



CREDS Annual Report: April 2018-September 2019

November 2019

Nick Eyre and Clare Downing



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1. Summary of Progress

1.1. Introduction

The Centre for Research into Energy Demand Solutions (CREDS) was established as part of the UKRI Energy Programme in April 2018 with funding of £19.5M over 5 years from EPSRC and ESRC. Its mission is to make the UK a leader in understanding the changes in energy demand needed for the transition to a secure and affordable, low carbon energy system. We are a team of over 100 people based in 15 UK universities.

The aims of the Centre are:

- to develop and deliver internationally leading research, focusing on energy demand;
- to secure impact for UK energy demand research in businesses and policymaking; and
- to champion the importance of energy demand.

This is CREDS first annual report and covers an 18-month period from April 2018 to September 2019. CREDS was announced on 26th March 2018, with a start date of 1st April 2018. This very short notice inevitably meant that research, administrative and knowledge exchange staff were not all in place on Day 1. However, staff from five of the six preceding End Use Energy Demand (EUED) Centres are involved in CREDS, and some of the research themes have benefitted from the researchers and activities undertaken by the EUED Centres continuing into CREDS. CREDS was formally launched at a well-attended event in London, jointly designed with EUED Centres to showcase their work on 20th September 2018.

In other research areas, and in the CREDS Core team based in Oxford, our activities began from a standing start. In these areas, recruitment was the major priority in the first six months of the Centre, and therefore the activities reported upon essentially cover a year.

1.2. CREDS Governance, Management and Knowledge Exchange

The governance systems of the Centre were established quickly. The Collaboration Agreement between the universities was agreed within the first 3 months. The residual issues raised by the funding panel were addressed. The Advisory Board met first in May 2018 and provided valuable guidance on early plans. It has met twice since then and will continue to be involved in the development and implementation of the activities over the life of the programme. The Executive Committee (consisting of the Director, Centre Manager and Theme and Challenge leaders) initially met monthly and now meets every six weeks. We had a "Whole Centre Meeting" (WCM) of all staff in the consortium three times in the first year and the expectation is that there will be 2 each year going forward. To date we have had four WCMs – two in Oxford and one in each of London and Leeds.

The CREDS Core Team is all based in the same Oxford office, and consists of the Director, the Centre Manager, two Knowledge Exchange Managers, a Web and Communications Manager and two part-time Centre Administrators. With the oversight of the Executive, it has developed the critical operational processes for the Centre. These include support for the Executive and Advisory Board, the internal communications mechanisms (such as the regular Consortium Update email), the Communications and Engagement plan, and a quarterly reporting system.

Based on the advice of the Panel, we took professional advice to develop a coherent name, vision and brand identity for the Centre, which were used as part of the Centre launch. The website is now fully populated with our people, plans and initial outputs, and increasingly with news, blogs, publications and other material.

Web statistics tell us that use is high and feedback on the website has been very positive. A few highlights include – 16,046 unique users visited the site, the four most popular pages are the homepage, the publication page for the Shifting the focus: energy demand in a net-zero carbon UK report, the people page and 4th was the challenges funding call in November 2018. On the digital marketing side the External newsletter that is produced quarterly has 448 subscribers and is very well received (~50 % open rate (average is ~20%), ~16% of subscribers click a link (average 4%)). CREDS has 871 Twitter followers and our tweets earned 76.7K impressions with an average of 843 impressions per day (impressions are the number of views a tweet receives). The full website & digital marketing analytics report for September 2018-September 2019 is available in Annex 1.

Key stakeholders have been engaged in the policy area and we have regular contact with Department for Business, Enterprise and Industrial Strategy (BEIS), Department for Environment, Food and Rural Affairs (Defra), Department for Transport (DfT), Office of Gas and Electricity Markets (Ofgem), Committee on Climate Change (CCC), British Standards Institute (BSI), and the Scottish Government. As part of our policy engagement work we regularly respond to calls for evidence from Government and Select Committees, and post these responses on our website. Our evidence to the Science and Technology Committee Inquiry on Technologies for meeting Clean Growth Emissions Reduction Targets was heavily cited in the final report.

We have made strong links with stakeholders in the research area, including other important Energy Programme investments including: UKERC, CESI, Decarbonising Transport Networks and the Supergen Hubs. CREDS has supported the EPSRC EUED Technologies calls. In our role as a hub for the energy demand research community, we brought together the PIs of energy demand research projects in the UK for a network meeting in May. We are now planning a series of other activities for this community throughout the life of CREDS starting with a meeting to discuss 'How can the research community respond to the climate emergency?'. We have excellent links to the CDT in Energy Resilience and the Built Environment, which is based at University College London and Loughborough University. We have already begun to have international impact as described in the impact case study in section 2.3

We have now completed the Call for two additional Challenges, which will start in 2020. We are mid-way through a process to fund early career researcher-led projects from our Flexible Fund. We will welcome the first international visitors next year. More details on all these initiatives are provided in Section 5.

