OAK RIDGE National Laboratory

Final Deliverable:

E2C Expert Match Tama County, IA

Microlearning modules on residential energy efficiency- Module 4

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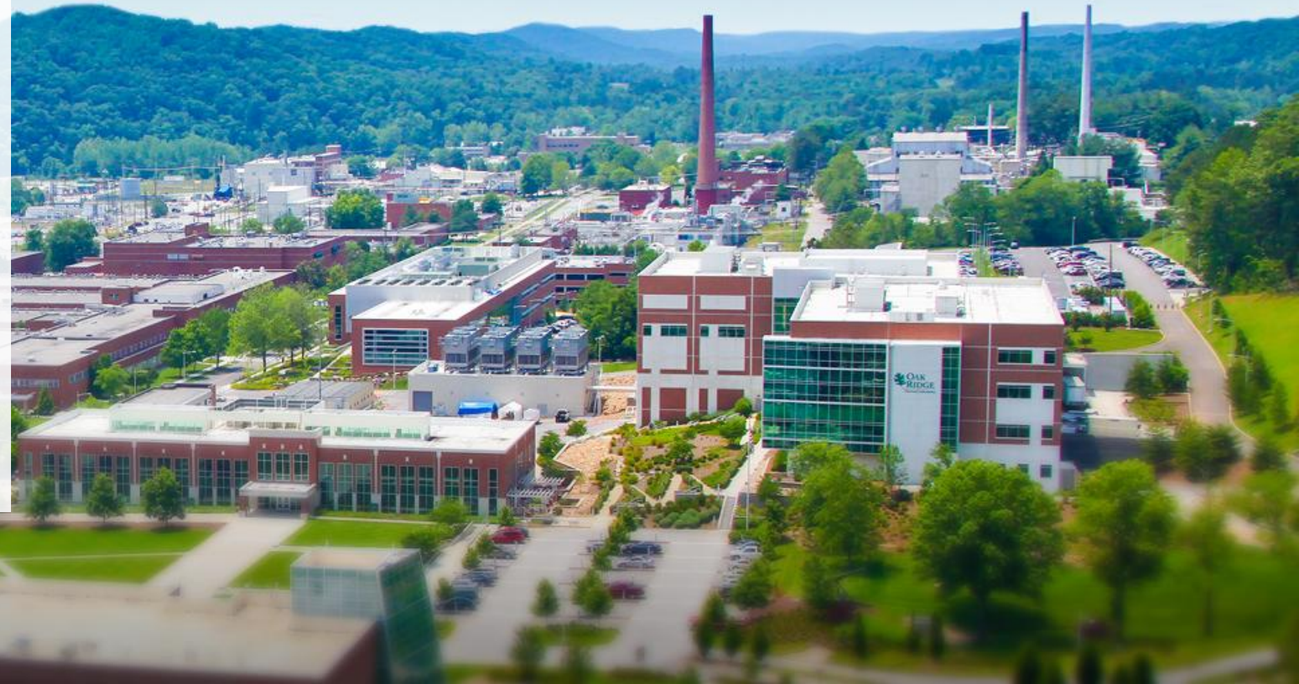

E2C: Technical Assistance Opportunities

EXPERT MATCH

E2C's Expert Match program connects energy experts with local governments, electric utilities, and community-based organizations to provide technical assistance to inform near-term energy decisions.

Expert Match offers:

- **Access to experts from the U.S. Department of Energy's national lab system.**
- **40–60 hours of support over 3 months from the first kickoff call.**
- **Focus on community-driven challenges or goals.**

For more information, visit:
www.nrel.gov/e2c/expertmatch

Scope

ORNL will develop a set of short microlearning modules to help Montour (Tama County) homeowners better understand and manage household energy use. The work focuses on creating clear, practical, and accessible content that guides residents toward cost-effective improvements and available incentives. Activities in this work may include:

- **Content Development:**
  ORNL will prepare seven (agreed upon) modules using plain language, relatable examples, and simple step-by-step guidance covering topics on home energy efficiency improvements.
- **Learning Management System on Website:**
  ORNL will use a simple WordPress website of learning management system (LMS) to support hosting the above modules and providing instructions for future updates.

