

“Green home” - Home of the future

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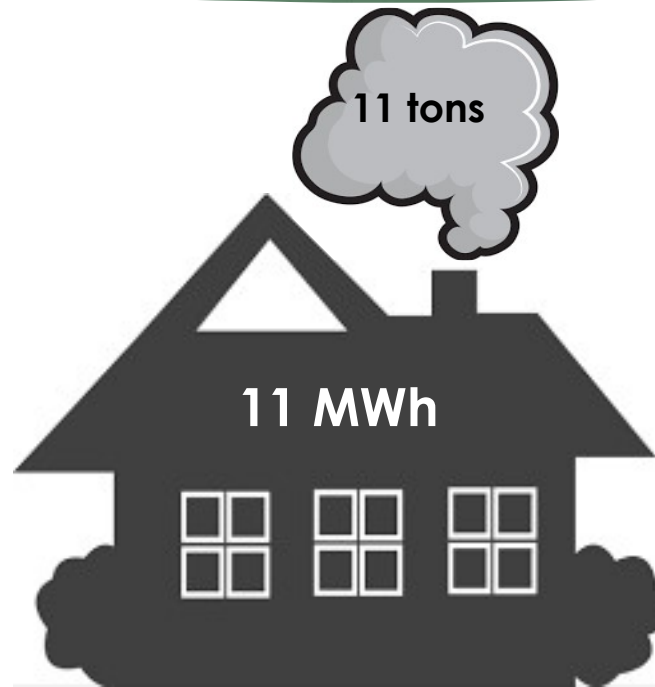
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Outline

- ▶ Background
- ▶ Introduction
- ▶ Green Home
- ▶ Cost and Environmental Benefits
- ▶ Concluding Remarks

