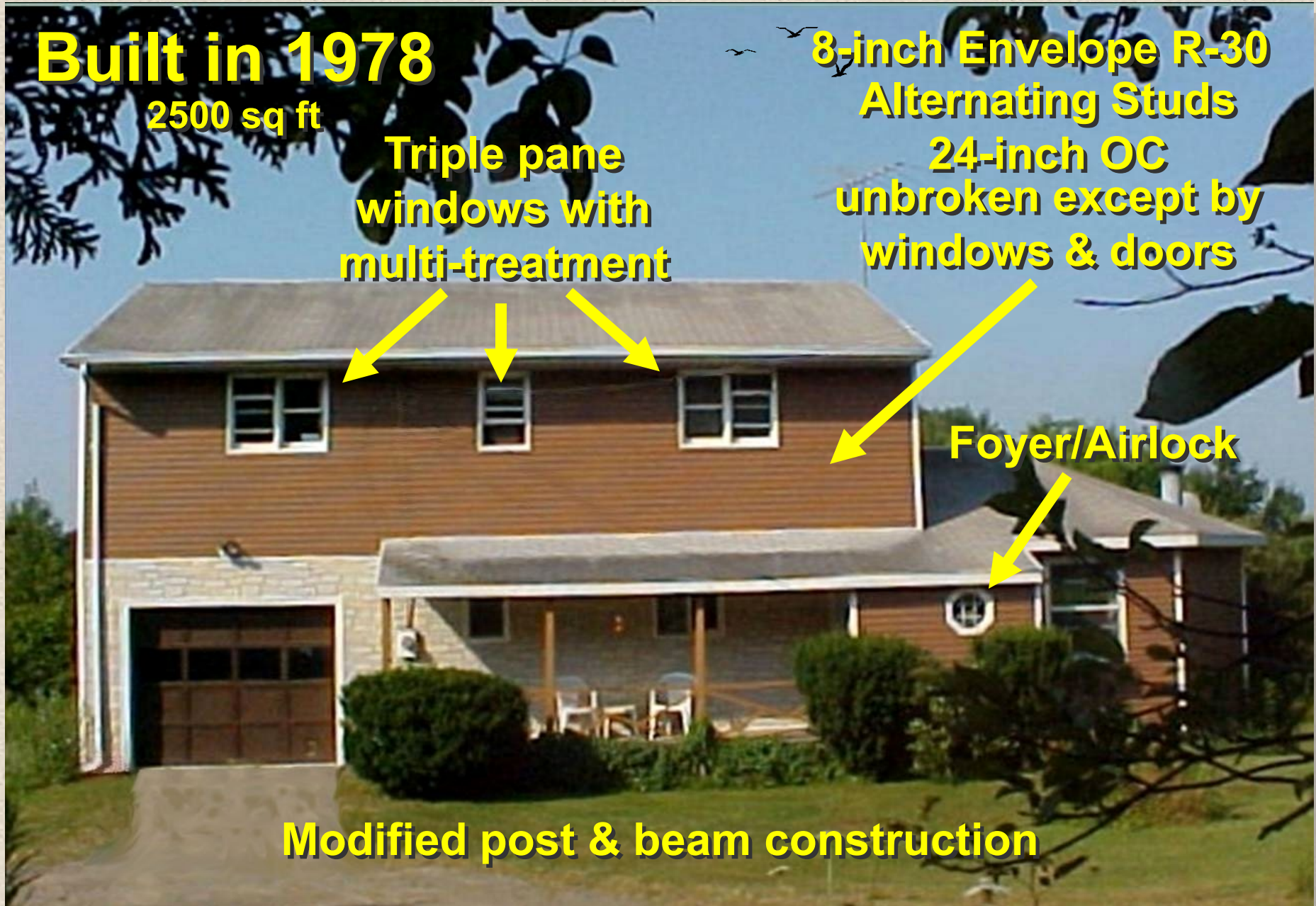
2500 sq ft

**Triple pane
windows with
multi-treatment**

**8-inch Envelope R-30
Alternating Studs
24-inch OC
unbroken except by
windows & doors**

Foyer/Airlock

Modified post & beam construction



Built in 1978

2500 sq ft

**21 (368 sq.ft.)
Photovoltaic
Solar Panels**

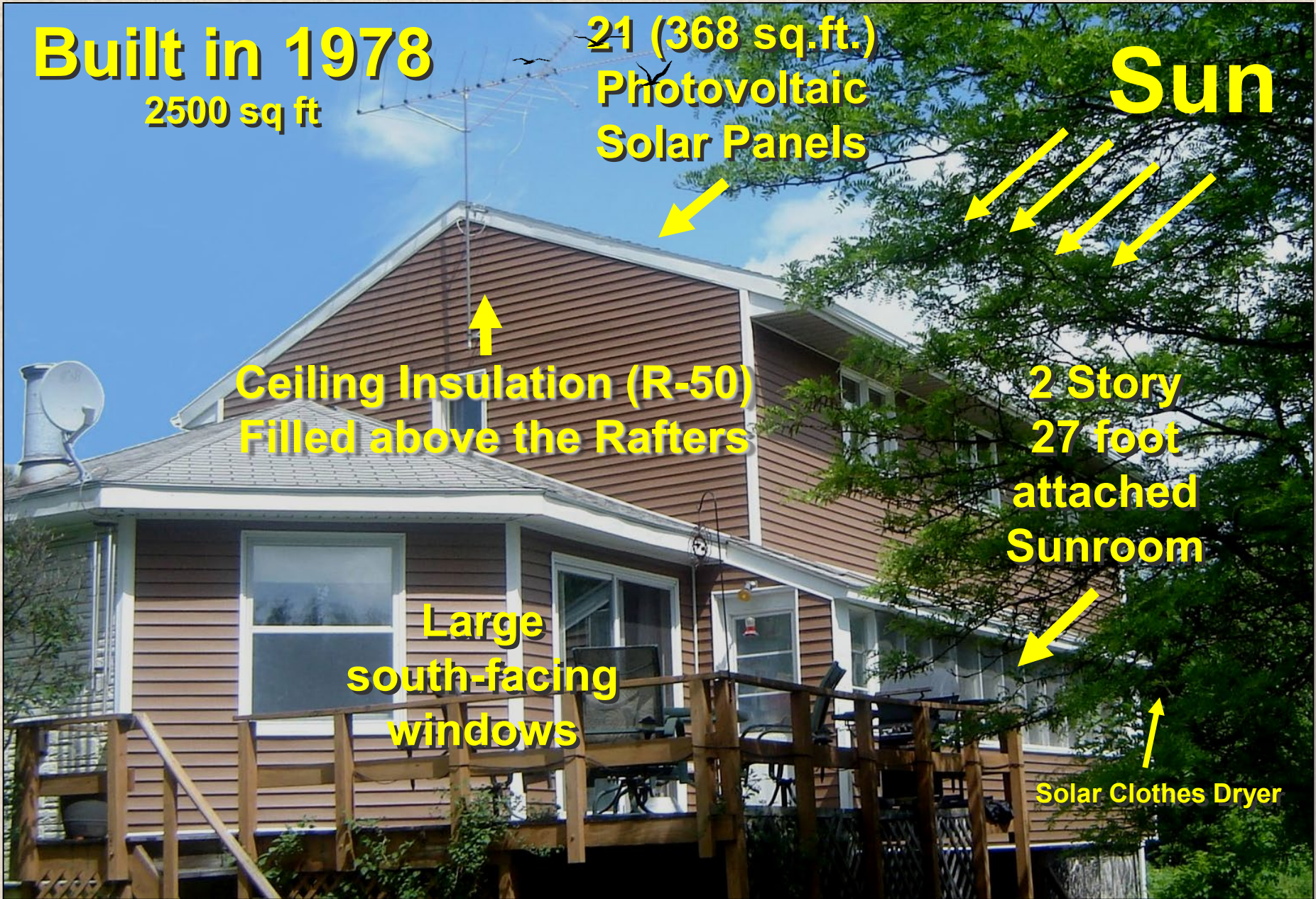
Sun

**Ceiling Insulation (R-50)
Filled above the Rafters**

**2 Story
27 foot
attached
Sunroom**

**Large
south-facing
windows**

Solar Clothes Dryer





2021 Ford Mach E

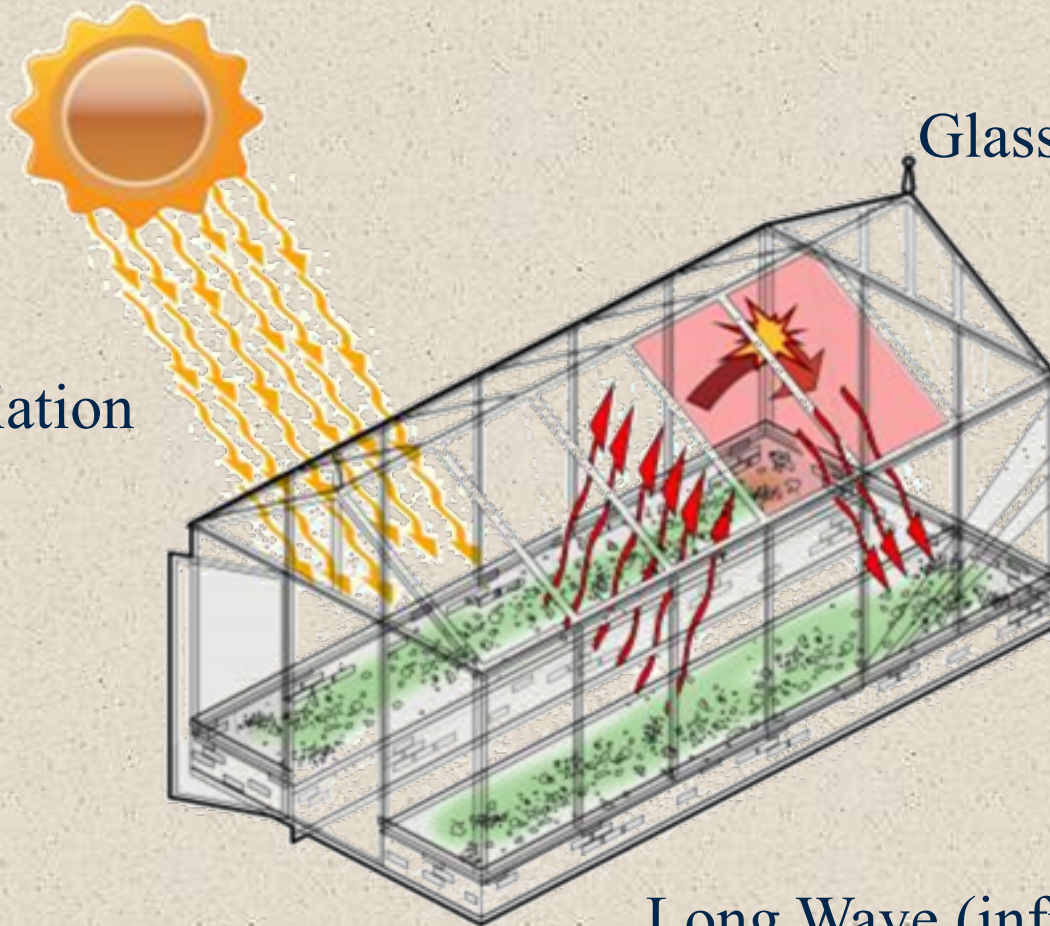
AWD, Range: 230 miles (summer) 190 miles (winter)