Cross-theme activity has been encouraged and is successful, through both the WCMs and by working together on projects. The first of these was a project reviewing how best to deliver and develop the energy demand aspects of the Government's Clean Growth Strategy. This project published a report entitled "Shifting the Focus: energy demand in a net zero carbon UK" in July 2019, attracting much media and stakeholder attention. The work is described in the impacts case study in Section 2.1.

The Centre has an active working group to develop and implement its plan for Equality, Diversity and Inclusion (see Section 3).

1.3. Research Progress

In the 18-month period, CREDS staff have authored over 40 publications, including from work commenced with support from the previous EUED Centres, and these outputs are listed in Annex 2. These include papers that already have high impact, including through reports which gained global media coverage, and a paper cited in the IPCC Report on Global Warming at 1.5 degrees.

1.3.1. Buildings

The Buildings Theme has made significant progress, developing some of the research activities established in the Centre for Energy Epidemiology (CEE). Research on co-benefits has already published several interesting papers, including one on radon and energy efficiency that finds a positive association between air tightness and radon levels. Research on comfort and control is examining the empirical evidence for energy savings from improved controls. Research on the performance gap has led to a paper on Energy Performance Certificates (EPC) and is analysing data from monitored homes. The London Building Stock Model (LSBM) is now complete and will soon be launched as a tool for the Greater London Authority plan for the decarbonisation of the building stock in London.

The Theme has made considerable policy impact, responding to several calls for evidence, arranging policy briefings for BEIS, and had an early career researcher providing oral evidence to the House of Commons Science and Technology Select Committee. The theme makes a key input to the globally influential Lancet Countdown on climate change and health, and it has participated in the Government's Mission Innovation initiative.

The Buildings research team has successfully raised funding from a wide range of other sources (Mexican Government, Greater London Authority (GLA), UKRI, and BEIS) which adds resource and value to the CREDS research theme.

1.3.2. Transport and Mobility

The Transport and Mobility theme has assembled a high quality team of Research Fellows. Four research projects are underway and making very good progress. Two more will begin by January 2020. The project plans have been discussed at an early stage with key stakeholders, notably the CCC, DfT and some transport operators through invitation to workshops, delivering seminars and a bespoke training event (potentially to be repeated bi-annually) to DfT junior officials.

The research is continuing the work of the EUED Centre DEMAND on the Commission on Travel Demand. Four inquiry sessions on Shared Mobility have been held, with very good engagement from local and national policy makers, non-governmental organisation (NGOs) and transport operators. The final report was launched at the Smart Transport conference in September 2019. (See impact case study 2.2)

Transport and mobility research in CREDS has a high visibility and impact. There was significant media coverage of the Shifting the Focus report (see Section 2.1) relating to elements of the transport chapter, particularly the need for demand reduction alongside electrification. This led to an invitation to meet a DfT Minister in November 2019 (now changed to a meeting with senior officials due to the General Election). Work on fairness and tackling 'excess' travel and energy demand is being used to underpin advice to the UK Climate Citizens Assembly and the Greater Cambridge Citizen's Assembly.

The Scottish Government is incorporating advice on travel demand reduction from CREDS Mobility theme work into its pending climate change strategy. The team made a submission using evidence from CREDS research on aviation and long-distance transport to Environmental Audit Committee Inquiry on Sustainable Tourism. There is ongoing engagement with the Government's Electric Vehicles and Energy Taskforce with invited inclusion as a 'critical friend' in the new parallel Road Automotive Power Infrastructure Review. There has been a great deal of attention to the theme leader's presentation on "Rearranging elephants on the Titanic".

1.3.3. Materials and Products

All parts of the research of the Material and Products theme are underway. The research covers identifying remaining energy efficiency opportunities in UK industry, exploring how use of materials and products throughout the supply chain can deliver a reduction in industrial energy use and analysis of the relationship between industrial strategy and future industrial energy demand. A number of key deliverables are due in the next few months including the final report with Aether Consulting on 'A Data Strategy to Support the Clean Growth of UK Industries' and an academic paper on the role of energy efficiency in delivering net zero emissions in the steel and cement sector.

There has been extensive early engagement with BEIS, Defra and the CCC, including through interviews, a workshop and a regular three-weekly conference call with a multi-departmental government group to guide, support and disseminate the research.

The research team plays a key role in the analysis of consumption-based emissions for UK Government. It provides support to the CCC, including for its Net Zero report and the Progress Report to Parliament. It has provided support to Defra on its Resources and Waste Strategy, and has briefed the shadow Treasury team.

An initiative by the researchers in the themes is developing a major a cross-theme collaboration in CREDS to develop low energy demand scenarios for the UK.

1.3.4. Flexibility

The Theme is progressing according to plan with active projects on 'Flexibility: past, present and future' and 'Conceptualising Flexibility'. It has already held workshops on 'Flexibility' in September 2018 and 'Time and Flexibility' in September 2019, as well as interviewing other themes on flexibility and time.