Points of Contact

Community POC
Kent Scheid, CEDI-Tama County

Subject Matter Expert
Archana Ghodeswar, ORNL

E2C Team
Darylann Aragon – NREL
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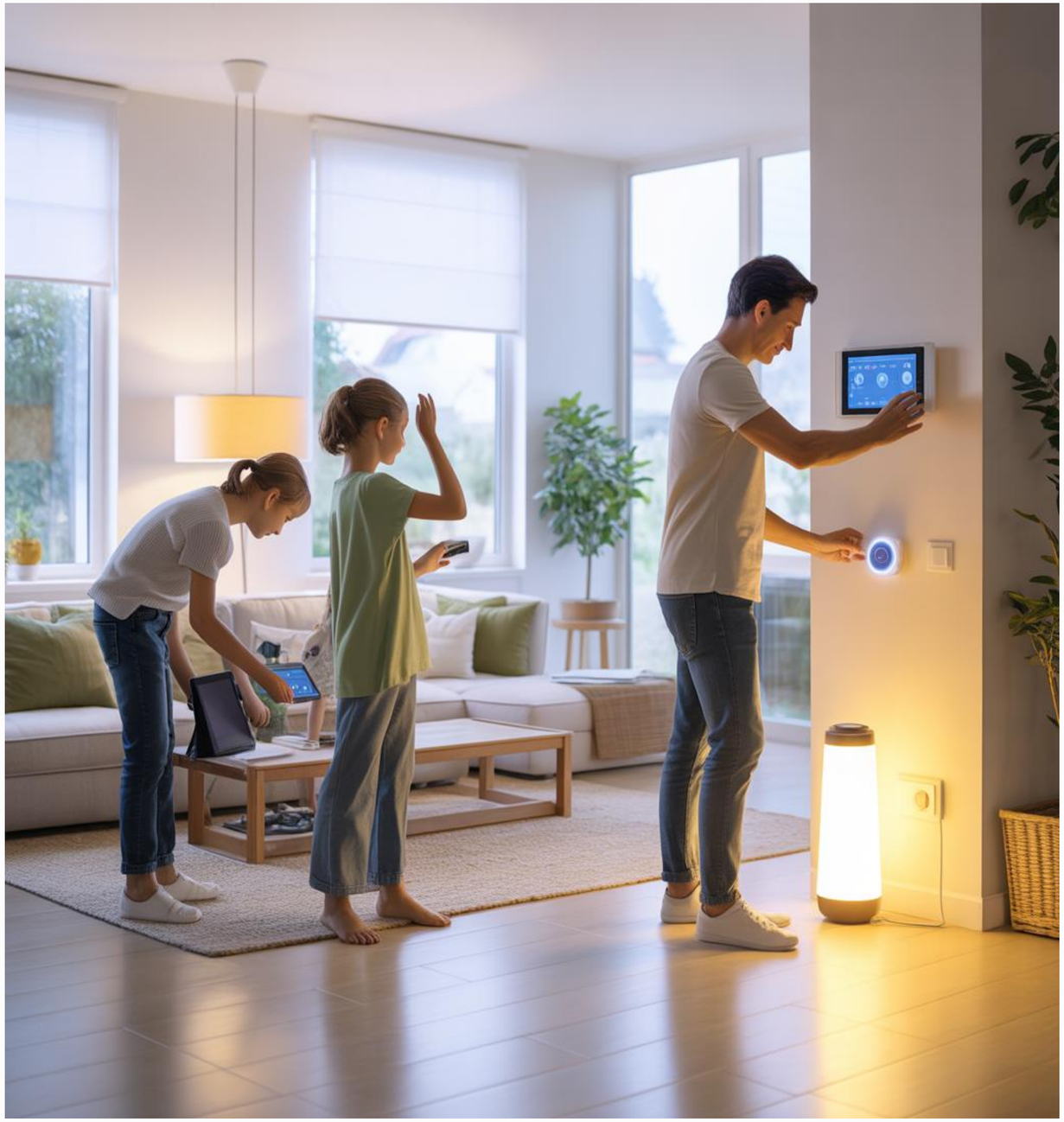


