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The Scottish APSE Energy Summit 2022

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cl!mate
County Durham

Measuring Carbon Emissions from Home Working

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Durham
County Council

Background

- This was a six month partnership project, undertaken January – June 2021, between Durham County Council and Durham University, funded by the LGA / UCL Net Zero Innovation Programme

- Competitive bids were invited for funding of up to £18k for a net zero partnership project between a university and a local authority

- Aim: to explore the impact on carbon emissions from the sudden transition to home working due to the Covid 19 lock down

Project Aims

- We aimed to enrol 100 staff volunteers from Durham University and Durham County Council who would be willing to share their home energy billing data for the year before lockdown (March 2019 – March 2020 and the year of lockdown (March 2020 – March 2021)

- We would compare this with half hourly gas and electricity consumption data from the 7 large office buildings in the University and the Council where these volunteers normally worked

- We would also collect data on each volunteer's normal commuting patterns, including vehicle details where appropriate

- The University would undertake detailed comparative data analysis. Accurate weather data for both years would be included

Challenges

We needed to devise a questionnaire to ensure that volunteers were eligible, to establish:

- Continuous residence at the same address for the two year period
- Continuous employment in the same place over the two years
- Whether other people living at the same address could impact the findings (eg school children at home during lockdown)
- Whether people could access their energy data, ideally via a smart meter

Smart meters: We were disappointed to find that most people who had switched energy supplier over the two years could not access their previous data and that first generation smart meters only stored one year's worth of data!

All these obstacles meant that only 42 volunteers were able to join the project and only 30 of those were able to supply a full data set.

Research Findings - Offices

- The office energy data was analysed in detail by Durham University. This is the two year comparative graph for Durham County Hall (blue is the pre-lockdown year and red is lockdown):
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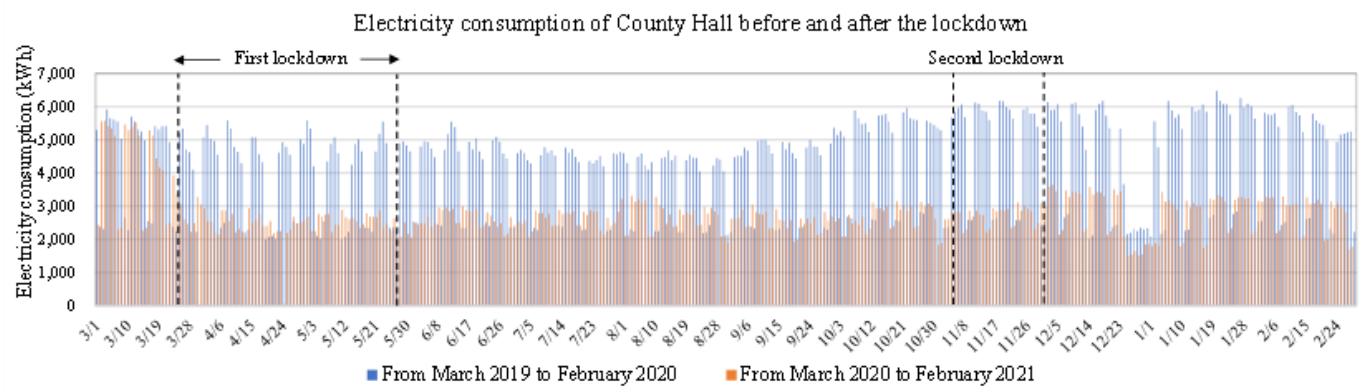

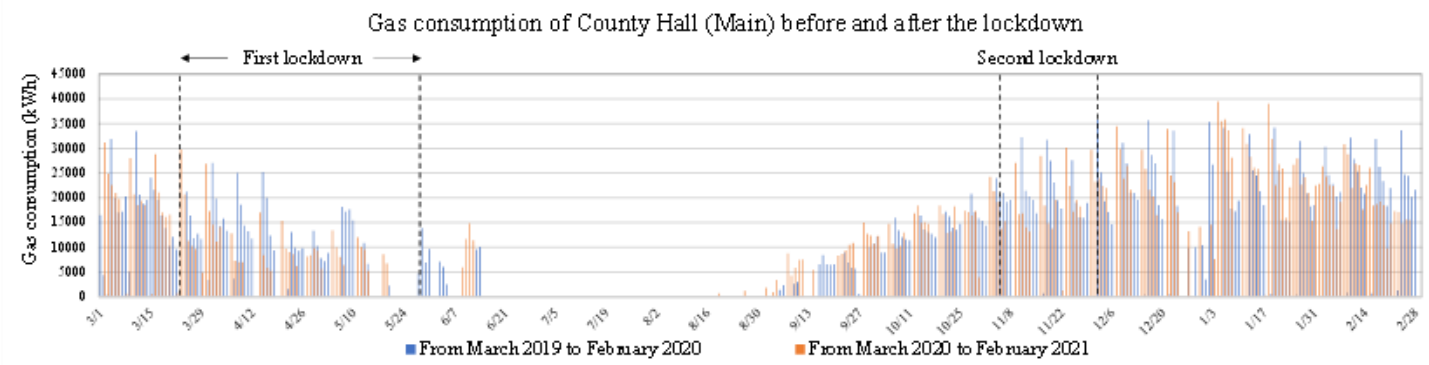

Research Findings - Offices

- Each of the 7 building's data analysis told its own unique story:
  - Reduction in electricity consumption over the full lockdown year varied from 8% (in the council's data centre) to 41% (an office) with an average 29% reduction
  - Reduction in gas consumption over the full lockdown year varied from 28% (council office building with simple on/off heating system for a skeleton staff) to 74% (university science building that closed to everyone) with an average of 45%