Two members of the theme edited a book on 'Energy fables: challenging ideas in the energy sector', based on ideas generated as part of the DEMAND EUED Centre. Theme members have presented at a number of high-profile events, including the International Energy Agency Demand Side Management Day, a World Bank conference on evidence-based policy-making, an Ofgem seminar series, the industry conference Solar & Storage Live, and the Citizens Advice annual Energy Conference. The theme led the CREDS response to the BEIS/Ofgem consultation on 'Flexible and responsive energy retail markets: putting consumers at the centre of a smart, low carbon energy system'.

Research has informed advice to Ofgem on various issues, including the Impact Assessment of the price control (RIIO-2), the Competition and Markets Authority (CMA) price transparency remedy, the reform of black start restoration, distributional impacts and the Demand Side Response literature. Policy advice has also been provided to the British Standards Institute, as part of the new Energy Smart Appliances Strategic Advisory Group, and BEIS with regards to storage as a separate asset class.

1.3.5. Digital Society

Five projects are underway in the Digital Society theme, namely: a) reviewing the evidence on ICTs and energy consumption; b) estimating historical impacts of ICTs on energy consumption; c) business models in the digital economy; d) expectations for automated vehicles; and e) user acceptance of smart homes. Each of these projects is on track and two will complete in October 2019. We will shortly launch two further projects – on the diffusion of smart meters and digital platforms for the sharing economy – with a third project on the future impacts of ICTs beginning in early 2020.

The review of the evidence on ICTs and energy consumption has led to three papers – on e-materialisation, e-working and e-sharing respectively – which will be published in a special issue of Environmental Research Letters on demand-side solutions for climate change. The papers in this special edition will also feed into the IPCC Sixth Assessment Report. The econometric analysis of historical impacts of ICTs on energy consumption is complete and a paper is in preparation. A household survey on smart homes is also complete and we are collaborating with the Energy Systems Catapult to analyse a broader data set on user behaviour in smart homes.

The research programme has been informed by interactions with external stakeholders, including the Ofgem Innovation Link team and the Energy Systems Catapult Living Lab on smart homes. We hosted a conceptual workshop on business models in February 2019, a meeting of the Greater Brighton Energy Strategy Working Group in September 2019, and a successful Responsive Innovation Forum in October 2019.

1.3.6. Policy and Governance

There has been good progress on the projects on refurbishment policies, devolved governance and distributed ledger technologies in energy retail markets. In the first of these, the research team has gained additional complementary funding. Work on deep refurbishment has produced journal articles on both the role of manufacturers and merchants, and SME energy efficiency policy, as well as two conference papers at Sustainable Built Environment 2019. Work on multi-level governance has produced an article on laggards and leaders among UK local authorities, and a conference paper to the International Social Innovation Research Conference. The research on peer-to-peer (P2P) trading has generated a number of outputs ranging from a board game to an article on the meaning of P2P trading. More publications are expected in the next two quarters. Members of the theme made several contributions at the leading European energy efficiency conference (ECEEE) and more details are available in impact case study in section 2.3.

There are high levels of engagement with policy makers, including through contributing to several calls for evidence, meetings with Ofgem and government, and as speakers and panellists at conferences and workshops, as well as expert input to the BEIS review on heat networks. One team member sits as a Commissioner on Scotland's Infrastructure Commission.

1.3.7. Decarbonisation of Heat

The Decarbonisation of Heat Challenge is focusing on the system architecture of decarbonised heat rather than specific technologies. To do this, it is reviewing proposals for how heat can be decarbonised; analysing and further developing existing whole energy system models, and evaluating potential social, regulatory and governance implications of findings. An initial review of the way in which energy system modelling has supported energy and decarbonisation policy over the last 15 years is almost complete and is likely to lead to two journal articles in early 2020. These will shed light on the co-evolution of models, modelling and policy since the publication of the 2003 Energy White Paper, and help to identify a set of concepts and analytical tools, which will both structure future energy system modelling work and support the critical interpretation and communication of model outputs.

The work of the Challenge has been supported by a series of Learning Events, which aim to deepen the team's understanding of key issues and technologies. There is good collaboration with modellers and their policy users, with links to other relevant activities, notably in BEIS and the Energy Systems Catapult. A presentation has been made to BEIS on system architecture, and a workshop is planned for early 2020. The initial thinking on social and regulatory issues has been presented to the ERSS-2019 conference.

Collaboration with the Buildings Theme, led by Challenge leader Lowe, has led to the publication of a paper on 'Possible future impacts of elevated levels of atmospheric CO₂ on human cognitive performance and on the design and operation of ventilation systems in buildings', which was awarded the CIBSE Napier Shaw Bronze Medal for best paper published in CIBSE's research journal in 2018.

2. Impact Case Studies

2.1. National impact:

Launch of *Shifting the focus: energy demand in a net-zero carbon UK* report

On 5 July 2019, CREDS launched its first major cross-theme report, based on existing research, called [Shifting the focus: energy demand in a net-zero carbon UK](#). The report (Figure 2.1) proposes actions to strengthen and deliver the commitments in the Government's Clean Growth Strategy.