Microlearning modules on residential energy efficiency

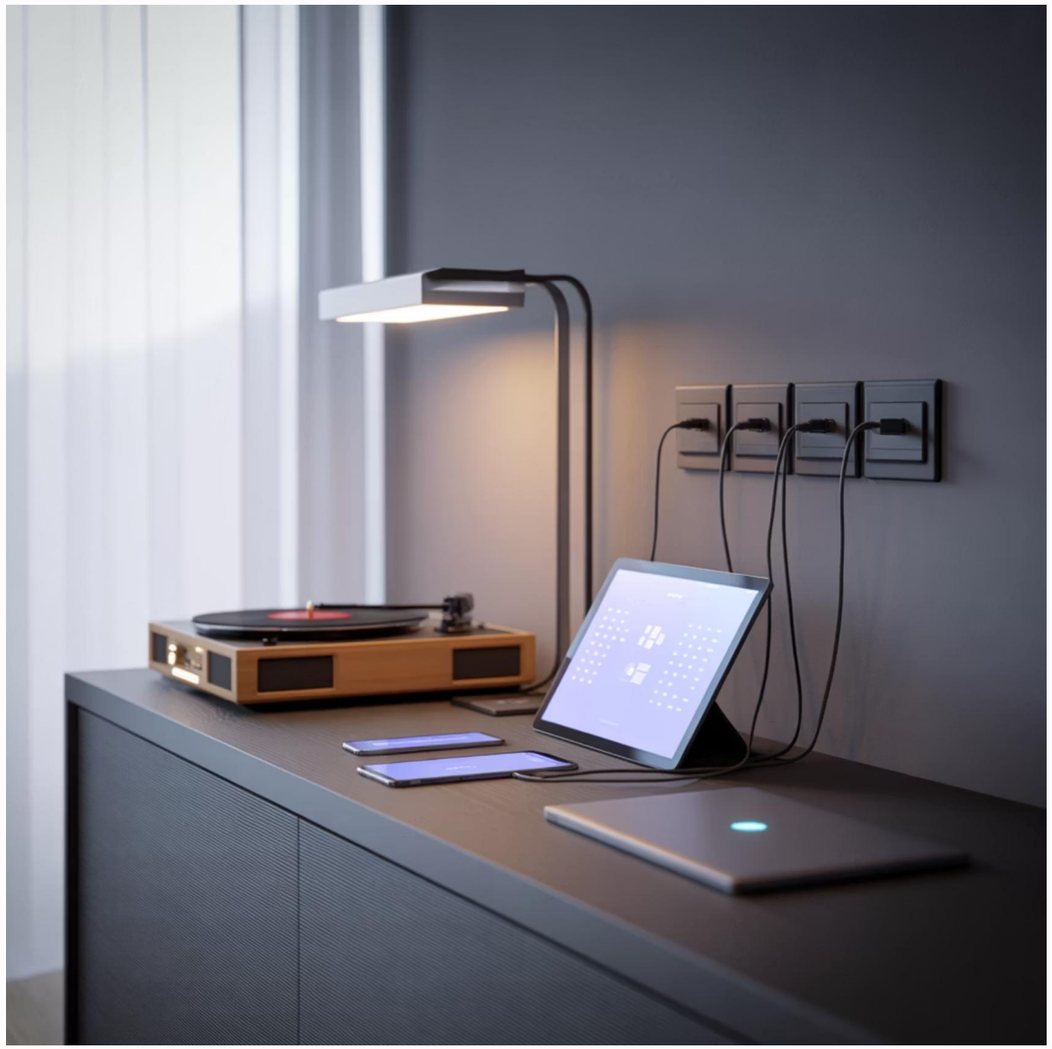
Module 4. Behavioral Changes for High Impact Energy Savings

This module presents simple and practical habits that offer high impacts with least efforts in managing phantom loads, appliances use, heating and cooling approaches.

*All the pictures in this presentation slides are generated through various AI tools and are added here for illustrative purpose. The pictures do not represent technical accuracy.

Phantom Loads: What They Are

Phantom loads, also known as standby power or vampire power, are the electricity consumed by electronic devices when they are switched off but still plugged into a power outlet. These devices continue to draw power even when not in active use.



Common culprits include:

- Television sets and entertainment systems
- Computers and monitors
- Mobile phone chargers
- Kitchen appliances with digital displays
- Gaming consoles

The Impact of Phantom Loads

10%

Home Energy Use

Phantom loads can account for up to 10% of a household's electricity consumption, adding to your energy bills.

$100-$150

Annual Cost

The average US household may spend over $100 per year powering devices that aren’t often used.

Unnecessary

Appliance Wear and Wasted Energy

These unnecessary energy drains for the standby power, contribute to appliance wear and wasted energy.

Reducing phantom loads is one of the simplest ways to lower your energy consumption with minimal effort.

More information- https://www.midamericanenergy.com/articles/phantom-load
https://native.eco/2017/11/phantom-load-how-unplugging-can-save-you-100-or-more/

How to Reduce Phantom Loads

1

Unplug Devices

The most effective solution is to simply unplug devices when not in use, especially those that are rarely used.

2

Use Power Strips

Connect multiple devices to a power strip that can be switched off with a single button, cutting power to all connected devices at once.

3

Smart Plugs

Invest in smart plugs that can be programmed to turn off at specific times or controlled remotely via smartphone apps.

