LOW CARBON LIVING CRC

MEDIA RELEASE

Title	**New study reveals ducted air-conditioning and pools drive Sydney's residential electricity demand**
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The first comprehensive modelling study to pinpoint the highest drivers of a typical Sydney household's daily electricity demand has been published online in Elselvier's international journal *Energy and Buildings*, revealing that ducted air-conditioning and pools are the top culprits.

Undertaken by the School of Photovoltaic and Renewable Energy Engineering at the University of New South Wales (UNSW) and funded by the CRC for Low Carbon Living (CRCLCL), the study[i] used data from Australia's first large-scale smart grid project (Australian Smart Grid Smart City) and associated household surveys conducted on driving factors such as household demographics, dwelling type, utilities, white goods, weather, behaviours and attitude.

CRCLC Integrated Buildings Systems Program Leader and study co-author, Associate Professor Alistair Sproul said the results will help policy makers and planners measure the impact of different housing types and housing trends on local electricity demand.

"We found that air-conditioning and pools were the top two drivers as the study showed households with ducted air-conditioning used on average 79% more electricity than those with none, while those with a split air-conditioning system consumed some 34% more. Pool pumps were also a big energy user as 15% of households surveyed had a pool and their annual average daily electricity demand was 93% higher than those without," he said.

"Overall the data collected showed a variety of patterns and behaviours for different households and residential building types so when planning for new dwellings we can accurately measure the future energy demand and find ways to make a residential building project more energy efficient.

"A key reason for the study was that in the residential sector, which represents around 30% of global electricity consumption, the underlying composition and drivers of energy use have until now been poorly understood," said Professor Sproul.

Between 2010 and 2014 the Australian Smart Grid Smart City project collected electricity readings at half-hour intervals from 9903 households in six major towns or regions and 730 smaller towns across New South Wales. The study used this detailed material to build a household electricity consumption model which was then linked and compared to detailed demographic information and housing survey results from some 3400 households to paint a detailed picture of consumption.

PhD student and lead author Hua Fan explained that the model looked both at individual households and household groups.

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"This statistical model investigated the consumption of both individual households and communities. There are limits to what can be achieved modelling single households given the myriad factors that go towards overall consumption including, importantly, the behaviour of the people living there. However, the model tested extremely well for forecasting the overall electricity consumption of communities," said Mr Fan.

"We concluded that models like this are useful to a range of stakeholders, including individual households striving to understand the implications of different choices they might face such as whether to put a pool in, utilities looking to better forecast the impact of different residential trends as they plan their networks, as well as policy makers seeking to improve energy efficiency."

Of all the homes surveyed 79% owned the home they lived in either outright (40%) or were mortgaged (29%); 19% had ducted air-conditioning, 50% split-system, 3% other and 28% no air-conditioning; 23% had a pool pump; 13% were units, 2% semi-detached and 85% were separate houses; and the average size of a trial household was 2.8 people.

Associate Professor Iain MacGill, Electrical Engineering, UNSW and another co-author, noted that the study was undertaken in the context of a largely unexpected fall in Australian residential electricity consumption over the past decade.

"This fall in residential electricity demand caught the industry and policy makers by surprise given near continuous growth in consumption over the 100 year history of the electricity industry in Australia. While very welcome in terms of households reducing their electricity bills, slowing excessive network investment and contributing to falling greenhouse gas emissions, we don't fully understand what drove this fall and how we might even facilitate greater improvements.

"Studies such as this can also make a useful contribution towards assessing recent efforts by some of the network businesses, under pressure from falling revenue due to lower sales, to change their tariff arrangements. In particular, how can we ensure that households undertaking energy efficiency activities or putting on solar home systems are not penalised for doing the right thing in saving both money and the environment, whilst still ensuring we all fairly contribute towards reliable and secure supply," he added.

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About the CRC for Low Carbon Living Ltd

The CRC for Low Carbon Living (CRCLCL) is a national research and innovation hub that supports Australian industry to be globally competitive in the low carbon built environment sector.

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It brings together property, planning, engineering and policy organisations with leading Australian researchers. CRCLCL develops new social, technological and policy tools for reducing greenhouse gas emissions in the built environment.

A key aim of the CRCLCL is to help cut Australia's residential and commercial carbon emissions by 10 mega tonnes by 2020, which is the environmental equivalent of taking 2.3 million cars off the road. This will be achieved through developing low carbon building construction materials and increasing the evidence base for government policy and planning, among other measures. Australia has set greenhouse gas emissions reduction targets of 25 per cent by 2020 and 80 per cent by 2050 compared with 2000 levels.

When the 2020 carbon reduction targets are met, the CRCLCL will have delivered a direct benefit of $250 million per year to the economy, while reducing risk to the $150 billion per year construction industry as it adjusts to a carbon-constrained economy.

Ultimately the CRCCLC will help unlock barriers to cost-effective carbon reduction opportunities, empower communities and facilitate the widespread adoption of integrated renewable energy. This will enable the sector to transition and contribute to Australia's greenhouse gas emissions targets while maintaining industry competitiveness and improving quality of life.

It is supported by the Cooperative Research Centres program, an Australian Government initiative.

[i] H.Fan, I.F MacGill and A.B. Sproul, 'Statistical analysis of driving factors of residential energy demand in the greater Sydney region, Australia,' *Building and Energy*, 2015

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