This was the first CREDS cross-theme activity, with the aims of developing collaborative working across CREDS, producing policy relevant outputs, providing early impact for CREDS and helping identify gaps in our research plans.

The drafting involved 22 members of the Centre and internal reviews involved another 12, so the report has achieved the goal of establishing joint working across themes. To take account of changing circumstances, we moved from a focus on the Clean Growth Strategy specifically to the broader question of the energy transition. The final version was designed to answer the question: "What is the role of energy demand change in the transition to an energy system that is consistent with a net-zero carbon UK?"

The overall conclusions were that demand side change should be a major part of the strategy for an affordable, secure and net-zero carbon energy system. Delivering it will not be easy, as it is a broad agenda, but delivering the transition without doing demand side change would be much more difficult.

The change required has four dimensions that are illustrated in Figure 2.2:

- Changing energy using activities. Broadening the scope of thinking to include the drivers of energy demand, such as social change to more sustainable consumption, resource efficiency to reduce industrial energy demand, and planning for service accessibility and modal shift to reduce mobility demand.



Figure 2.1: *Shifting the focus* report cover

- Radical improvements in energy efficiency. These include net-zero energy new buildings, low energy modes in transport, electrification of vehicles and heating can give efficiency improvements, and new industrial processes.
- Flexing electricity demand in time, using the large scope for demand side response (DSR) enabled by new opportunities from electrification of vehicles and heating, and digitalisation.
- Switching to decarbonised fuels at the point of use. This raises major challenges in sectors that are difficult to electrify: space heating, freight, aviation and industrial processes, and will involve major changes by supply chains and users.

Our key message is summarised in this diagram (Figure 2.2). It demonstrates that changing energy demand is more complex than the traditional agenda of marginal energy efficiency improvement.

The report was published on 5 July 2019, i.e. within one year of the Centre's launch. It is available as the [full report](#) or as a [summary version](#), with [video highlights](#).

We established an excellent working relationship with the BBC's environment correspondent, Roger Harrabin, and a media exclusive was agreed with him in advance. Roger was given early sight of the report and briefed by Nick Eyre. Materials were prepared, including a news release, key messages and media plan.

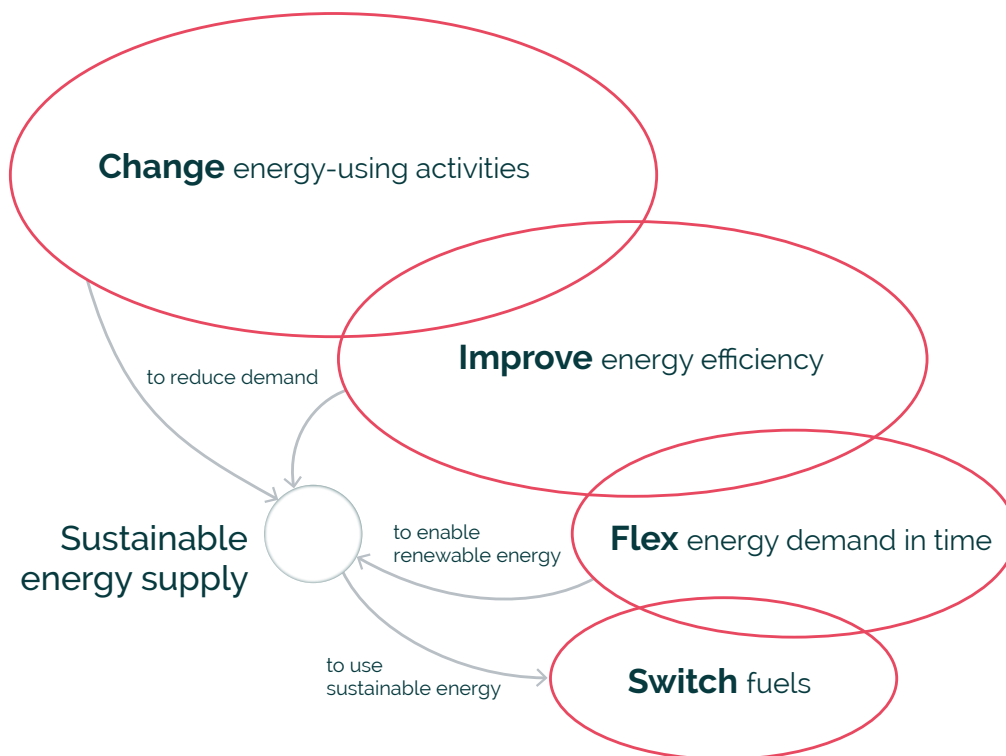


Figure 2.2: The four dimensions of energy demand change.

The day before the launch, when the story was added to the BBC 'wire', a significant amount of media interest was fielded and interviews arranged by the CREDS core team. This resulted in multiple national and local TV and radio interviews on the day of the launch, many with high listening/viewing ratings. The highlight was Nick being interviewed by Mishal Husain on the BBC Radio 4 Today programme on the morning of the launch. The table below outlines the scale of the media coverage that the report received.