- Conclusion for office buildings:
  - Detailed understanding of each building is necessary
  - It's a myth that closing the building will stop all consumption
  - We need investment in zoning and more flexible ways of using office buildings to maximise carbon reduction as hybrid working evolves

Research Findings – Home

- The 30 volunteers who could provide their full data all showed some increase in energy consumption when working at home

- The highest individual electricity consumption increase was 141.4%; and the highest gas increase was 22.0%

- The average change in home energy consumptions was:
  - electricity consumption - 30.3% (689 kWh) increase
  - gas consumption - 23.3% (829kWh) increase

- We undertook more detailed dialogue and found many individual issues (eg purchase of an EV or heat pump). Weather data is also important

(the first lockdown took place during warm weather)

Research Findings - Home

- Our most significant finding was from the transport data. To our surprise, **reductions** in carbon emissions from staff not commuting to the office were on average five times greater than the increased emissions from home energy consumption

- We compared this with a study done by Cornwall County Council who found the same results.

- Obviously this varies by mode of travel, vehicle type for private car and
- the average distance commuted

What we have Learned (1)

- This was a project that can't ever be replicated because of the unique conditions (sudden lockdown when five day a week office working was still the norm)
- Don't underestimate how much time is needed to engage volunteers in a complex project like this!
- Smart meters are very disappointing as a tool for measuring long term home energy consumption
- There were significant reductions in energy consumption in all office buildings during lockdown but not as great as would be expected (baseload demand continues; intervention is needed to ensure controls are switched down or off; older heating systems stay on for the very small number of staff in the building, etc)

What we have Learned (2)

- Reducing staff travel from home to office can have a large reduction on overall CO2 emission. The longer the travel distance, the greater the reduction. *(Logically, to maximise carbon savings, staff who walk or cycle to work should be in the office every day and staff who live a long way from the office should work permanently at home!!)*

- Hybrid working is currently unlikely to reduce office emissions significantly because heating and lighting, etc will still be required for those staff working in the office. Consideration of zoning, smart controls and flexible use of office space is needed, to maximise energy efficiency when smaller numbers of staff attend on a daily basis.

- There's a lot more research to be done!

Thankyou for listening!

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Association for Public Service Excellence

APSE Network Query
RENEW123 – Monitoring the Carbon Impact of Homeworking

Charlotte Banks
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APSE Energy

RENEW123 - Monitoring the carbon impact of homeworking

This authority is looking to monitor the carbon impact of staff working from home. This includes matters such as extra electricity use for laptops or computers used at home, extra fuel for heating used at home and extra water used at home.

They would like to hear from others who have:

- introduced methods of monitoring these and related activities; how well they are working; problems encountered; if / how these problems were overcome; if / how this is being reported internally; any definitions for performance indicators; any other thoughts or ideas related to this issue.

Darlington Borough Council

- Used the EcoAct Homeworking Emissions White Paper calculation to estimate homeworking emissions.
- Quick survey of homeworking staff to find out whether or not heating would have been on anyway.
- They had to use the power demand of a workstation from the paper as the data wasn't available for their workstations.
- There are a number of assumptions, for example the calculation assumes that if heating is on, it is heating the whole house not just one room.

Wolverhampton Homes

- Undertake a staff survey to get a sample of homeworking activity.
- For example: energy usage - understand type/number of devices staff use for homeworking (kwh per device multiplied by hours worked); understand subsidiary energy use e.g., lighting, heating, cooking; travel – understand the impact of not commuting to the office (mileage / vehicle type); water use (increase/decrease – there was a report that suggests that water use has decreased due to people taking less frequent showers while working from home; impact on waste (less waste as lunch is made fresh at home, less single use materials etc. and resources (less printing).

Bristol City Council

- Calculated commuting emissions alongside homeworking emissions, since staff will either commute, work from home, or be on leave each day.
- The council used data from the system that allows staff to access council workplaces using proximity cards. If a card is used to access one or more council buildings during a day, the card owner is counted as commuting that day. If it isn't, they are counted as homeworking that day.
- The findings from Bristol's commuting and homeworking emissions calculation were taken into account when setting their post-pandemic working strategy and they will also be included in the Council's public carbon reporting.

South Lakeland District Council

- Currently not monitoring carbon emissions from home working, but they are basing figures on the rough estimates from the carbon trust report written in 2014
- The report states that if you live 7 km or more away from work (and usually drive) you are saving carbon by working from home – but less than that you should go to the office to reduce your carbon footprint.

Rotherham Borough Council

- The electricity use at home for laptops and heating and water would be offset by the travel costs and time saved on commuting to an office. This would be largely dependent on the distance travelled; mode and mobile working requirements; home heating type and home energy efficiency.
- Energy / water consumption is monitored at all Council buildings and is being compared with pre-covid data. The main office is actually using more gas with less people as the added body heat and laptop heat is no longer there.
- Commuter data isn't monitored but a voluntary data system will be set up in the future.

Over to you…

- Have you done any work in your authority on this?
- Have any of the considerations changed since the recent energy price rises?

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