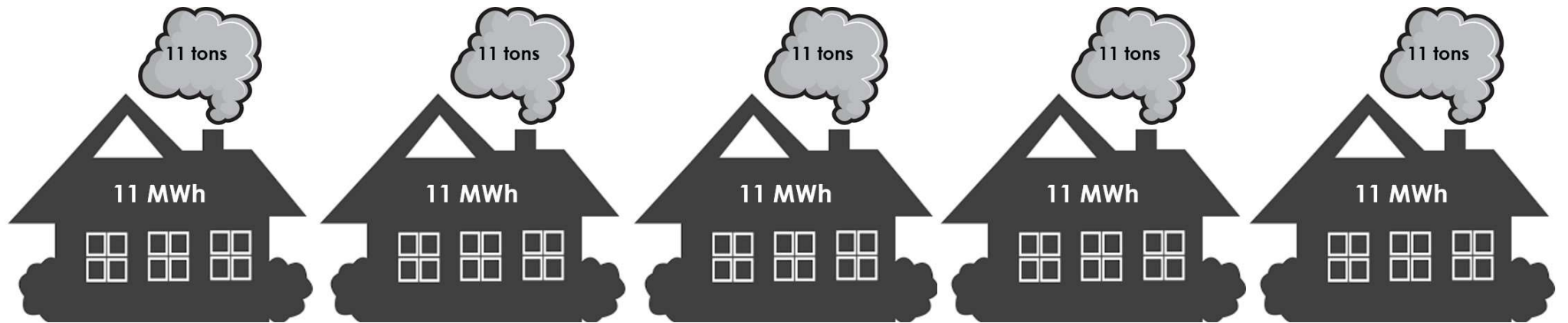


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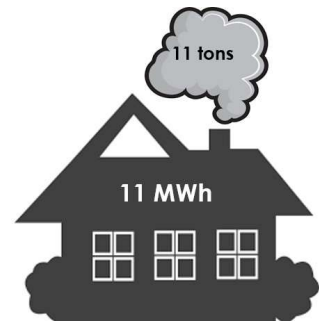
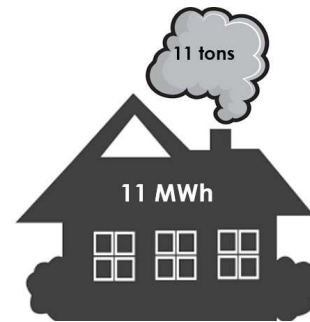
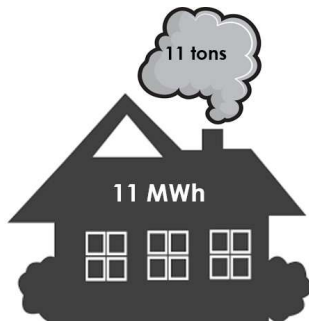
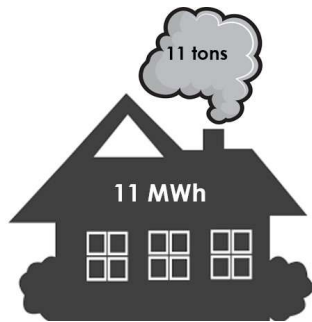
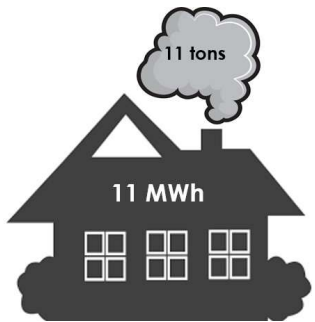
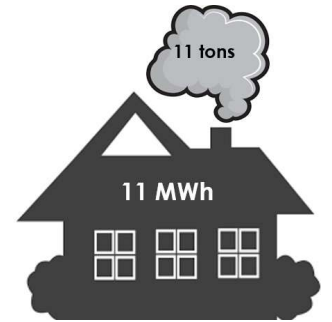
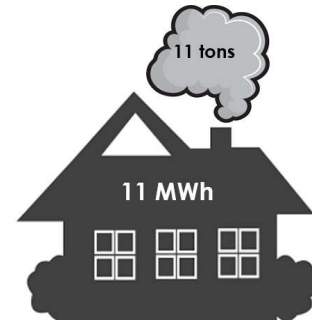
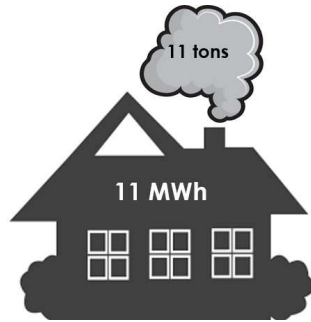
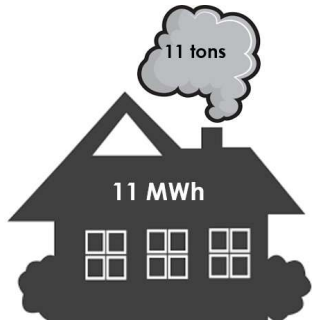
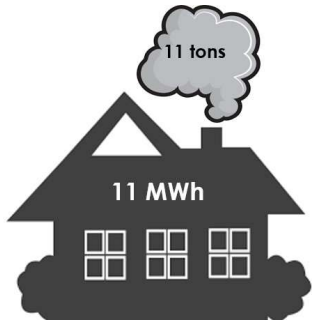


Reference: US Energy Information Administration (EIA)

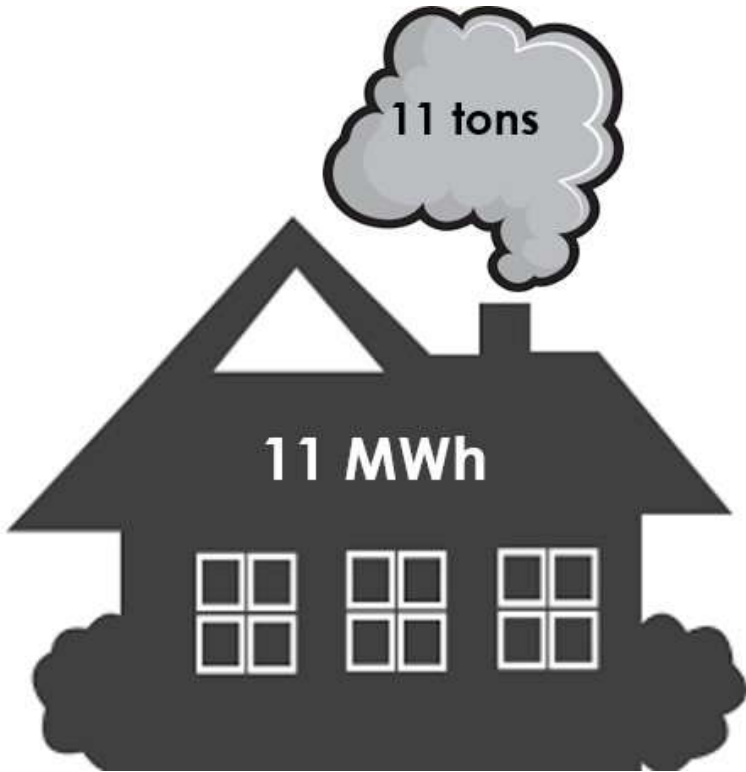
Background



Background



Introduction to Green Home



Definition

A green home is a type of home designed to be environmentally sustainable. It means being smart about how we use energy, water and building materials without needlessly damaging the environment.