In the first 5 days after the launch, the CREDS website news item and report publication page were viewed more than 1,100 times and the report PDF was downloaded 873 times. Subsequently, we have responded to a wide variety of stakeholders who expressed an interest. We produced a limited number of hard copy reports that have been posted to key stakeholders including MPs. This has resulted in an invitation to meet DfT officials, in November.

On 20 September 2019, the anniversary of the launch of CREDS, a series of videos with the lead authors of the report was launched on the CREDS website to give more insight into the complex content. A highlights document (summary) was also published to support the full report. We intend to continue to promote the messages within the report by developing tailored materials for other stakeholder groups, such as businesses, and to use its core messages as opportunities arise

A snapshot of the analytics from the website and Twitter between 5 and 9 July 2019 is provided in the table below :

Website (5-9 July)	Twitter (5-9 July)
1,660 users which is a 535.7% increase on previous period, 1,551 (93%) were new users	10 tweets from CREDS_UK
Average duration of a session is 2min 56 sec	18.5k impressions over the 5 days (total number of times a tweet shows up in a timeline)
Most popular page visited was the report launch news item with 1,185 views	429 engagements over the 5 days (total number of times a user interacted with a tweet such as link clicks, retweets, likes)
Second most popular page visited was the publications page where the report is available to view/download with 1,161 views	135 new followers over the 5 days (9 July – 726 followers).
The report PDF was downloaded 873 times over the 5 day period.	

Media coverage for the Shifting the focus report		
Media	Who	Web link and time stamp
BBC Radio 4, Today programme, 06:50, 5 July	Nick Eyre – live interview with Mishal Husain	
BBC Radio Scotland, Good Morning Scotland, 5 July	Nick Eyre – live interview	
BBC Breakfast News, BBC1, 08:08, 5 July	Nick Eyre as part of a Roger Harrabin report	www.bbc.co.uk/iplayer/episode/m0006hjn/breakfast-05072019 2.08.36
BBC1 South Oxford Evening News, 5 July, 18:30	Nick Eyre – pre-record TV interview	https://bbc.in/2YB48d1 3.52
BBC Radio Oxford, Breakfast Show, 07:49 5 July	Tina Fawcett – live interview	www.bbc.co.uk/programmes/p07d5639 50.00
BBC2, News at Nine, 09:20, 5 July	Jillian Anable – live interview on phone	Not available on iPlayer
BBC2, Victoria Derbyshire Show, 10:42, 5 July	Andrew Smith – live TV interview	www.bbc.co.uk/iplayer/episode/m0006hf5/victoria-derbyshire-05072019 43.00
BBC News Online, 5 July	Roger Harrabin report – Jillian Anable quoted	https://www.bbc.co.uk/news/uk-48875361
Carbon Brief, 5 July	Daily briefing news round-up – second item	https://www.carbonbrief.org/daily-brief/climate-change-trees-most-effective-solution-for-warming
Oxford University website homepage, 5 July	Press release content	http://www.ox.ac.uk/news/2019-07-05-shifting-focus-energy-demand-net-zero-carbon-uk
Current News website, 5 July	Press release content	https://www.current-news.co.uk/news/ulev-uptake-targets-muddled-prioritise-demand-reduction-says-creds
Oxford Mail, 6 July p3 of printed version and on web	Nick Eyre quoted	https://www.oxfordmail.co.uk/news/17753422.oxford-39-s-first-electric-private-hire-vehicle-will-help-city-39-s-journey-zero-emission-zone/
Sussex University website, 5 July	Press release content	http://www.sussex.ac.uk/staff/newsandevents/?id=49017
New Zealand news and current affairs station, Newstalk ZB, 10 July, 14:44 (NZ time)	Telephone interview for Tuesday evening show	https://www.newstalkzb.co.nz/on-air/early-edition/audio/jillian-anable-british-academics-call-for-massive-reduction-in-car-usage/
BBC News Online, 11 July	Roger Harrabin article – Jillian Anable quoted	https://www.bbc.co.uk/news/business-48944561
Current News website, 10 July	Government slammed by CCC over 'shortfall' in net zero policy action, Alice Grundy article mentions STF report	https://www.current-news.co.uk/news/time-to-act-government-slammed-by-ccc-over-shortfall-in-net-zero-policy-action
Reasons to be Cheerful Podcast (Ed Miliband and Geoff Lloyd)	Jillian Anable interview on 'Electric Dreams: The end of the petrol and diesel vehicle?'. (30th June 2019).	https://podtail.com/en/podcast/reasons-to-be-cheerful-with-ed-miliband-and-geoff-/93-electric-dreams-the-end-of-the-petrol-and-diese/
BBC Kent The Wake Up Call, 23rd August	Jillian Anable interview	Anable discusses the recent Science and Technology select committee report on clean growth and whether it's realistic to expect people to give up their cars. (N/A)
BBC News at One, 29 August	Libby Peake from Green Alliance	N/A
BBC News website, 29 August	Roger Harrabin interview with Prof Sir Ian Boyd	https://www.bbc.co.uk/news/science-environment-49499521
Physics World, 4 September	Dave Elliott report	https://physicsworld.com/a/in-praise-of-energy-saving-and-cutting-demand/