Greenhouse Effect

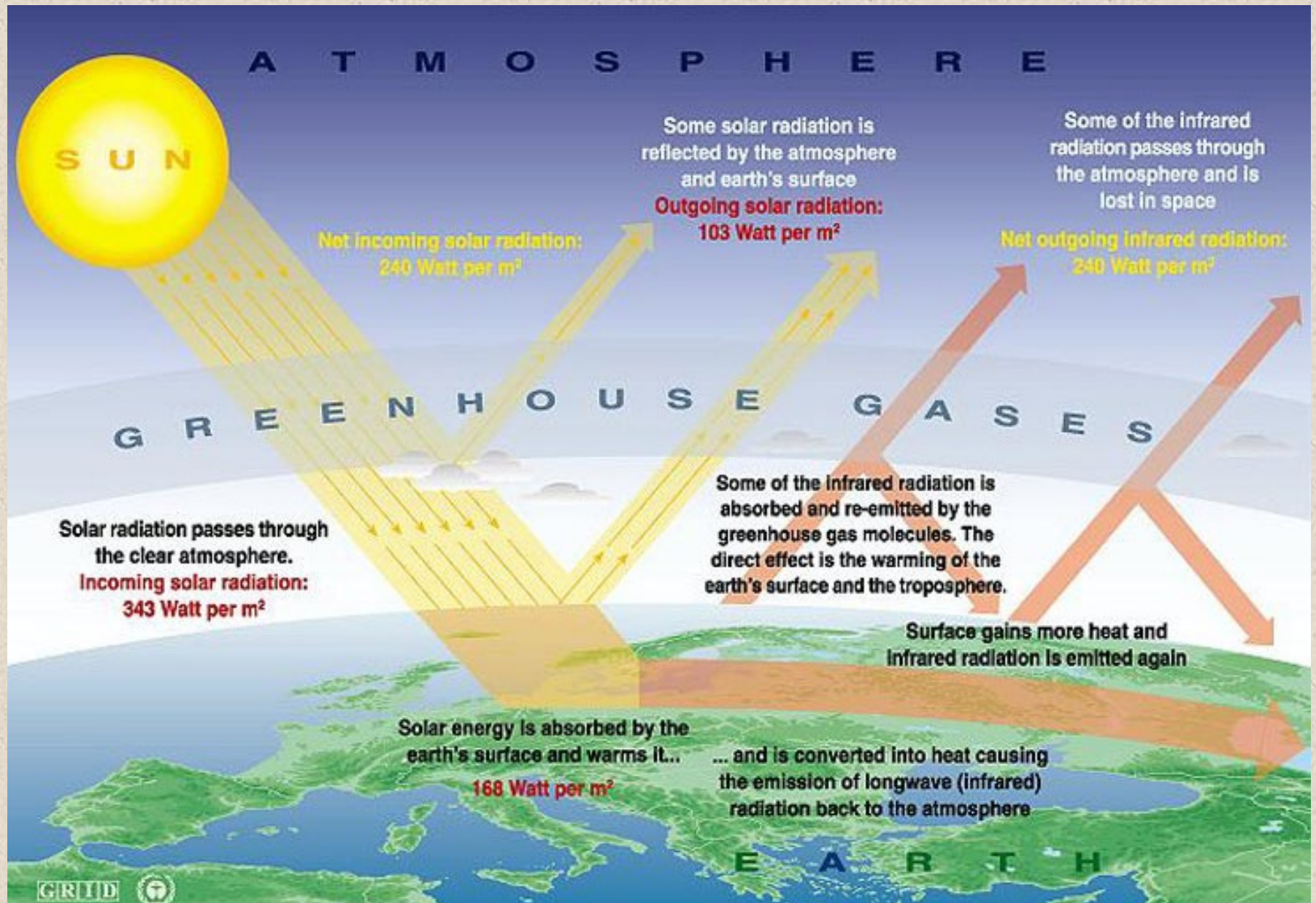
Solar Radiation



Blocked by
Glass/Greenhouse Gas

Long Wave (infrared) Radiation

Greenhouse Effect



Devonian Period (400 million years ago)

Atmosphere

Created planet for

**Water covers most of planet
plants, algae, & fish**

42 times more Water Vapor



Formation of Fossil Fuel (sequestering of Carbon)

- Plants and Algae separate carbon from carbon dioxide (**CO₂**) in the atmosphere (**Photosynthesis**)
- Carbon (**C**) is locked within the plant tissue and oxygen (**O**) is released (**Carbon Sequestering**)
- Marine Life eat plants/algae. Plants, Algae and Marine Life die
- If covered, tissues decay in the absence of free oxygen to form a hydrocarbon (**CH_x**) (**Anaerobic Digestion**)



Formation of Fossil Fuel

- If plant tissue accumulates in swamps or bogs, it forms **peat**.
- If peat then becomes buried and put under pressure; water is squeezed out, then heated, it becomes **coal**.
- If plant tissue or animal tissue settle to the bottom of a body of water and then covered with sediment; it forms **oil** or **gas** deposits.
- If the tissue mixes with the sediment; it forms a **shale oil** or **shale gas** deposit

Evolving vs. Devolving

Sequestering carbon changed Earth from a planet with a high carbon (CO₂) atmosphere, bogs, & shallow seas into a planet hospitable to higher life forms

When we burn fossil fuels ($\text{CH}_x + \text{O} = \text{CO}_2 + \text{H}_2\text{O}$), we are essentially reversing this process

40 times more CO₂

20 times more Oxygen



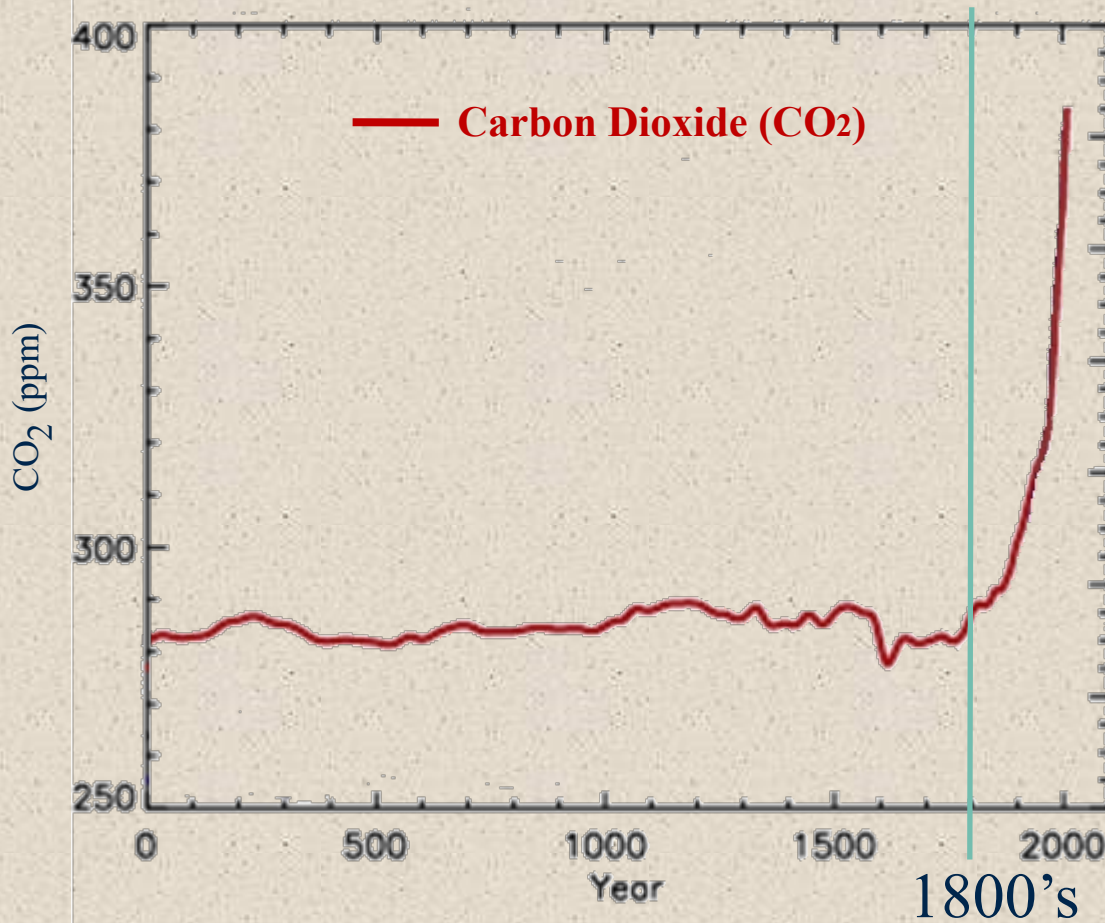


Greenhouse Gas Concentrations

We are **releasing** carbon faster than the planet is **sequestering** carbon

Unsustainable

Concentration of Carbon Dioxide

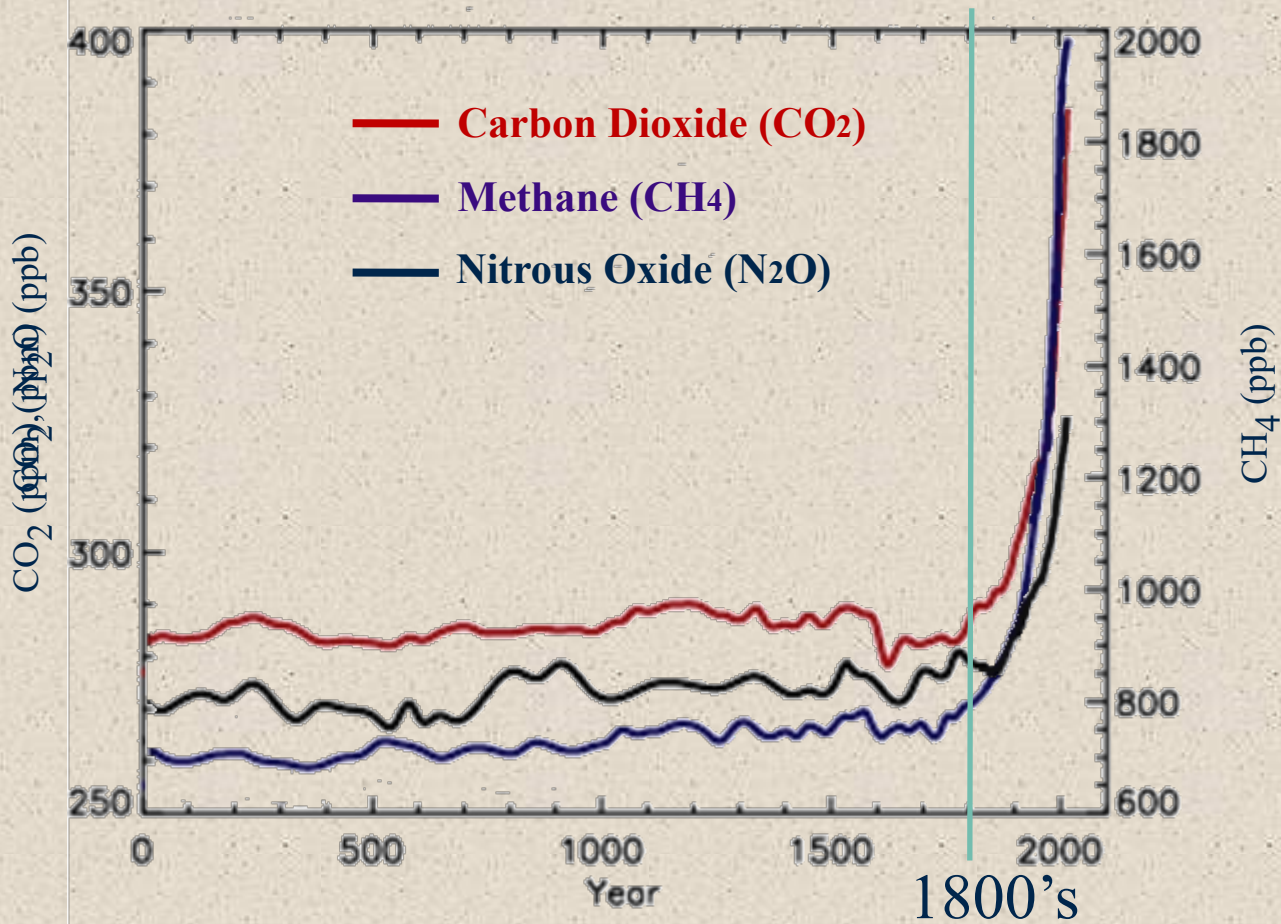




Greenhouse Gas Concentrations

There are other green house gases besides CO₂

Concentrations of Greenhouse Gases





Reducing Greenhouse Gas Emissions by addressing Waste Crisis

- Reduce burning of fossil fuels by replacing extractive economy with circular economy.
- Curtailing the use of plastic along with increasing the recyclability of plastic, avoiding the use of plastic as fuel source.
- Reduce Methane (CH_4) emissions by banning organics from landfills.