Alternative names for Green Home

Smart Energy
Home

Sustainable
Home

Home
Renewable
Energy
System

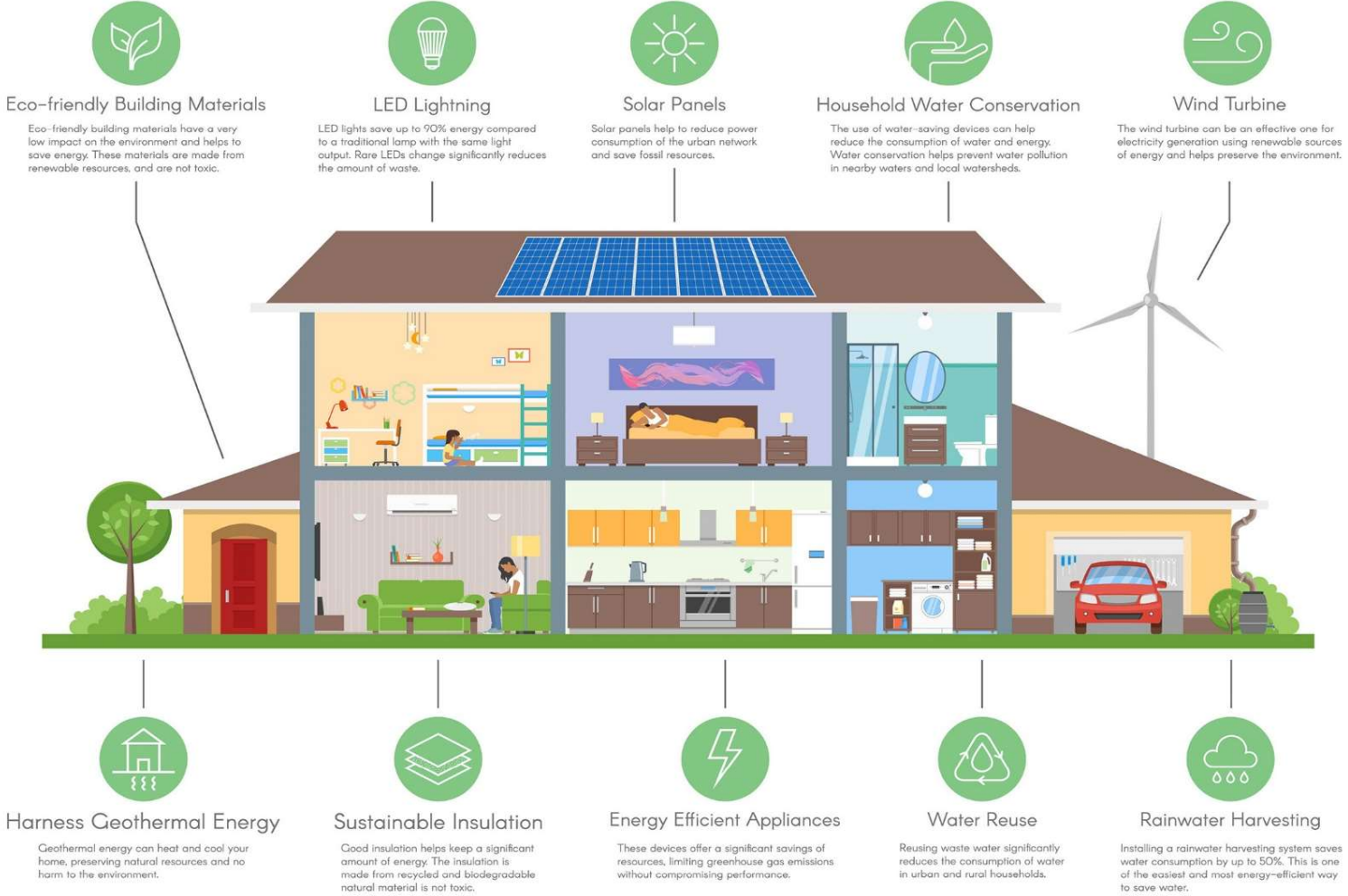
Eco-Friendly
Home

Green Home

Zero Energy
Home

Residential
Renewable
Energy

A typical "Green Home"



Solar Radiation Map for Kentucky



Model estimates of monthly average daily total radiation, averaged from hourly estimates of direct normal irradiance over 8 years (1998-2005). The model inputs are hourly visible irradiance from the GOES geostationary satellites, and monthly average aerosol optical depth, precipitable water vapor, and ozone sampled at a 10km resolution.