2.2. Sectoral Impact:

Commission on Travel Demand Inquiry on Shared Mobility: Where Now? Where Next

The Commission on Travel Demand is part of the CREDS Mobility theme, having initially been established as part of the EUED DEMAND Centre. It has been set up to bring together research within the CREDS programme (and beyond) with evidence from government and industry to reframe the debate about what is possible in cutting emissions from mobility. The inquiry into Shared Mobility was the second of the Commission and particularly focussed attention on how poorly utilised the car fleet is both as an owned asset and in-use. It looked at what is known about alternative policy approaches and their effectiveness and made a series of recommendations.

The Commission comprised Professor Greg Marsden and Professor Jillian Anable from CREDS along with Jonathan Bray from the Urban Transport Group, Elaine Seagriff from Jacobs Consulting (formerly TfL) and Dr Nicola Spurling from Lancaster University. The Commissioners set out a call for evidence and the topics for four evidence sessions, each of around 4 hours duration where industry, academia and governmental experts presented on specific topics, mostly based around the written evidence received.

We had 41 people submitting or attending evidence sessions from 28 different organisations including the Department for Transport, Committee on Climate Change and Connecting Places Catapult. It is a critically important part of the trust building process that, as well as being an active contributor to the evidence, the Department for Transport is also able to understand how the evidence and commentary is developing.

CREDS research included both background literature review work, and the usage profiles of vehicles across the working week. This showed that on any given day around a third of vehicles do not move at all and only around a third are involved in journey profiles connected to archetypal commuting patterns. This opened up space for a new discussion about the necessary size of the vehicle fleet.

CREDS provided the website for hosting the call for evidence, made available the presentations and summary write up of each session in accessible and user friendly formats and provided all of the design and production capabilities for the report. One particular output was the production of an infographic which was used to preview key statistics and as a hook for report downloads and social media communication as shown in Figure 2.3.

The [Shared Mobility report](#) was launched at the Smarter Transport Conference on 17 September 2019. On 18 September the related news item was the most viewed CREDS page (113 views). The report publications page has been viewed 583 times up to 9 October (second most viewed after the homepage) and the report has been downloaded 165 times.

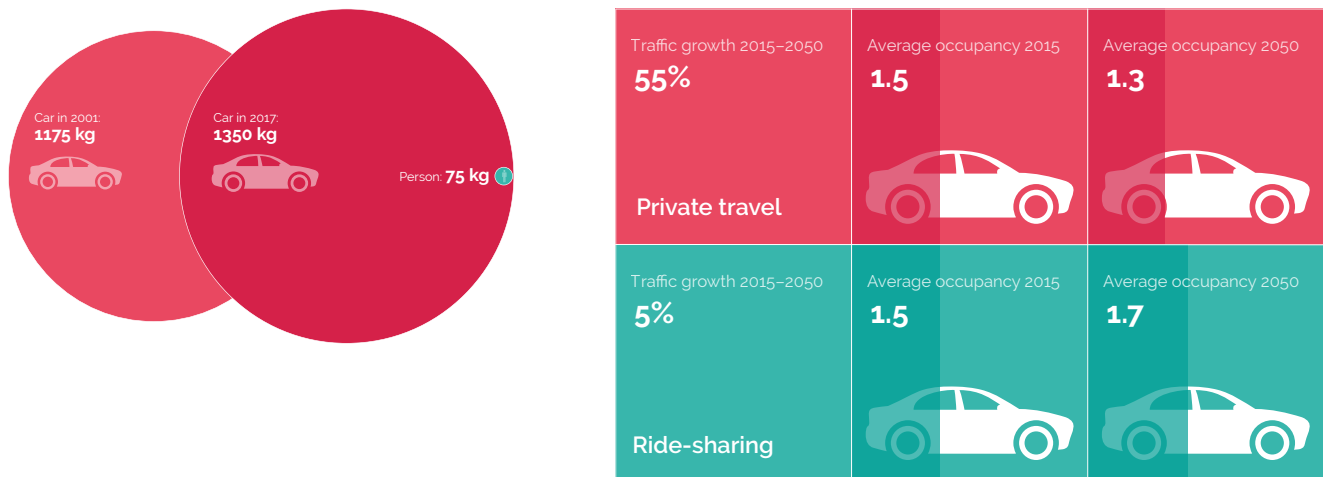


Figure 2.3: Graphics showing how cars are getting bigger even though they are less shared and that we spend £55billion per annum on owning a car, even though it is used for just 3-4% of the day

Initial findings were presented to the Department for Transport’s Strategy Committee. It has been well received by the Department, particularly Richard Bruce (Director, Energy Technology and Innovation). Early feedback from our lead DfT link confirms that policy colleagues are “actively using the findings and recommendations in their work” developing a policy framework on shared mobility. It has also been influential in broadening the Government’s role in shared mobility from being around innovation to “honing in to focus on the environmental impacts with the aim of feeding into the Department’s Decarbonisation Plan”. Greg Marsden will be presenting this work to the Department for Transport’s Think People programme in December.