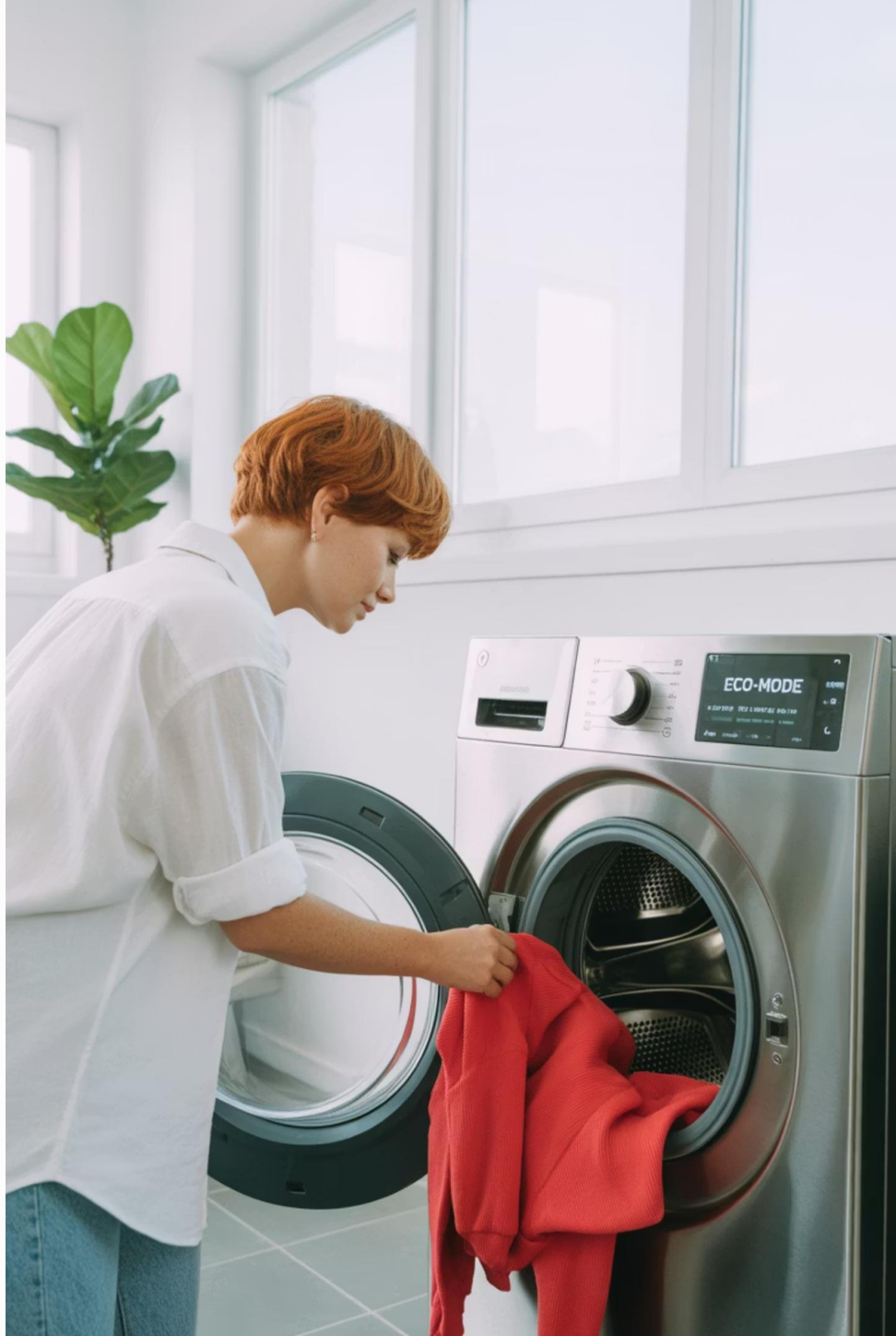
4

Energy-Efficient Products

When purchasing new electronics, look for energy-efficient models with low standby power consumption.

