



Research Participant Information Sheet

Apartment Energy Behaviour Study

Project overview

The Nationwide House Energy Rating Scheme (NatHERS) is an Australian program that sets a standard way to assess and improve the energy efficiency of homes. When evaluating a building, NatHERS uses software to analyse the design (like materials, insulation, windows, and shading) for the local climate, and makes assumptions about how people use energy. These assumptions about energy use have never been tested. This project will collect real data about the how people use energy at home, specifically for cooking, working or studying, relaxing, cleaning; and for maintaining comfort. The focus is on apartments living and not houses.

What does participation involve?

Participation in this project means allowing us to access your home. We will install small and discrete devices to collect data about the environmental conditions inside your home. We will also monitor your use of air conditioning for heating, cooling, and ventilation, as well as your habits of opening or closing windows for fresh air and daylight. Below is a summary of how we will collect the information. All devices will be installed by professionals, and we will consult with you about where to place them. They will remain installed for a minimum of two years. There will be no cost to you. See over the page for photos of the devices, which were tested as part of a rigorous investigation to determine its applicability for residential settings, and long-term data collection. .

We will use Devices A, B, and C to collect information about the environmental conditions in your apartment, recording data every 15 minutes, for 24 hours a day.

- Device A will be installed in the bedroom to measure temperature, humidity, carbon dioxide, light, and total volatile organic compounds (which can impact air quality).
- Device B will be placed in the living room to measure temperature, humidity, carbon dioxide, light, and sound pressure. Sound pressure is *recorded in decibels only*, at a rate of one data point (with a length of 1 millisecond) once every 15 minutes. This device cannot record conversations and the data be used to investigate whether background noise changes when occupants open their windows.
- One in every four apartments will have Device C installed in the kitchen, which measures temperature, humidity, and particulate matter (which can impact air quality).

We will collect data on your air conditioning in the living space and one bedroom using Devices D and E, which will record the time of use, thermostat temperature, and whether you are heating or cooling the room. Device E will replace your current air conditioning remote control; however, it will have all the same features (including a wall mounting plate) so it should not change how you currently use your air conditioning.

We will collect data on your habits of opening or closing windows for fresh air and daylight, via up to three of Device G. These will be installed these on your balcony door, and operable windows in the bedroom and living space at height of approximately 2meters. This device is powered by a button battery. If you have safety concerns, please raise these with the Project Leader to hear about how child safety is being managed.

We will collect data about occupancy via Device F, which will be installed in the living space. It will only log data about the time and date when movement is detected and cannot continuously record any information.

A CSIRO representative will install Devices A-G, which will take about one hour. They will also sketch a floor plan of your apartment, survey your major appliances, and note design features, like window covering. To do this, the installer will briefly enter each room and may take photos that do not include personal or sensitive information. Before leaving, the installer will show you any photos that have been taken and confirm (via demonstration of the online dashboards) *exactly* what data is being collected. They will also answer any questions you have about how your privacy is protected. A summary of this is provided in the Privacy Notice accompanying this document.

Separately, you will be contacted by Wattwatchers who are coordinating the installation of the energy monitoring device, which can only be installed by a licensed electrician. This device monitors household energy consumption and is installed inside the apartment which board. At the time, the electrician will need access to the switch board and will briefly switch-off the power. This installation will take less than one hour.

You are not required to do anything during the device installations other than be present. If an adult is not present at the time of the installations, the installer cannot enter your home and may need to reschedule.

While the devices are collecting data in real time, the data is collected via API automation, therefore nobody is watching this data stream in real time. This means that if the devices detected any unusual conditions ('smoke'), there is no way for CSIRO to inform you or the authorities ('Fire department').

Before the installation, you or someone in your household will need to complete a *commencement survey* with questions about the apartment and your household. This survey only needs to be completed once and can be done so online and in under 15 minutes. A paper survey and return envelope will be provided on request.

Each adult living at the address will need to complete a brief section of the *commencement survey* that asks for personal information (e.g., gender, ethnicity, age), which must be provided directly by each individual. This information is essential to the study and not duplicative. As part of the consent process, all consenting adults will be asked to provide these details to the Project Leader, either through an online form or a paper form (available upon request). Since the monitoring devices will be installed in shared areas of the apartment (such as the living room and kitchen), everyone in the household must provide consent for the installation to proceed.

One representative of your household will be asked to complete periodic short surveys throughout the monitoring period (estimate one per month) with one to three multiple choice questions, about a specific action that may have occurred in the past 24-hour period. For example, the method used to dry clothes. This survey will arrive via mobile phone text message and take one minute to complete.