Resource Utilization

Extract → Process → Use → Dispose

Unsustainable

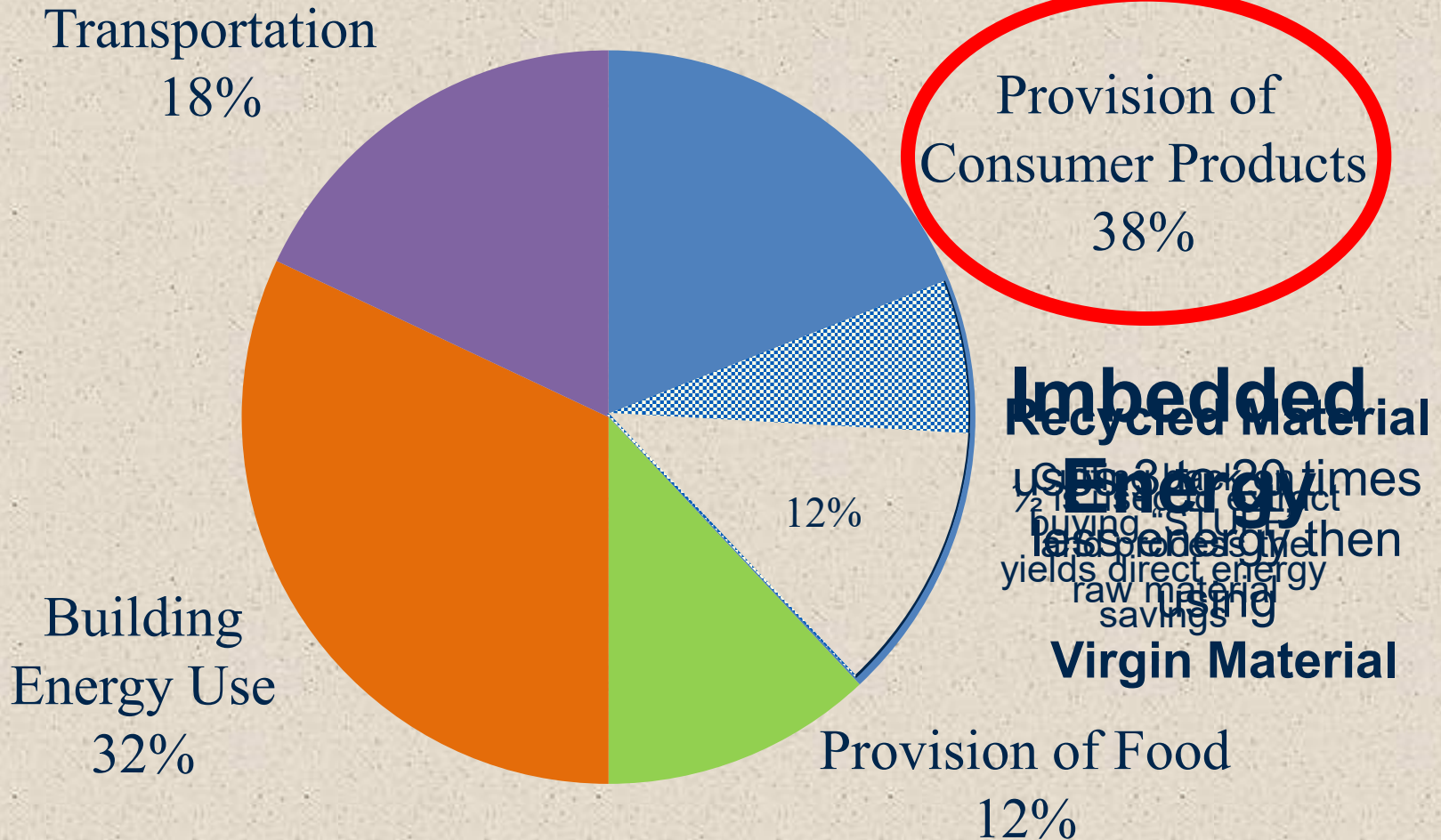
in a finite World with finite Resources

Negative
Impacts

Negative
Impacts



US Energy Use





Resource Utilization

Potential to Reduce US Energy use by **12% or more**



Circular Economy



Reducing Greenhouse Gas Emissions by addressing Waste Crisis

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Resource Utilization

Extract → Process → Use → Dispose



Negative
Impacts

Unsustainable

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Negative
Impacts





Resource Utilization

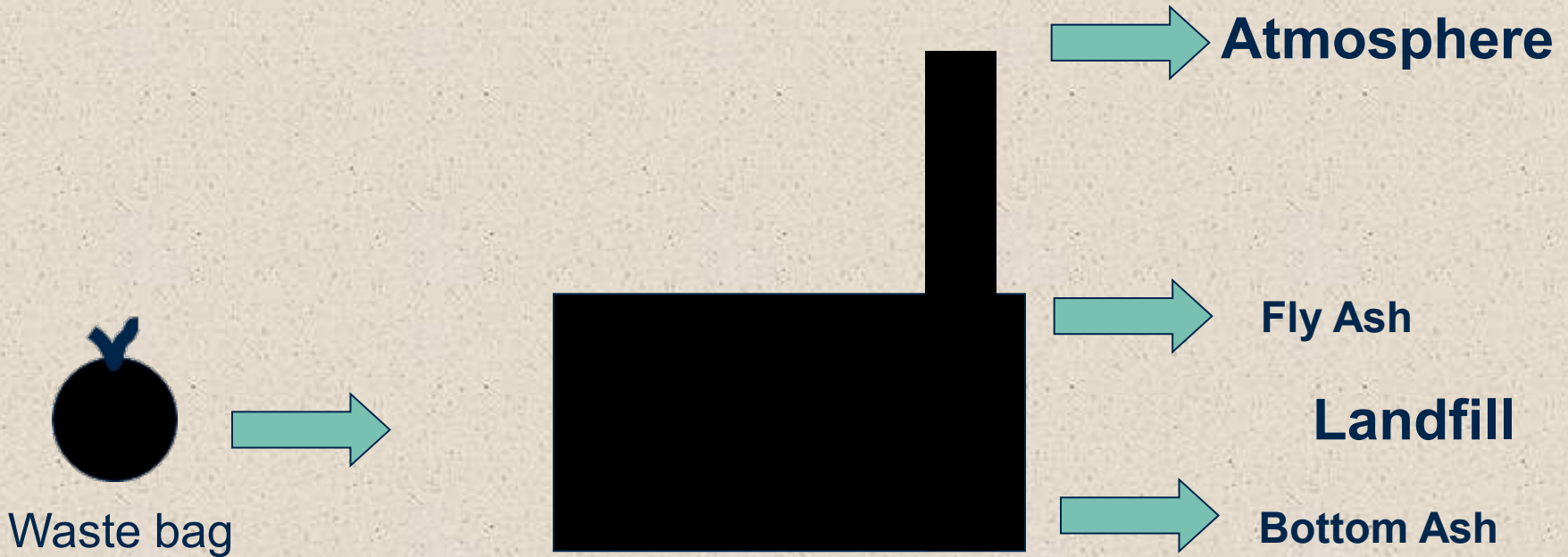
Incinerating collected used plastic for energy is the fossil fuel industry's

“PLAN B”

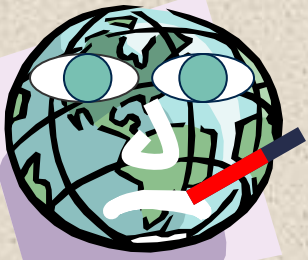


Disposal - Incineration

Does not make waste disappear



Degrades or rules out resource utility



Disposal - Incineration

**Fly Ash and
Bottom Ash
Landfilled**



Disposed into Air



Resource Utilization

Think of plastic as
**Sequestered
Carbon**
to be recycled,
not burned.



Resource Utilization

226th General Assembly (2024) Overture

[ENV-03] On Becoming Free from Plastic Pollution

- 1. Encourage all our settings to commit to changing from a disposable culture to a reusable, sustainable one.**
2. Encourage education within our congregations and in our communities to advocate for alternatives to single use plastics, whether through mitigation efforts and campaigns or by supporting local and state bans on single use plastics.
3. Encourage all settings of the Church to determine the best pathway forward for strategies and actions to mitigate plastic pollution.
4. Reduce the use of single-use plastics and packaging.
5. Commend all settings of the church to join in possible opportunities for participation in addressing plastic pollution.
6. Acknowledge that accommodations in expectations need to be made for certain impacted groups such as those who are disabled or unhoused.
7. Encourage people in all settings to speak truth to the public square against plastic pollution of our planet.



Reducing Greenhouse Gas Emissions by addressing Waste Crisis

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Global Warming Potential

(CO₂ Equivalents vs. Radiative Forcing)

CO₂ Equivalent for Methane calculates CH₄
25 times more potent than CO₂ (CO₂e)

Used by US Environmental Protection Agency

Radiative Forcing for Methane calculates CH₄
79 and 105 times more potent than CO₂