Laundry & Dishwashing Tips

Energy-smart habits for everyday chores



Laundry: Temperature Settings

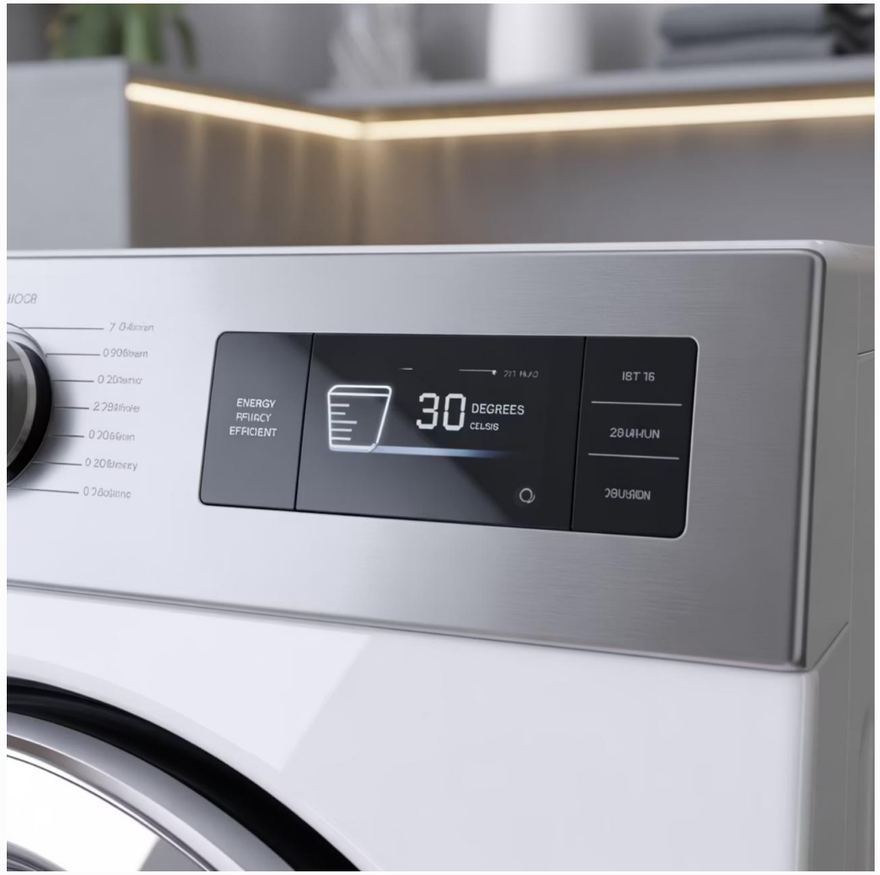
One of the most impactful changes you can make is washing your clothes at lower temperatures:

30°C vs 40°C

Washing at 30°C instead of 40°C can use around 40% less electricity.

Cold Wash

Modern detergents are designed to work effectively even in cold water for most everyday laundry.



Laundry: Load Size & Drying

Full Loads

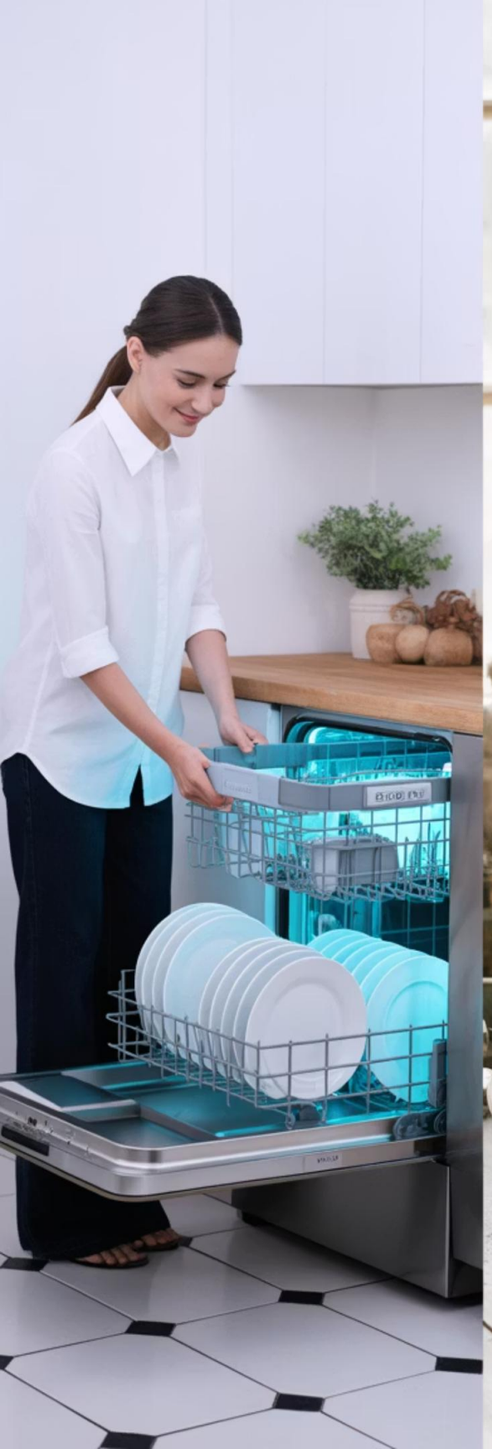
Always wash full loads rather than multiple smaller ones. This maximises the efficiency of water and energy use.