kWh/m²/Day



0 15 30 60 Miles

This map was produced by the National Renewable Energy Laboratory for the U.S. Department of Energy, September 25, 2007



Cost Benefits (Solar Panels)

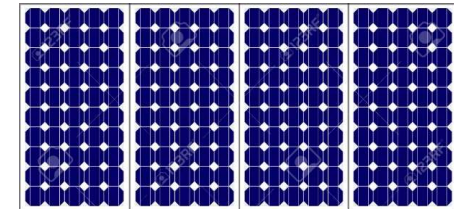
Conventional Home



1000 units/month x \$0.1/unit=\$100/month
\$1200 for one year
\$30,000 for 25 years



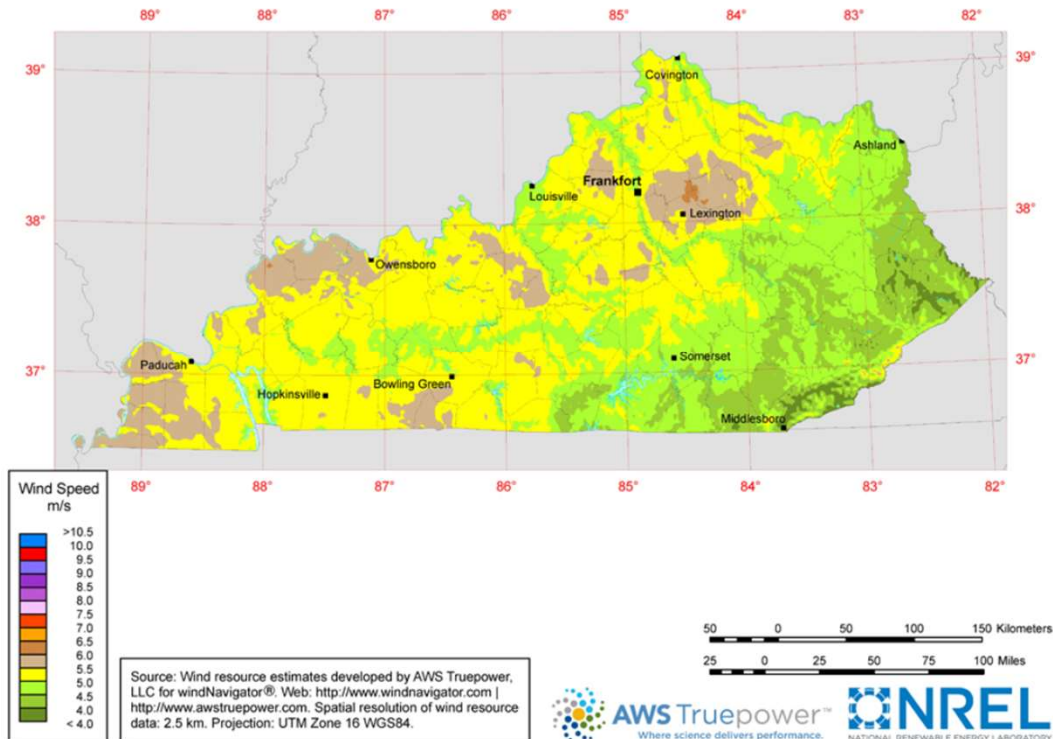
Using Solar Panels



7 kilowatt(kW) x \$3.18/W = \$22,260
26% Federal solar tax credit = \$16,472
\$16,472 for 25 years

Wind Speed Map for Kentucky

Kentucky - Annual Average Wind Speed at 80 m



Cost Benefits (Wind turbine)