Used by UN Intergovernmental Panel on Climate Change



Greenhouse Gas Contribution

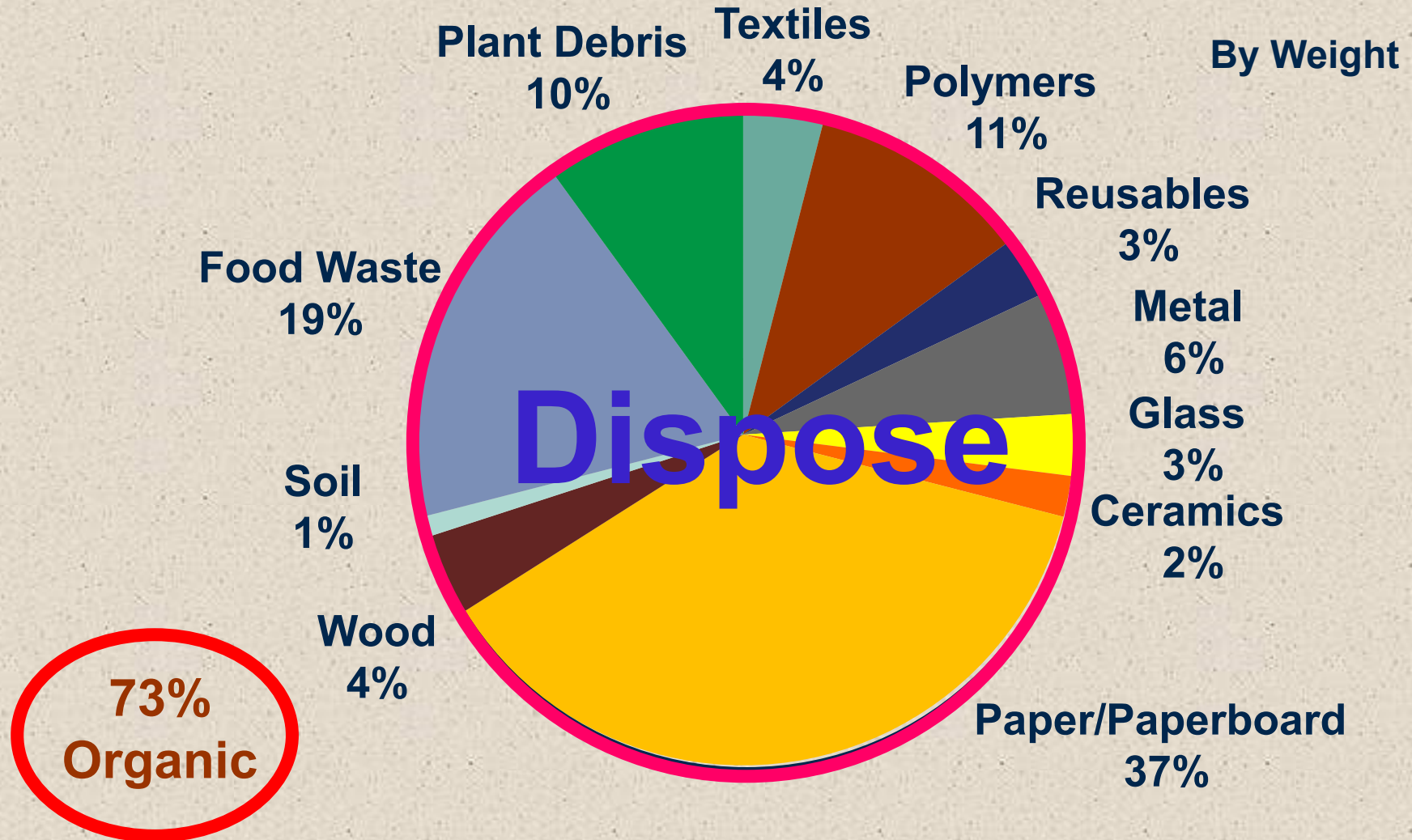
2022

Greenhouse Gases	Chemical Formula	Anthropogenic (Human Activity) Sources	Global Warming Contribution
Carbon Dioxide	CO ₂	Fossil Fuel Combustion Cement Production	78%
Methane	CH ₄	Natural Gas Systems Waste Landfills Livestock	16%
Nitrous Oxide	N ₂ O	Fertilizers Industrial Processes Fossil Fuel Combustion	6%

Source: EPA (adjusted)