Risks and benefits

There are no foreseeable risks associated with participating in this study and at the end of the project, you will receive a report with the results of the environmental monitoring. You can choose to keep the devices (worth \$1500) or have them removed. At the completion of the study, every household that participated for a minimum 6-months will receive a report with an aggregated summary of their own data. If you keep the devices, you might be invited to participate in future research involving CSIRO that helps your household understand and take actions to address energy intensive behaviours and/or poor indoor environment quality. But this is not a requirement to keep the devices, or to participate in this project.

Since Wi-Fi is needed for Device D, CSIRO will provide a Wi-Fi router and a data-only subscription for your apartment. This ensures that the installed devices won't affect your existing household Wi-Fi connection. Only Device D needs to be plugged into a power outlet using a USBC cord, while the other devices run on batteries. To avoid inconvenience, Device D will be installed with an adapter so you can still use the power outlet.

CSIRO will remotely access the data from the devices and will know if there are any connectivity or battery issues. The devices are chosen for their durability, but unexpected problems may occur. If this happens, the installer might contact you to request access to your apartment to fix the issue.

Withdrawal from the research project

Participation in this project is completely voluntary and you do not have to take part. Your decision whether to participate will not affect your current or future relationship with the researchers or anyone else at CSIRO. If you wish to withdraw after the project, simply notify the researchers listed below and your data will be destroyed. You may withdraw from this study at any time up until publication of the final outputs.

The project will collect data for two years, and we hope all participants can stay involved for the full duration, but it is not required. If you need to withdraw because you are moving, please consider if the project team can continue with you at your new home (if it meets the selection criteria). We can then arrange to move the devices to your new address. If you need to withdraw, we will send an installer to remove the devices, as they will be needed for new participants. The offer to keep the devices will only be available at the end of the two-year data collection period. A summary of the aggregated data collected in your apartment will only be made available at the end of the project, and to those households that participate for a minimum 6-months.

Confidentiality

All information provided by you will be treated confidentially. Any personal information collected will not be included in any publications resulting from the project. Any data collected as part of this project will be securely stored as per CSIRO's Recordkeeping Procedure.

How will my information be used?

The data obtained through the project will be utilised to test more than 50 assumptions in the Nationwide Housing Energy Rating Scheme about how people use energy at home, specifically for cooking, working or studying, relaxing, cleaning, and for maintaining thermal comfort. This will help the researchers establish whether assumed behaviours that are currently used in energy efficiency modelling programs are reflective of actual behaviours. The aggregated data will be used in publications on the outcome of the project and may be used as part of future related research projects. The data may also be provided to other researchers when requested, but only when approved by CSIRO. The data will not be made publicly available.

Ethics clearance and contacts

This project has been approved by CSIRO's Social Science Human Research Ethics Committee in accordance with the National Statement on Ethical Conduct in Human Research 2007 (Updated 2018). If you have any questions concerning your participation in the study please contact the researchers via their contact details provided. Alternatively, any concerns or complaints about the conduct of this study can be raised with the Executive Manager of Social Responsibility and Ethics on +61 7 3833 5693 or by email at csshrec@csiro.au.

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Thank you for taking the time to help with this research project. Please keep this sheet for your information.



Small, discrete sensors will be installed by a professional using adhesive strips that won't damage your walls. Installers will consult with households about where to place them.

A	B	C	D	E	F	G
 <p>← 13cm → ← 13cm → 300gram weight</p>	 <p>← 13cm → ← 13cm → 300gram weight</p>	 <p>← 10cm → ← 10cm → 200gram weight</p>	 <p>← 7cm → ← 7cm → 150gram</p>	 <p>← 7cm → ← 7cm → 150gram</p>	 <p>← 5cm → ← 5cm → 50gram</p>	 <p>← 2cm → ← 2cm → 15gram</p>
Environmental monitoring (sound)	Environmental Monitoring (no sound)	Air quality monitoring	Smart AC controller	Remote Controller	Motion sensor	Door and Window sensor
15min interval	15min interval	15min interval	Time of use	Time of use	Time of use	Time of use
<ul style="list-style-type: none"> - Battery - No Wi-Fi (SigFox) 	<ul style="list-style-type: none"> - Battery - No Wi-Fi (SigFox) 	<ul style="list-style-type: none"> - Battery - No Wi-Fi (SigFox) 	<ul style="list-style-type: none"> - Mains power - Wi-Fi 	<ul style="list-style-type: none"> - Battery - No Wi-Fi (Z-Wave) 	<ul style="list-style-type: none"> - Battery - No Wi-Fi (Z-Wave) 	<ul style="list-style-type: none"> - Battery - No Wi-Fi (Z-Wave)