Conventional Home



1000 units/month x \$0.1/unit=\$100/month

\$1200 for one year

\$30,000 for 25 years



Using Wind turbine

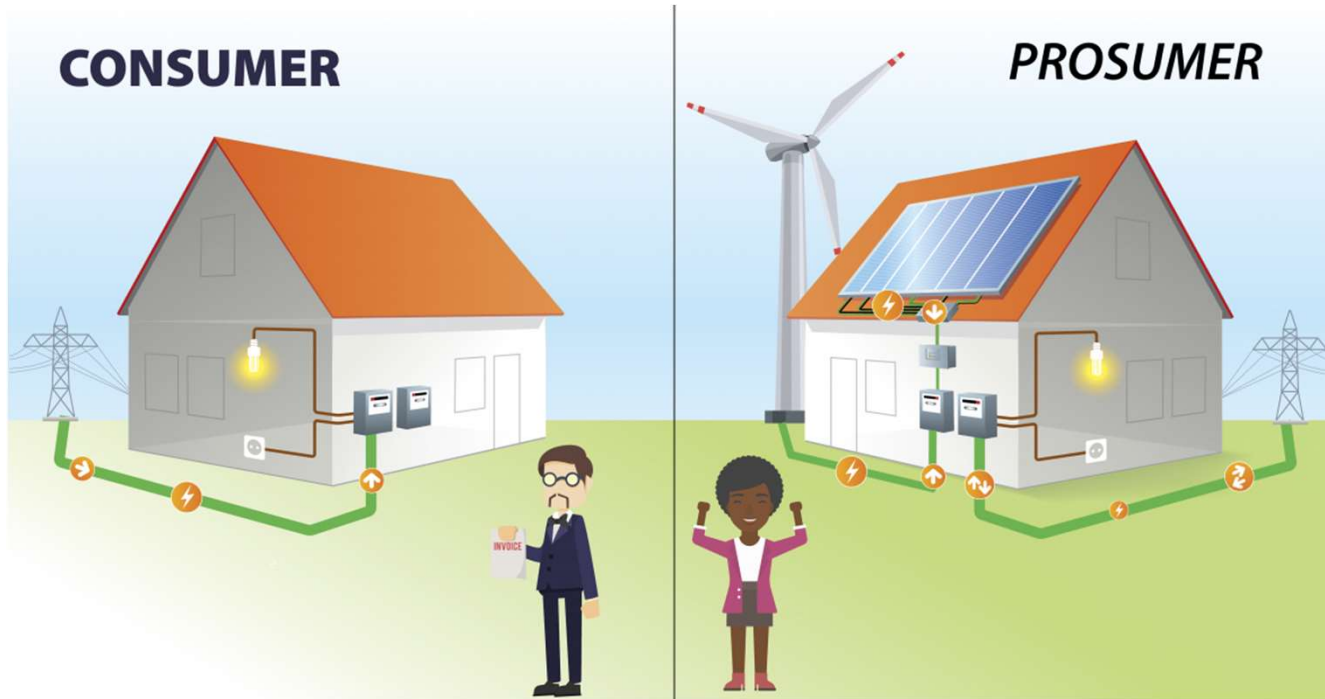


5 kilowatt(kW) x \$3/W = \$15,000

30% Federal tax credit = \$10,500

\$5,000 for Operations &
Maintenance for 25 years

Consumer vs Prosumer



Reference: Office of Energy Efficiency and Renewable Energy

Environmental Benefits

- ▶ Reducing air pollution
- ▶ Help to slow climate change
- ▶ Reducing your household's carbon footprint- Around 11 tons of emissions saved per home annually!
- ▶ Using less water
- ▶ Reducing reliance on fossil fuels

Green Building Materials



The global market for green building materials is set to reach \$364.6 billion by 2022

Source: "Green Building Market Overview, Industry Top Manufacturers, Market Size, Industry Growth Analysis & Forecast to 2023," *Grand View Research*, 2018

Future Green Buildings

- ▶ 1000-unit Mark, in the Dutch city of Utrecht
- ▶ Project will complete by 2023
- ▶ Greenhouses on roof and patios to grow vegetables
- ▶ Solar panels on parking garages to produce enough power
- ▶ Garage capacity of 3500 bikes
- ▶ Provision for electric car sharing service
- ▶ Affordable to most people, majority will be sold to low-income or elderly



Reference: <https://www.fastcompany.com/90295742/this-sustainable-apartment-complex-of-the-future-has-farms-community-space-and-bike-parking-galore>

Future Green Building

- ▶ Milwaukee Common Council approved 21-story tower, North America's tallest timber tower
- ▶ Other cities where big timber towers are proposed- Chicago, Cleveland, Portland in US and Tokyo, Japan
- ▶ 25 King Tower, Brisbane, Australia- 10 story eco-friendly office

The construction of the 25 King tower compared to a traditional concrete building



29% less clean water



46% less energy

Source: "Australia's tallest timber building makes a towering case for eco-friendly construction," *New Atlas*, 2018

Concluding Remarks

- ▶ Green home effectively use energy, water and building materials to reduce impacts on human health and environment
- ▶ Plan installing renewable energy for home
 - ▶ Estimating energy needs throughout the year
 - ▶ Size and cost of the system you will need
 - ▶ Deciding on solar ,wind or both depending on your location
 - ▶ Other measures to reduce electricity use
- ▶ Transitioning to a green home not just saves money but is also eco-friendly
- ▶ The future of home is not just smart; its green, sustainable and affordable

Related Research at NKU

- ▶ Solar based smart outdoor lighting system
- ▶ Creative solar space at NKU
- ▶ Wind turbine emulator
- ▶ Solar array emulator

Quote



Thank You!
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