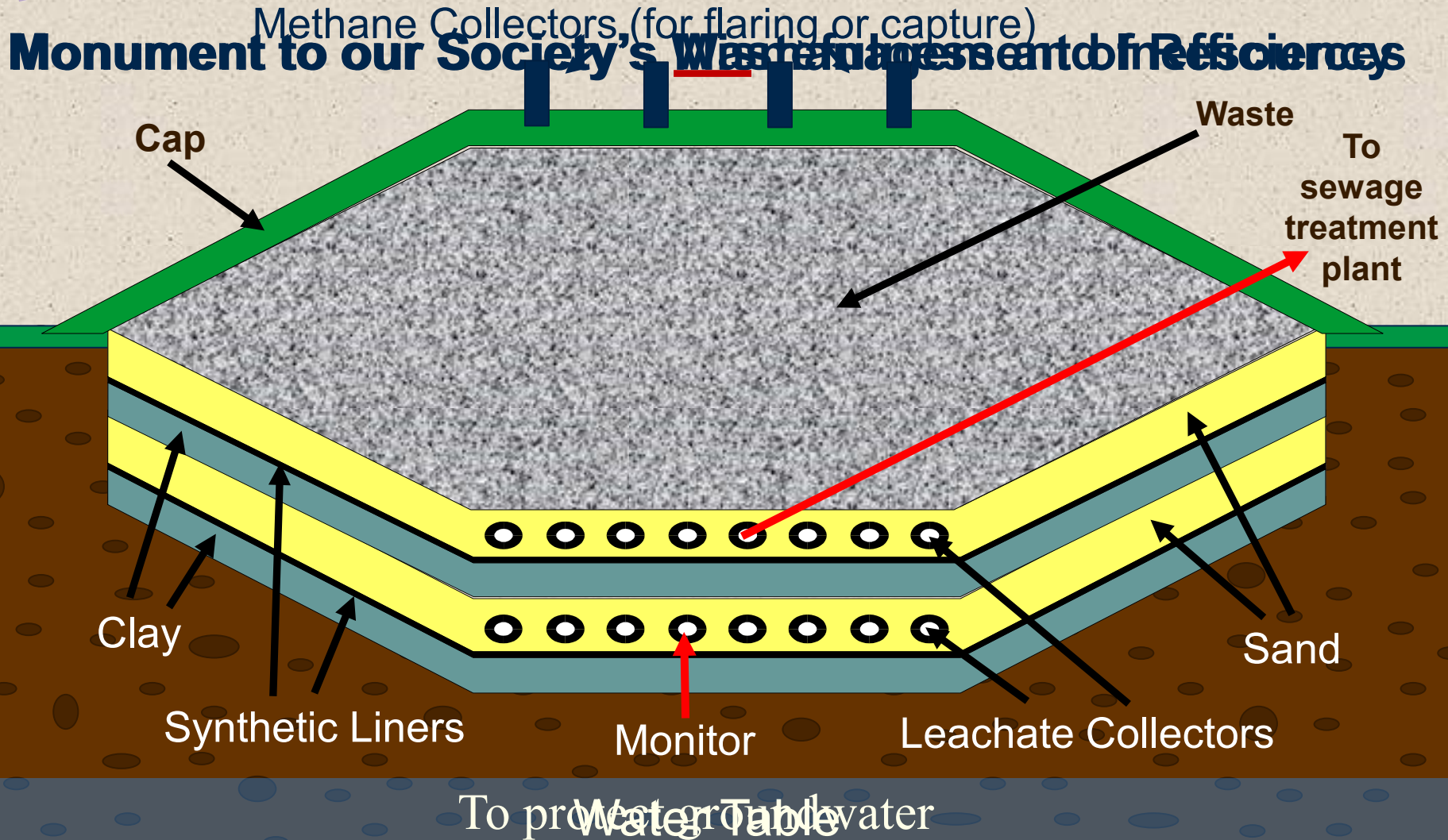


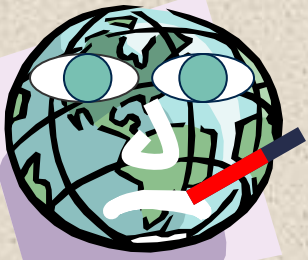
What society throws away





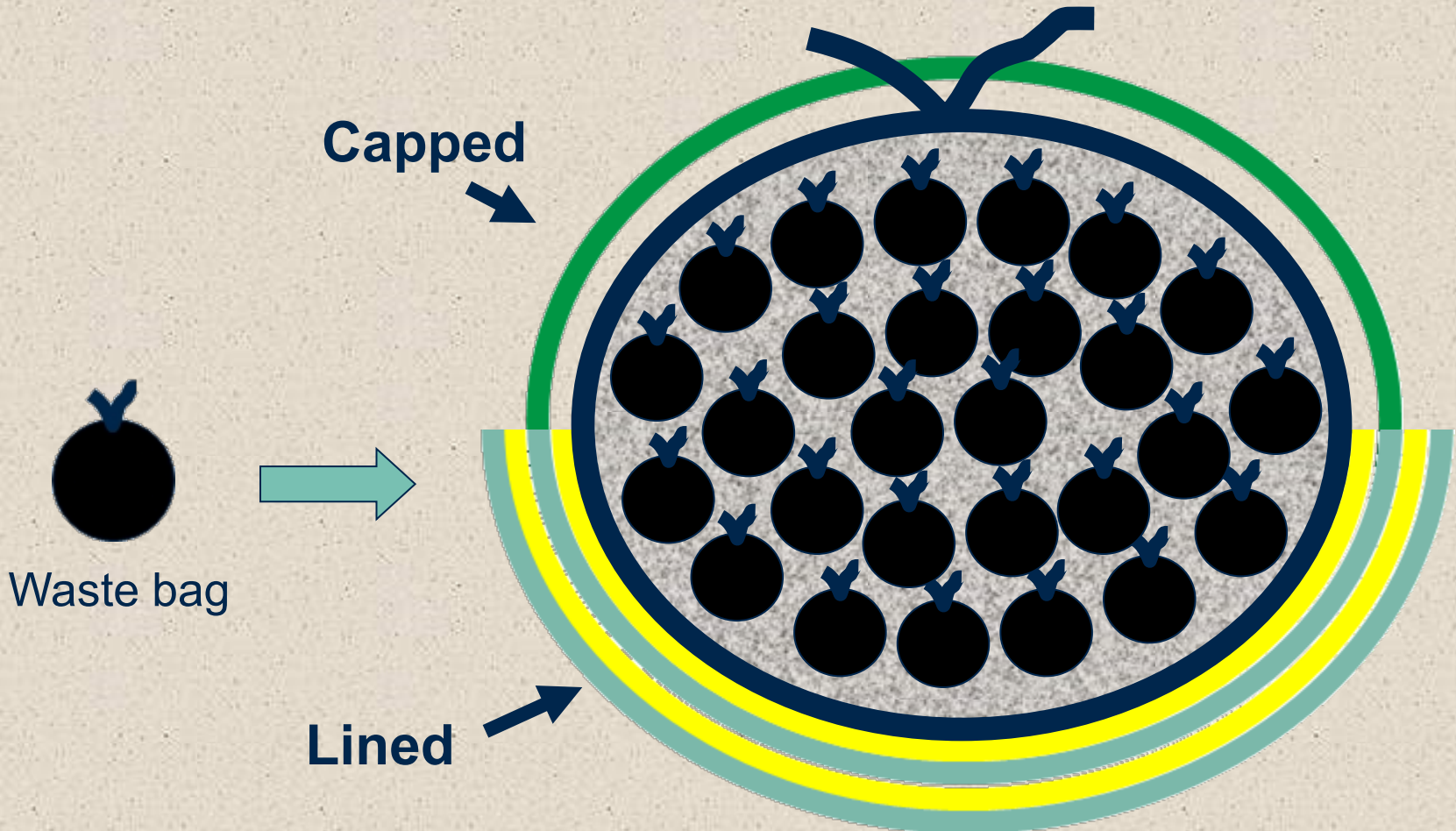
Disposal - Landfill





Disposal - Landfill

Gives ill health by just dealing with waste





Greenhouse Gas Contribution

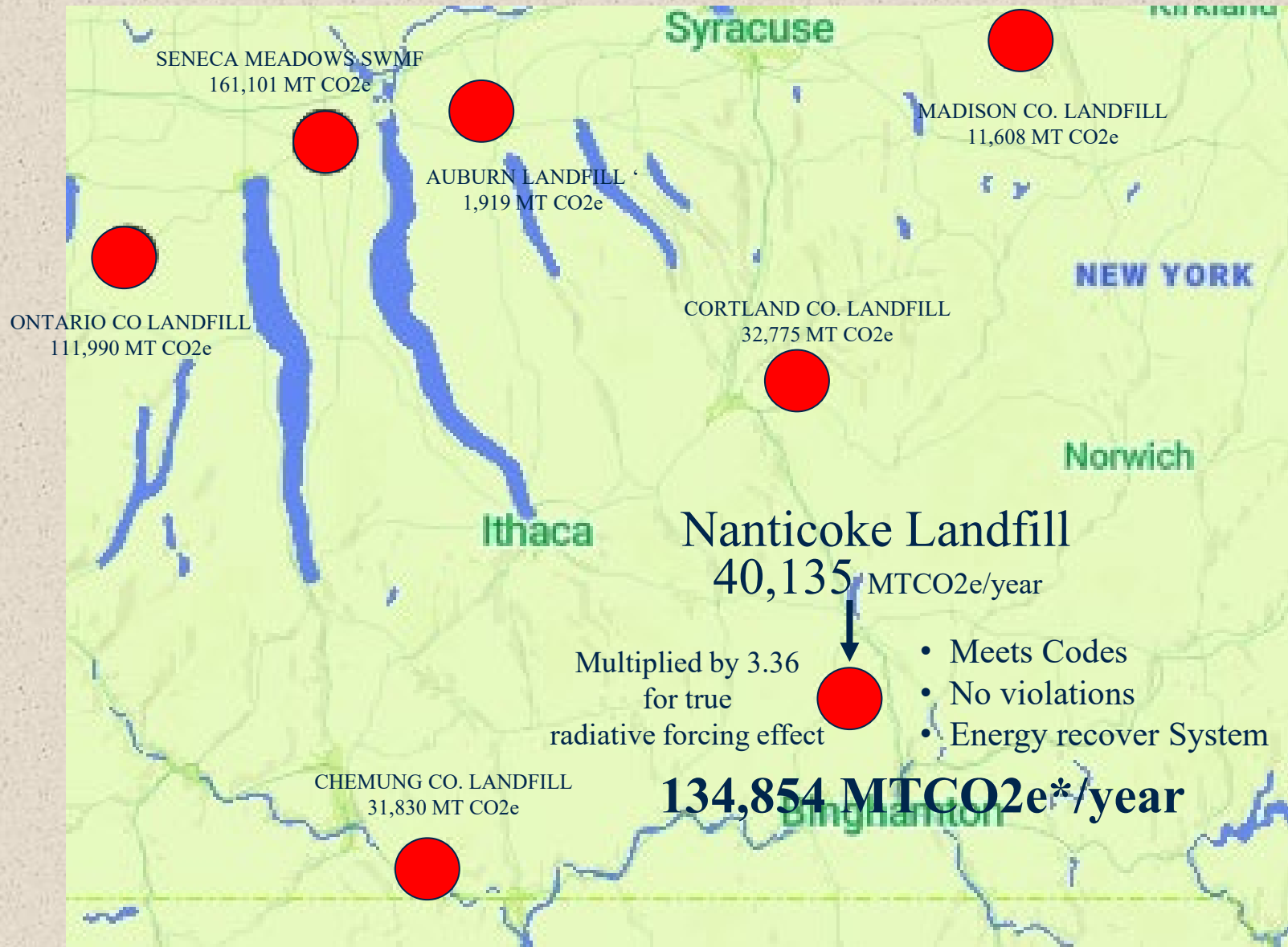
20%

of landfills do not meet environmental standards set by EPA using ground monitoring

67%

of landfills have emissions which exceed levels reported to the EPA, according to satellite data.

Methane Source Points





Greenhouse Gas Contribution

In 2022, landfills contributed

3.7 million metric tons of methane

(or about 311 million metric tons of carbon dioxide equivalent using IPCC formula)

Roughly equivalent to the annual emissions
from driving 70 million ICE vehicles
or operating 83 coal-fired power plants
(204 coal power plants in the United States)



Greenhouse Gas Contribution

Even the best landfills
(with methane capture for energy recovery)
capture only **20 to 25%** of the methane

The Oonk Paradox (Dutch engineer, Hans Oonk):

- Most methane is generated is when landfill gas capture is the least efficient.
- When landfill gas capture is the most efficient, the least methane is produced.



Greenhouse Gas Contribution

- Methane is a greenhouse gas over 84 times more potent than carbon dioxide (CO₂) and **landfills** are one of the largest anthropogenic (human-caused) sources of this gas in the atmosphere
- Methane is generated from organics deposited in the landfill (73% Waste Organic)
- The only effective way to avoid Methane emissions from landfills is to **ban organics** from landfills



Resource Recovery Park

Moving from **Waste Management** to **Resource Management**

**Residual Stabilization
&
Research Center**
(4 % to landfill)
Data to PSC

**Construction
&
Demolition**

**Aerobic
or
Anaerobic
Digester**

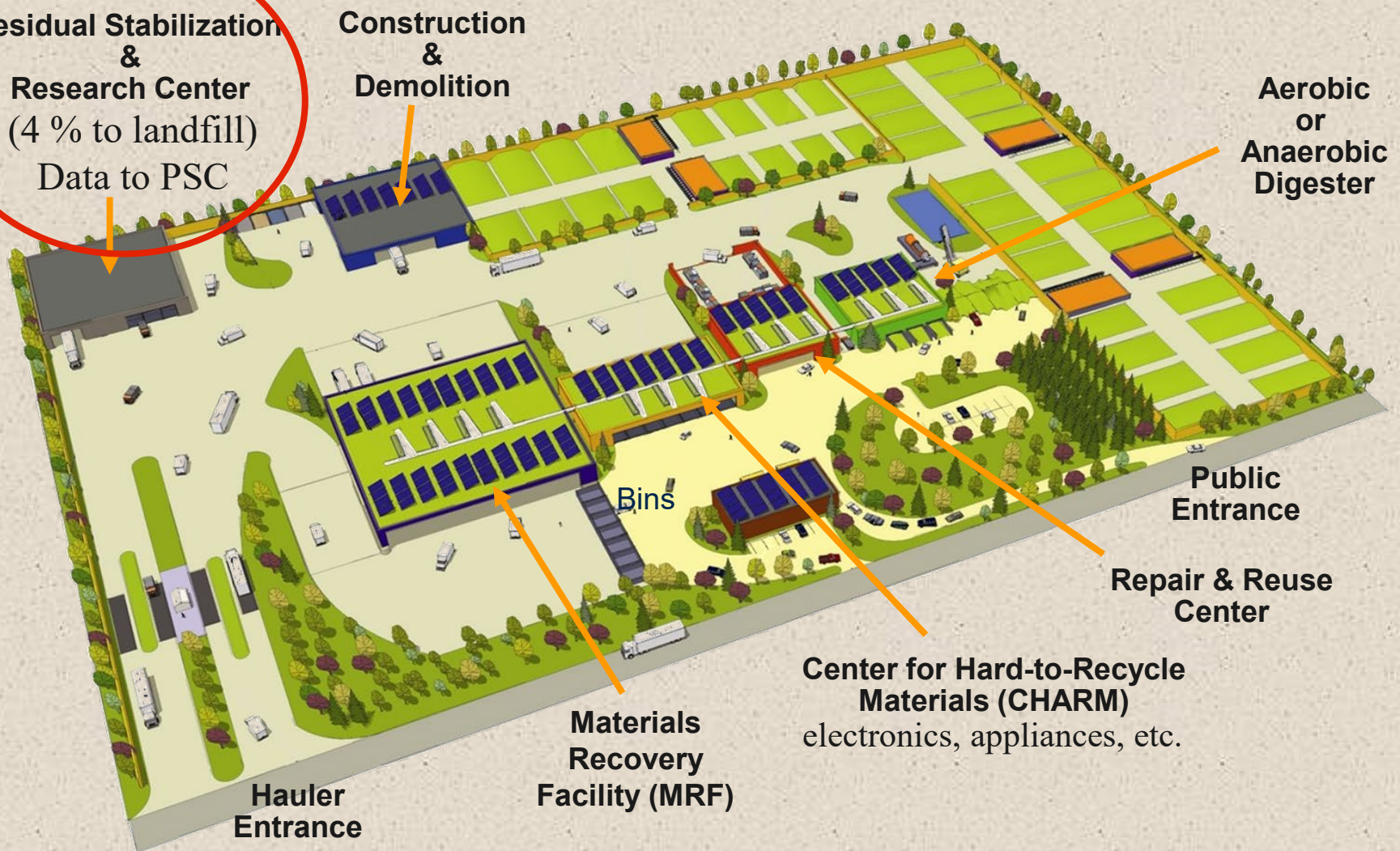
**Public
Entrance**

**Repair & Reuse
Center**

**Center for Hard-to-Recycle
Materials (CHARM)**
electronics, appliances, etc.

**Materials
Recovery
Facility (MRF)**

**Hauler
Entrance**





Seven Steps to reduce your carbon footprint

1. Reuse, Recycle, and Compost
2. Change eating habits
3. Practice energy conservation
4. Make your home as energy efficient as possible (reduce energy waste and loss)
5. Electrify all your home equipment and appliances (including cooking, heating, and hot water)
6. Electrify your transportation
7. Ensure that your electricity comes from a renewable source

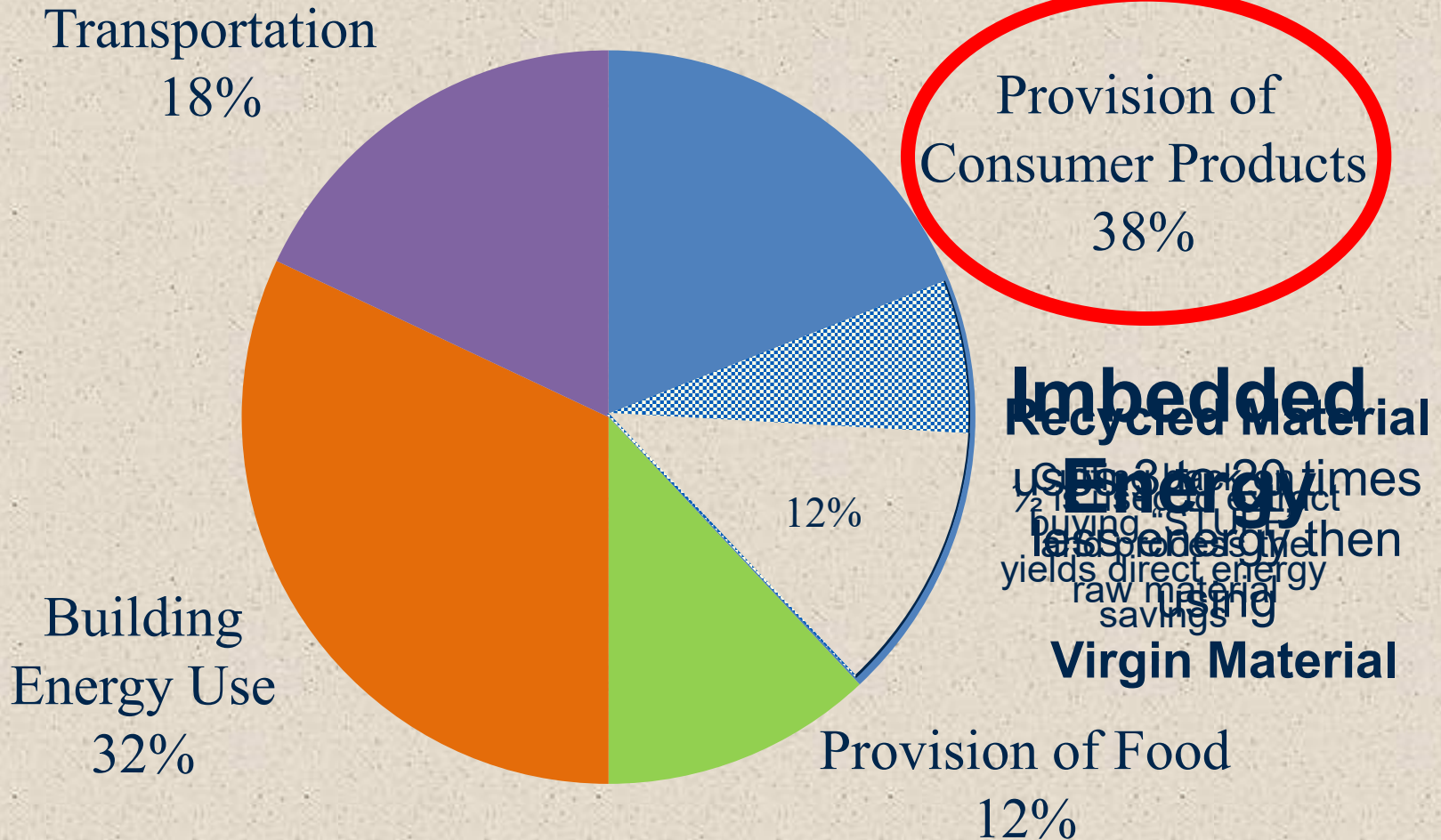


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US Energy Use





Reducing energy consumption associated with consumer products

Individual level level:

- **Use materials wisely:**
 - **Cut down on waste and inefficiencies**
- **Reuse, Recycle, and Compost**
- **Avoid what you cannot Reuse, Recycle and Compost**