The report has also been well received by industry. Follow ups have included an invitation to collaborate with Enterprise Holdings who operate the largest car club vehicle fleet in the UK and a data sharing agreement is being developed. This will inform project 2.3.1 on Governing Radical Change. Greg Marsden has also been invited to speak on the report at the ComoUK Collaborative Mobility Conference in Birmingham on 12-13th November which will have around 150 of the key industry and government actors in this area in attendance. Within CREDS, the report will feed into a cross-centre initiative being led by John Barrett and colleagues looking at what a radical low carbon low energy future could look like and what it might achieve.

The next steps beyond those listed above will be to follow up with the specific agencies which have recommendations aimed at them (e.g. Highways England which runs the trunk road network – it does not monitor vehicle occupancy and has no remit as it sees it for increasing person rather than vehicle capacity on its network). We will push the DfT for this to be an ambitious part of the forthcoming decarbonisation plan and then for the CCC to assess the potential and monitor progress towards intensifying shared mobility. We aim to hold a summit in Autumn 2020 to assess progress in the field.

We recognize that the impact for this report is immature because it was only launched just over one month ago and we intend to update this case study in the future to better reflect the full impact it has generated.

2.3. International Impact

Launch of Visiting International: Programme (VIP) at the European Council for an Energy Efficient Economy Conference

CREDS was very well represented at this year's ECEEE with staff from CREDS contributing to 11 papers that were presented across the topics of transport, buildings, policy and flexibility. The theme of this year's conference was 'is efficient sufficient?' This is partly a play on the full name of ECEEE – the European Council for an Energy Efficient Economy. It also reflects the desire of the ECEEE board and members to expand the focus of research and knowledge exchange beyond efficiency. The idea of sufficiency was a common theme in many of the keynote speeches, papers and informal discussions. It builds on a history of sufficiency research as presented in previous Summer Studies, and also ECEEE's current project on [energy sufficiency](#).

CREDS and UKERC hosted a joint workshop on sufficiency led by Sarah Darby, Tina Fawcett, Clare Downing, Sarah Higginson and Nick Eyre. There was an introductory presentation based on work Sarah and Tina had done for the [ECEEE sufficiency project](#), followed by an interactive workshop that asked participants to explore the infrastructure and society-wide changes needed to deliver sufficiency. Participants came up with lots of creative ways to encourage and enable individuals and organisations to live within limits.

Nick Eyre announced the launch of the CREDS Visitors: International Programme within the joint workshop. In addition to the launch, Clare Downing and Sarah Higginson ran a specialist informal session with potential applicants to the programme. ECEEE attracts energy researchers, practitioners, policy makers, NGOs and businesses from across Europe and beyond, with around 450 people in attendance. This made it an ideal venue for contacting potential visitors and for encouraging international links with CREDS. The VIP call closed in September and we will invite 6 people to visit CREDS as a result of the call that was launched at ECEEE.

There was also an informal session on excessive energy demand – exploring and debating different types and meanings of excess. This provided extensive material for the project team to investigate this topic further within the CREDS High Energy Consumers project.

Finally, Tina Fawcett and Marina Topouzi won a prize for their poster on 'The time dimension in deep renovation: evidence and analysis from across the EU' and 'Hares and tortoises home renovation' game.