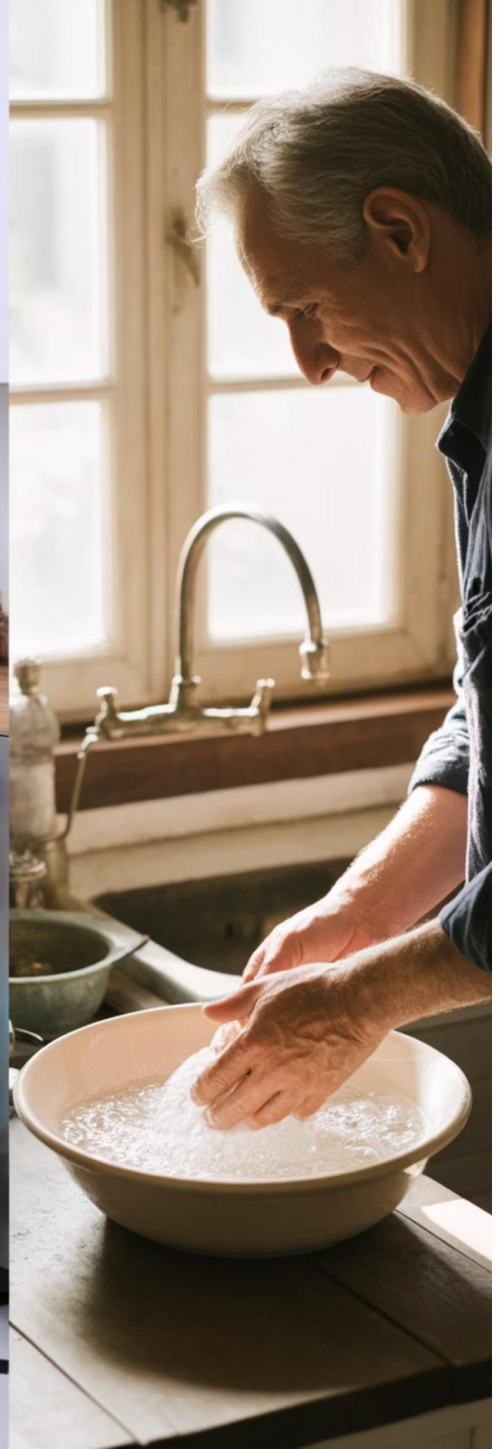
Air Drying

Avoid tumble dryers when possible. Air drying clothes on a line or rack uses zero energy and is gentler on fabrics.

High Spin Speed

Use a higher spin speed in your washing machine to remove more water, reducing drying time if you must use a dryer.





Dishwashing: Machine vs Hand Washing

Dishwasher Efficiency

Modern dishwashers are typically more water and energy-efficient than hand washing, especially when:

- The machine is fully loaded
- You use eco settings
- You skip the pre-rinse
- You avoid the heat-dry setting

Hand Washing Tips

If hand washing, conserve resources by:

- Using a washing-up bowl instead of running water
- Soaking heavily soiled items first
- Washing least dirty items first
- Rinsing efficiently with minimal water

Dishwashing: Energy-Smart Habits

Scrape, Don't Rinse

Simply scrape food residue off plates instead of rinsing them under running water before loading the dishwasher.

Run at Night

If you have an off-peak electricity tariff-of-time of use tariff (TOU), run your dishwasher during cheaper hours.

Maintain Regularly

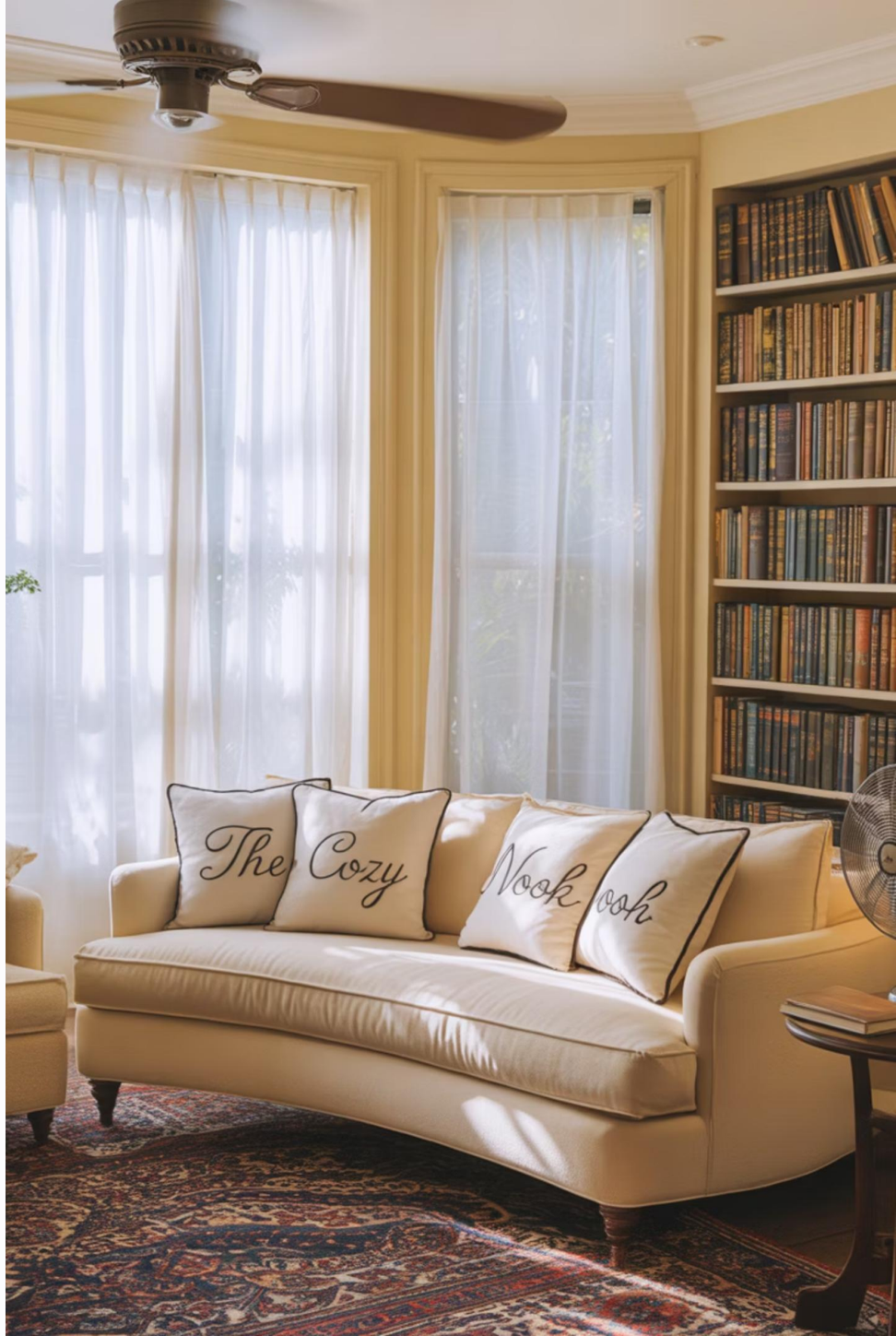
Clean filters and spray arms monthly to ensure your dishwasher operates at peak efficiency.