Society level:

- **Substitute virgin material with recycled material**
- **Provide necessary recovery infrastructure**

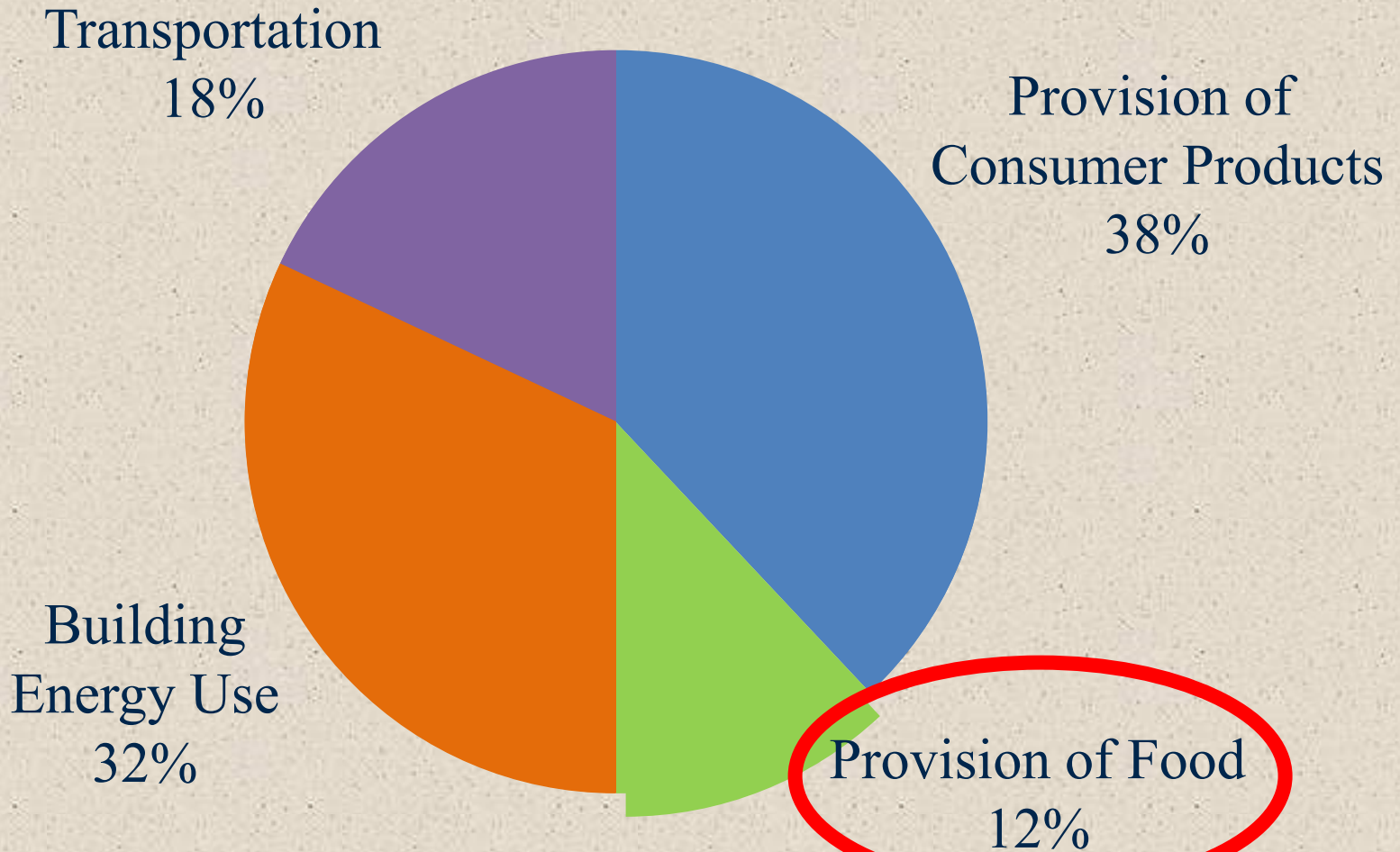


Steps to reduce our carbon footprint

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US Energy Use





Reducing energy consumption associated with food

Waste Less: 40% of food wasted.

All stages - farmers, distributors, stores, customers

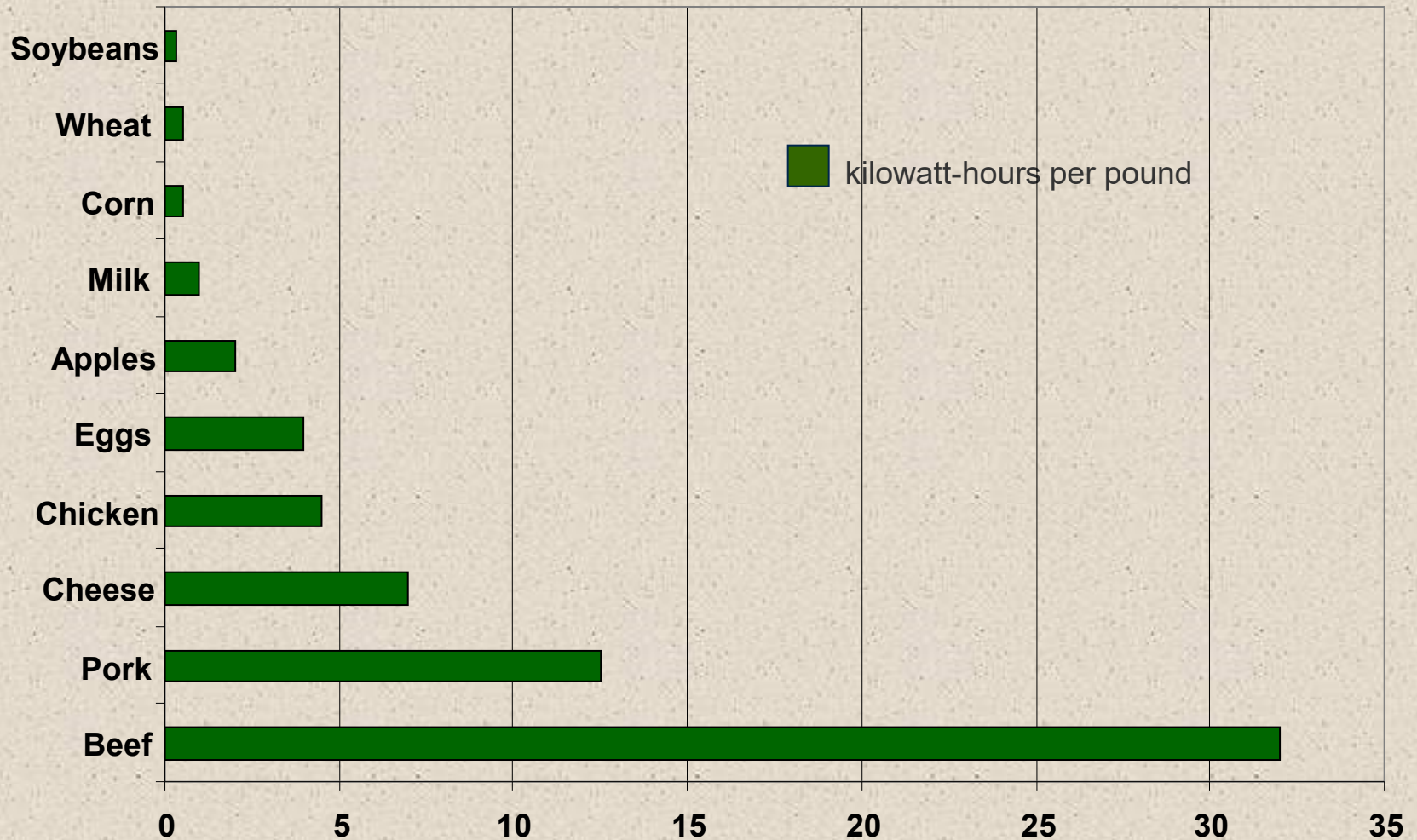
Avoid purchasing processed foods: These foods take more energy to produce (and have less nutritional value than whole foods). In addition, choose foods with minimal packaging.

Buy foods grown locally: The equation is simple: the closer the farm is to you; the less fuel is needed to transport its food to your table.

Cut back on meat (especially beef): Meat is the least fuel-efficient food we have. Large quantities of energy are required to cultivate, harvest, and ship animal feed, house, transport and slaughter animals, process and package their meat, and refrigerate it until it's cooked.



Energy required to Produce pound of food



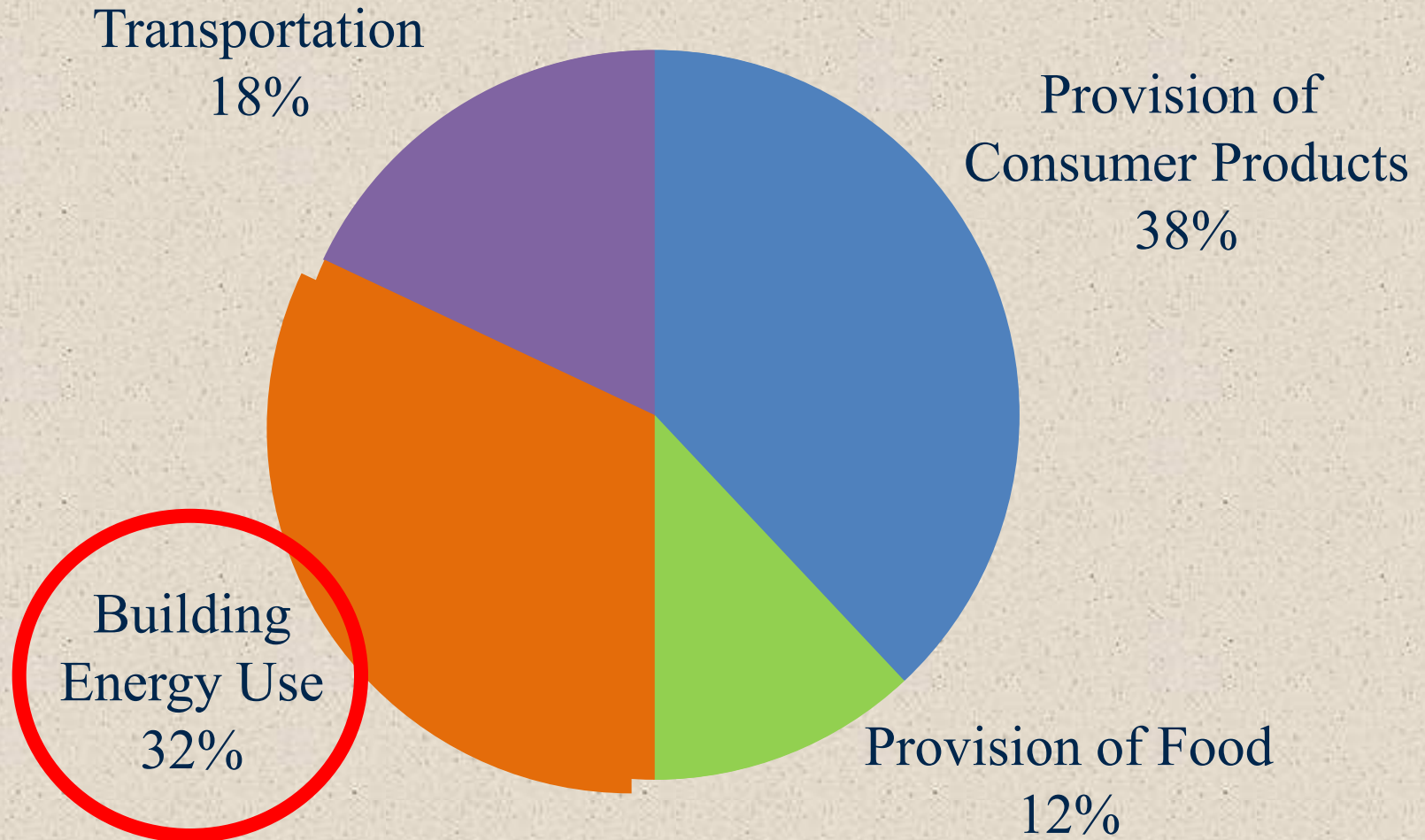


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US Energy Use



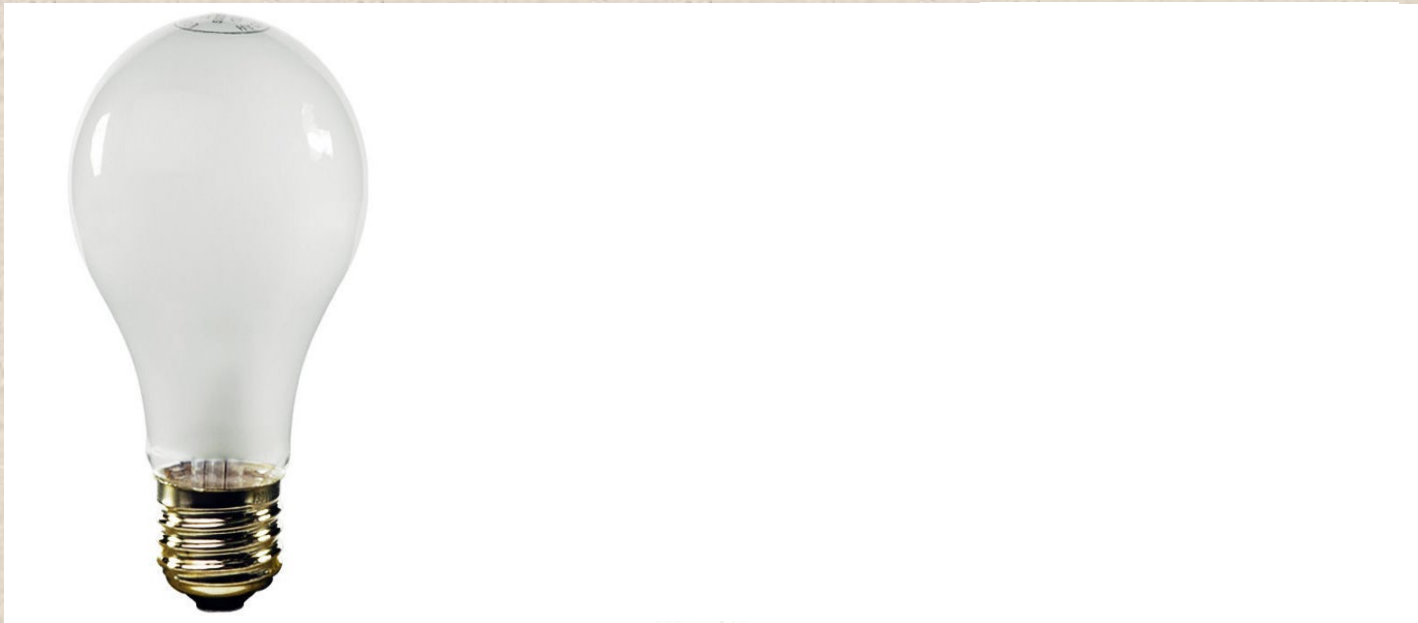


Conservation vs. Efficiency

Legacy

Efficiency

Conservation



Incandescent
Balls

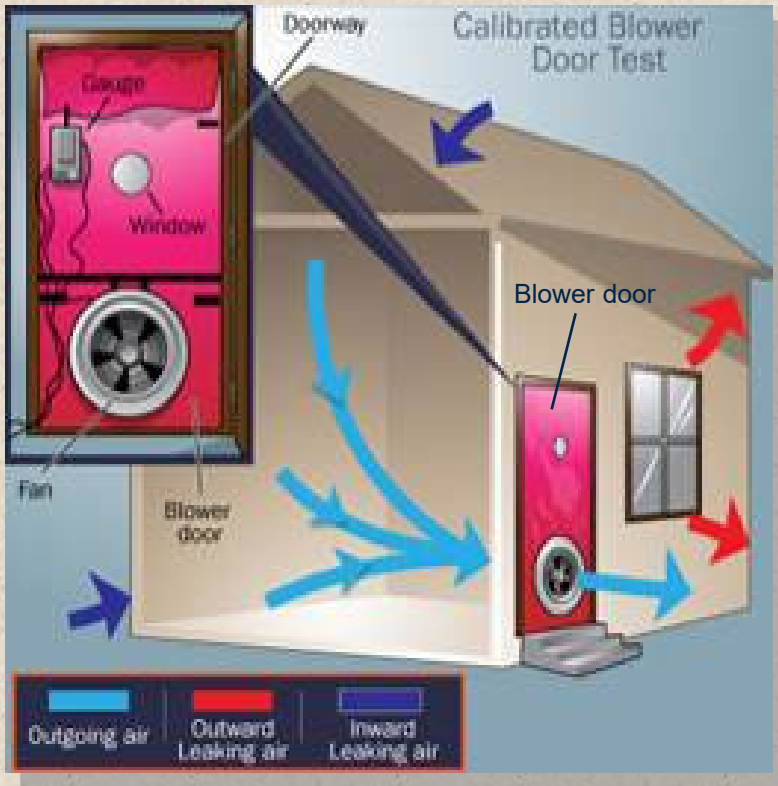
Replace with
LED lighting
with less

Turn Off
when not in
use



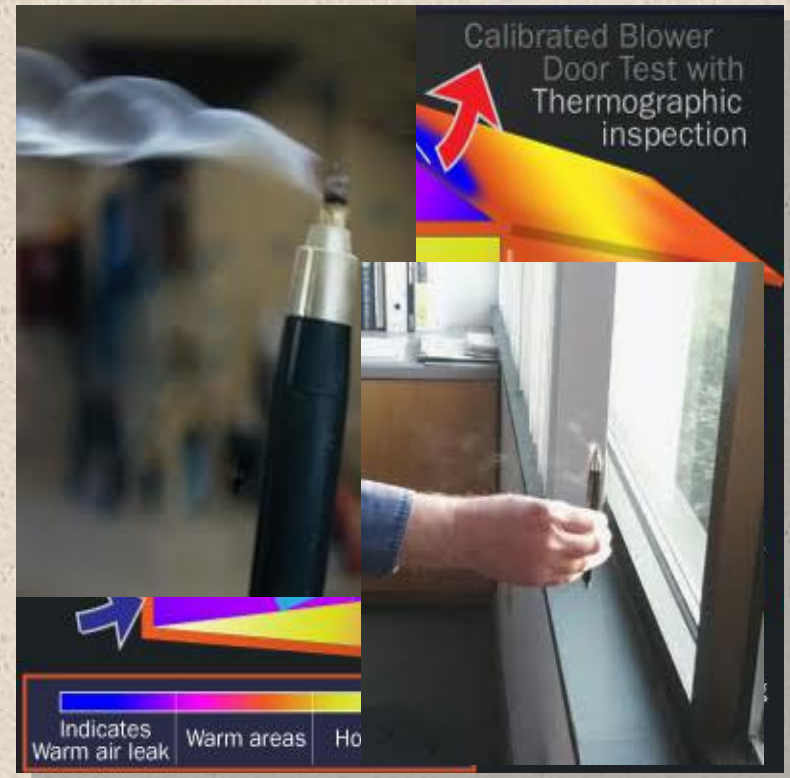
Pre-Existing Homes

Energy Audits



Blower Test

~~Infrared Camera~~
for testing infiltration loss



Weatherization (increasing efficiency)

Typical Weatherization Measures Installed



Average savings:
15-35%

Pay off for investment:
2 months to
5 years



MECHANICAL MEASURES

- Clean, tune, repair, or replace heating and/or cooling systems.
- Install duct and heating pipe insulation.
- Install programmable thermostats and other HVAC controls.
- Repair/replace water heaters.
- Install water heater tank insulation.
- Insulate water heating pipes.
- Install solar water heating systems.
- Install waste heat recovery devices.



HEALTH & SAFETY MEASURES

- Complete combustion appliance safety testing.
- Repair/replace vent systems to ensure combustion gas draft safely outside.
- Install mechanical ventilation to ensure adequate indoor air quality.
- Assess fire hazards. Install smoke and carbon monoxide alarms when needed.
- Evaluate mold/moisture hazards.
- Perform incidental safety repairs when needed.



BUILDING SHELL MEASURES

- Install wall, floor, ceiling, attic, and/or foundation insulation.
- Complete Blower Door Testing.
- Perform air sealing.
- Repair/replace primary windows/doors.
- Install storm windows/doors.
- Install window film/solar screens/window louvers and awnings.
- Repair minor roof and wall leaks prior to attic or wall insulation.



ELECTRIC BASELOAD MEASURES

- Install motor controls.
- Install efficient light sources.
- Replace refrigerators and freezers with energy efficient models.

- Increases home comfort and safety
- Improves indoor air quality



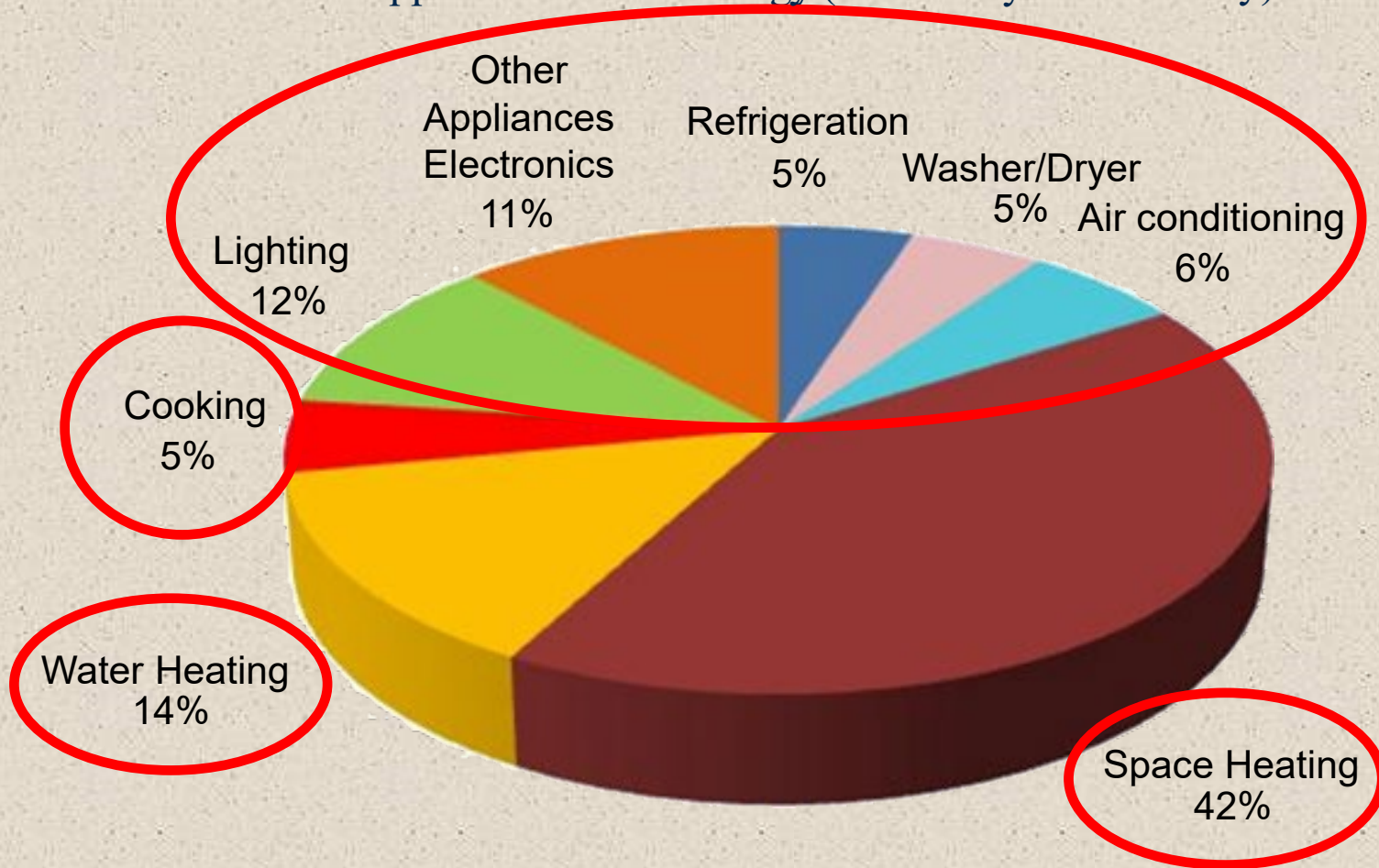
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Beneficial / Strategic Electrification