Air Dry

Open the dishwasher door after the wash cycle instead of using the heat-dry setting to save up to 50% of the energy used per cycle.

Cooling Without AC

Natural ventilation and fans



The Impact of Air Conditioning (AC)

Air conditioning systems are among the most energy-intensive appliances in homes in the US- Midwest) with financial costs:

12%

Home Energy Use

AC account for about 12%* of total U.S. household electricity use.

$250+

Annual Cost

Running central AC can cost the average U.S. household $250 or more per summer, depending on system efficiency and electricity rates.

72°F vs 78°F

Thermostat Impact

Every degree you raise your thermostat in summer can cut cooling costs by 3–5%

Comfort doesn’t have to be costly; efficiency helps to save without sacrificing cool.

* Reference: https://www.eia.gov/consumption/residential/?utm

Natural Ventilation Strategies

Cross Ventilation

Open windows on opposite sides of your home to create air movement through the space. This works best in the early morning and evening when outside temperatures are cooler.

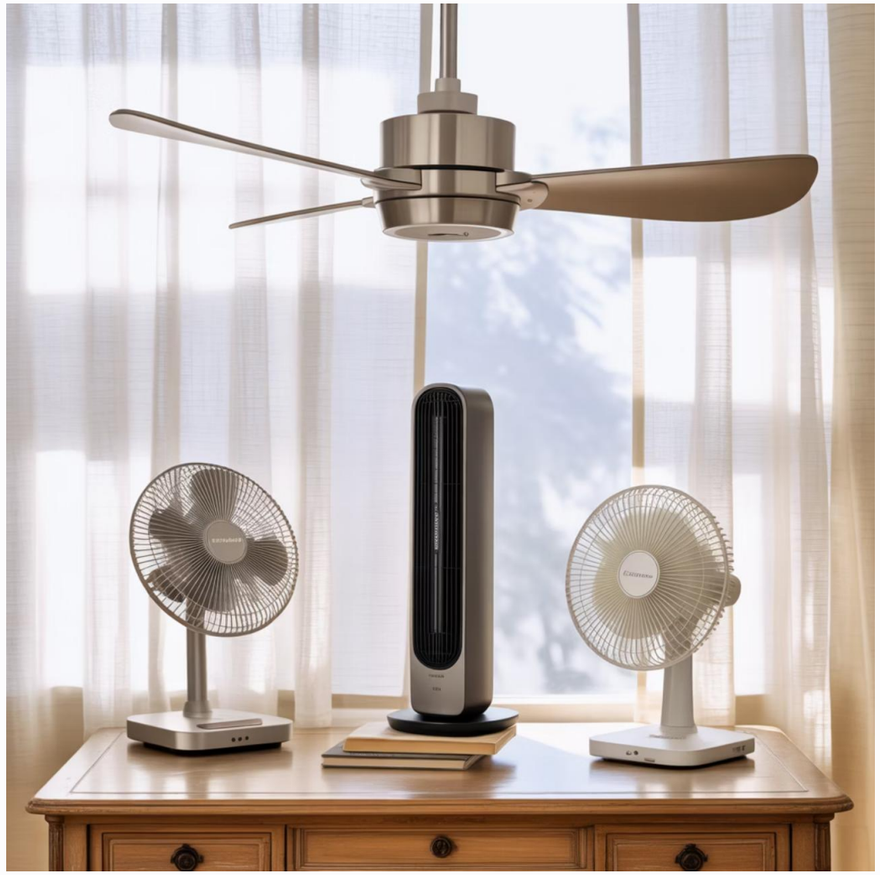
Stack Ventilation

Open windows at different heights to create a chimney effect. Warm air rises and exits through upper windows while cooler air enters through lower openings.

Solar Control

Keep blinds and curtains closed during the day on sun-facing windows. Light-coloured, reflective blinds can reduce heat gain

Fans: Efficient Cooling Alternatives



Fans use significantly less energy than air conditioners while still providing cooling comfort:

Ceiling Fans

Use only 60-100 watts and can make a room feel 4°C cooler through the wind-chill effect.

Pedestal & Tower Fans

Portable options that use 25-75 watts and can be moved to where cooling is needed most.

Direction Matters

Set ceiling fans to rotate counter-clockwise in summer to push air downward for maximum cooling effect.*

*Reference: https://www.energystar.gov/products/ceiling_fans
https://www.boehmerheating.com/blog/energy-savings/ceiling-fan-rotation-why-direction-matters/

Creative Cooling Approaches

Landscape Shading

Plant deciduous trees on the south and west sides of your home to provide natural shade in summer while allowing sunlight through in winter.

Night Purging

Open windows wide during cool nights to flush out accumulated heat, then close windows and blinds before the day heats up.

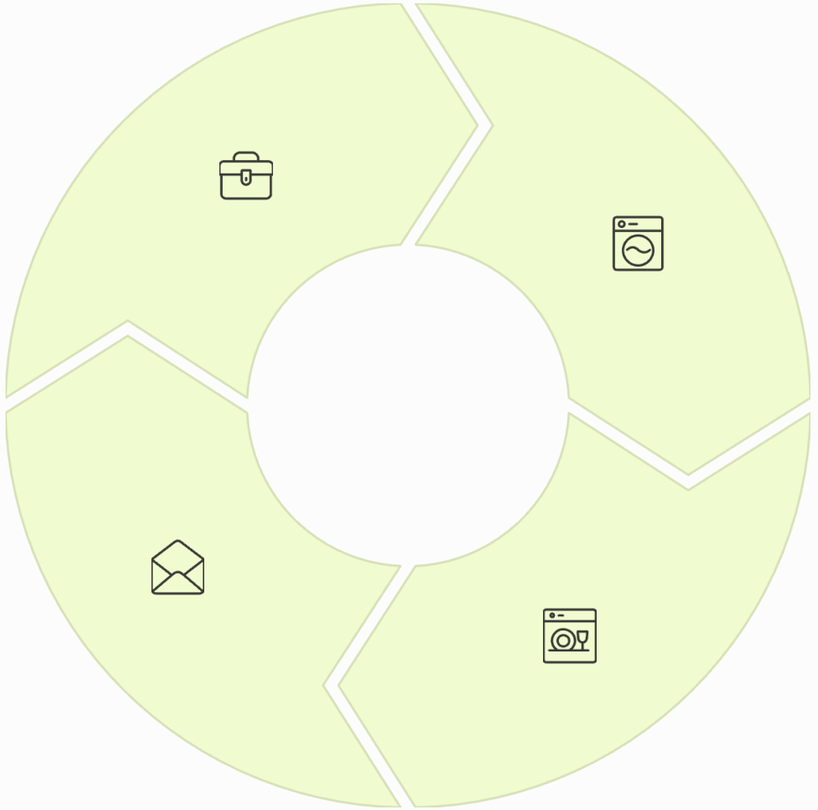
Summary: High-Impact Behavioral Changes

Phantom Loads

Unplug devices, use power strips, and invest in smart plugs to eliminate wasted standby power.

Natural Cooling

Utilize cross ventilation, fans, and solar control instead of energy-intensive air conditioning.



Laundry Habits

Wash at lower temperatures, run full loads, and air dry clothes whenever possible.

Dishwashing

Use eco settings, skip pre-rinsing, and air dry dishes instead of using heat-dry functions.

By implementing these simple behavioral changes, you can significantly reduce your energy consumption, lower your utility bills, and decrease environmental impact—all without sacrificing comfort or convenience.