Other ~~Clopp~~ ~~not~~ ~~40%~~ ~~of~~ ~~Electricity~~ ~~(is~~ ~~not~~ ~~already~~ ~~ref~~ ~~rad~~ ~~ified~~ ~~)~~



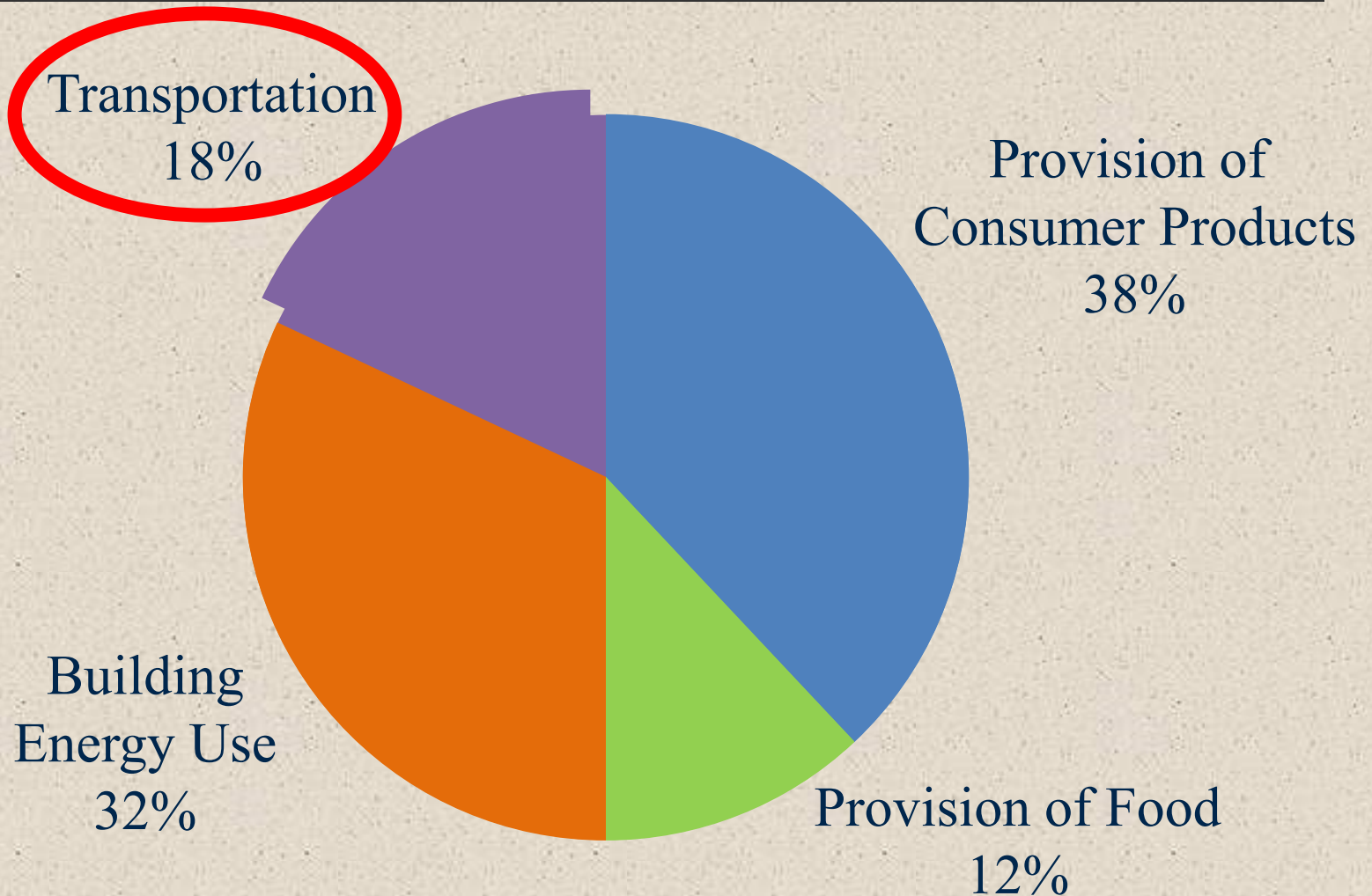


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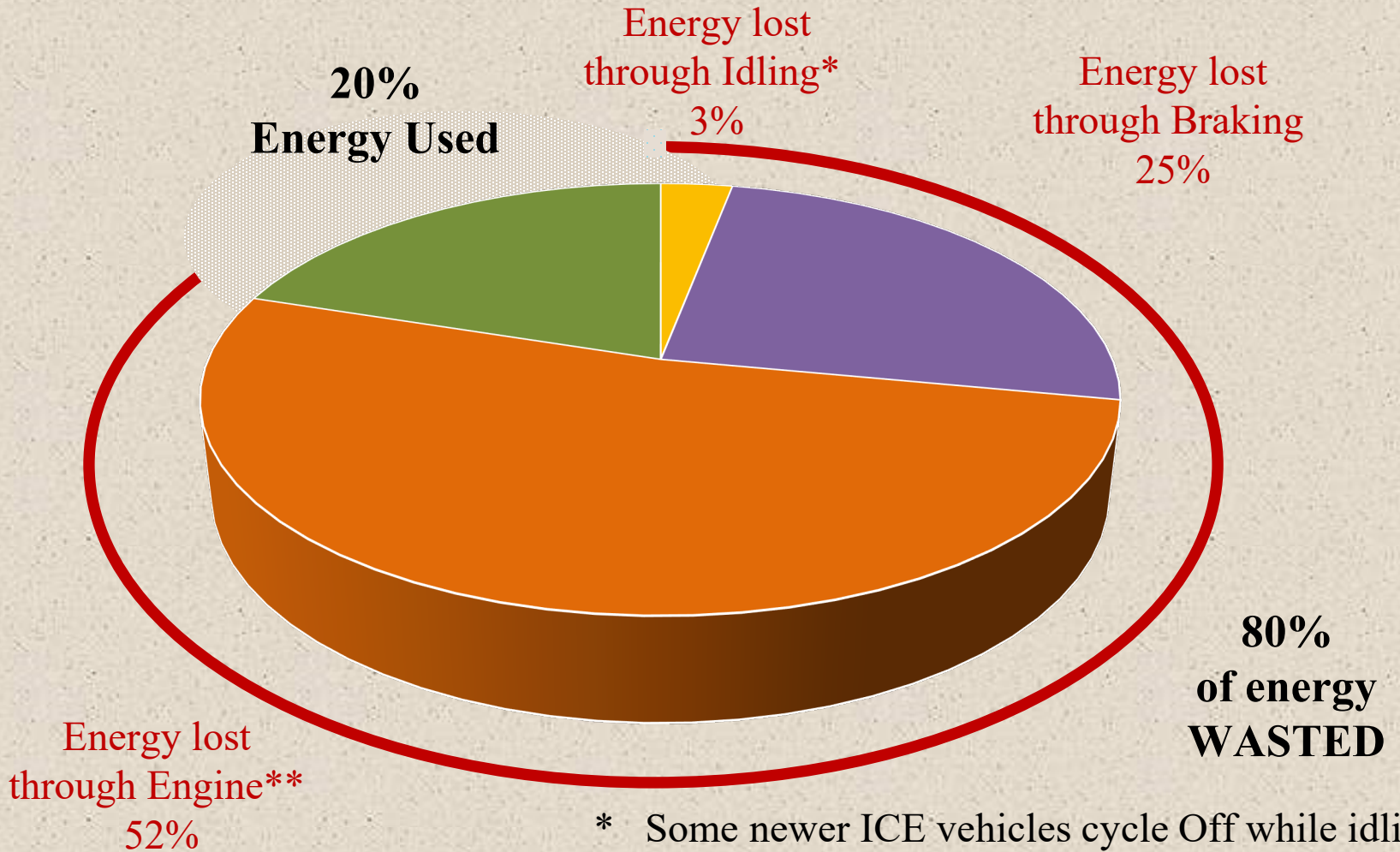


US Energy Use





ICE Vehicles: Inefficient use of Energy

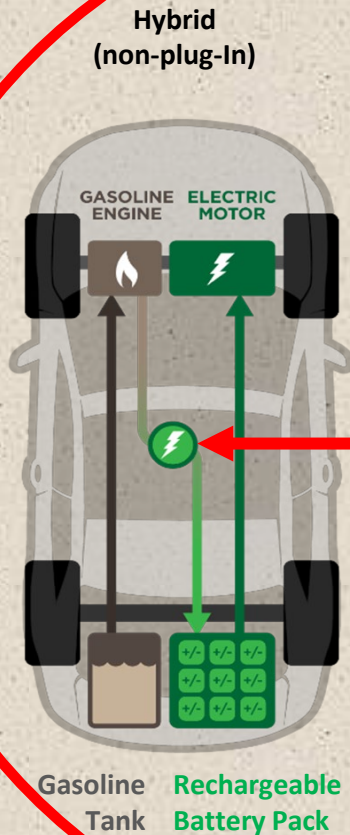


* Some newer ICE vehicles cycle Off while idling
** Some heat recovered in winter to heat cabin



Types of Electrified Vehicles

- Electrified vehicles include hybrids.
- Electric vehicles (EVs) have no Internal Combustion Engine.



Plug-Ins
Gasoline
Engine
Used to
charge
Battery
Pack
for
short
distances

**Ideal for
Urban/Suburban
driving when
battery range
equals typical
day, but you
have range
anxiety on long
car trips**

Gasoline Tank Rechargeable Battery Pack



**When you are
ready to
stop using
fossil fuels
for your
transportation**



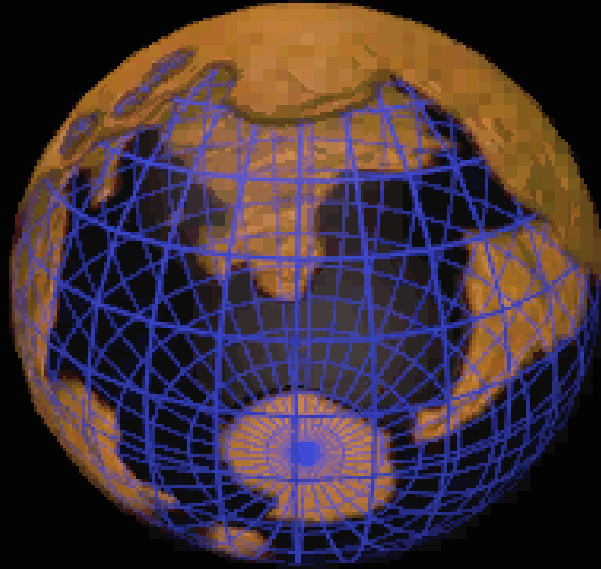
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Purchasing Power generated by Renewables

- **Energy Supply Company (ESCO)**
 - 5% to 10% savings
- **Leased Solar**
 - 20% Savings
- Buy a share in a **Community Solar Farm**
 - 50-60% Savings
- Buy **Solar Panels for your roof or yard**
 - 50-60% Savings



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