List of activities presented and written about ECEEE		
Activity and author	Date	Content
Paper	June	Energy efficiency in the energy transition (2-041-19). This is a peer-reviewed paper. Nick Eyre, ECI-CREDS, University of Oxford
Paper	June	Energy sufficiency in policy and practice: the question of needs and wants (2-226-19) This is a peer-reviewed paper. Tina Fawcett, Sarah Darby, University of Oxford
Paper	June	The time dimension in deep renovation: evidence and analysis from across the EU (7-162-19). This is a peer-reviewed paper. Tina Fawcett, Marina Topouzi ECI-CREDS, University of Oxford
Paper	June	Deep retrofit approaches: managing risks to minimise the energy performance gap (7-349-19). This is a peer-reviewed paper. Marina Topouzi, Gavin Killip, Tina Fawcett, University of Oxford, Alice Owen, University of Leeds, UK
Paper	June	Excess? Exploring social, structural and behavioural drivers of energy demand in areas of high combined energy consumption or "how much energy is more than enough?" (6-019-19) This is a non-peer reviewed extended abstract. No paper available. Tim Chatterton, Jillian Anable, Milena Buchs, Robin Lovelace, Karen Lucas, Caroline Mullen, Malcolm Morgan, Muhammed Adeel, University of Leeds, United Kingdom
Paper	June	A small area estimation of the capability of individuals to replace car travel with walking, cycling and e-bikes and its implications for energy use (6-233-19). This is a peer-reviewed paper. Ian Philips, Jillian Anable, Tim Chatterton
Paper	June	A week in the life of a car: a nuanced view of possible EV charging regimes (6-272-19) This is a peer-reviewed paper. Giulio Mattioli, TU Dortmund, Germany, Jillian Anable, University of Leeds, Phil Goodwin, University West of England, United Kingdom
Paper	June	'Disruption' and 'continuity' in transport energy systems: the case of the ban on new conventional fossil fuel vehicles (6-309-19). This is a peer-reviewed paper. Christian Brand, ECI, University of Oxford, Jillian Anable, University of Leeds, United Kingdom
Paper	June	Exploratory analysis of family-related activities during peak electricity periods (1-221-19). This is a peer-reviewed paper. Máté Lórinicz, Timur Yunusov, Jacopo Torriti, School of Built Environment, University of Reading, United Kingdom
Paper	June	Load shifting with smart home heating controls: satisfying thermal comfort preferences (8-098-19). This is a peer-reviewed paper. Clare Hanmer, Michelle Shipworth, David Shipworth, Charlotte Johnson, UCL, United Kingdom
Paper	June	Utilising smart meter data for research and innovation in the UK (8-113-19) This is a peer-reviewed paper. Ellen Webborn, Eoghan McKenna, Simon Elam, Tadj Oreszczy, University College London, United Kingdom
Workshop	5 June	Excess Demand
Workshop	6 June	CREDS and UKERC Joint workshop on Sufficiency + Launch of CREDS Visitors: International Programme
Workshop	7 June	Information sharing and Q&A workshop for potential applicants to VIP
Blog: Tina Fawcett	25 June	CREDS at ECEEE Summer Study (number of page views 70)
Blog: Clare Downing	23 July	The changing use of energy efficient technologies – reflections from ECEEE Summer Study (number of page views 39)

3. Approach to Equality, Diversity and Inclusion

CREDS has adopted a policy and action plan on Equality, Diversity and Inclusion (EDI). Our aim is to foster an inclusive culture within the Centre, which promotes equality, values diversity and maintains a working and social environment in which the rights and dignity of all our staff, students, partners and stakeholders are respected. This fulfills our legal obligations under the Public Sector Equality Duty, but also goes further than the legal requirements.

The first draft of the EDI Plan was developed within the first six months of the Centre, as required in the terms and conditions of the grant. The Director led the development of the plan, reflecting the importance we place on EDI issues. It was discussed and agreed by the management team, with input from our Advisory Board, other staff and professional guidance from the Equality Officer of the School of Geography and Environment in the University of Oxford.

Subsequently the Plan has been revised to adopt changes recommended by the CREDS EDI Working Group set up under the Plan from amongst CREDS staff. We interpret 'staff' broadly, seeking to include in our decision-making staff with responsibilities for administration, communications and knowledge exchange, as well as those identified as researchers. The Plan has been discussed at Whole Centre Meetings of CREDS. It covers legal responsibilities, recruitment, bullying and harassment, flexible working, career progression, communications, researcher-led activities, and monitoring and reporting. It has already influenced our practices on a number of issues, including use of the Flexible Fund, recruitment to funding panels, remote access to meetings and mentoring.

The CREDS EDI Working Group meets three times annually and has been tasked by the CREDS Executive with taking forward the implementation of the Plan and monitoring delivery against it. The Plan contains 12 specific commitments, which we are working through systematically. Five have already been delivered. Many of the remainder are the responsibility of individual institutions and we are in the process of writing to them about these, as part of our monitoring of progress on EDI.

4. Early Career Researchers support

At our Whole Centre Meeting in January 2019 we presented our plans for early career researchers (ECRs) and gathered the names of ECRs within CREDS. This list has since been used to invite these people to an ECR event on 22nd and 23rd October that discussed ideas and expectations for engagement and support to ECRs within CREDS and provided training on 'How to write a proposal'.

In addition, one of our Energy Demand Research Network meetings in the future will be dedicated to ECRs within the Energy Demand community.

Finally, our second major funding call is dedicated to supporting projects led by ECRs, i.e. people active in energy research in the UK who have not previously led a project with funding exceeding £100k. See section 5.2 for more details.

5. CREDS Funding calls

5.1 Challenges call

We had funding allocated to a further 2 challenges of up to £1million each within the proposal and we held a 2 stage funding call process to select projects. The call was live for 10 weeks on our website and was the 4th most popular page with 1949 views. We held a webinar on 13th December 2018 that was attended by 36 people and the presentation and Q&A from the webinar were made available on the website and had 106 page views. There were 24 proposals that applied in Stage 1 and of these, 7 were selected for Stage 2. The process involved 2 reviewers for each proposal and a score was allocated, the combined score from the 2 reviews were used to rank the proposals which were then debated in a panel forum. One proposal was contentious and hence further new reviews were gathered before it was accepted.

The two projects that will be funded as a result of the call are:

- Fuel and trAnsport poverty In the UK's energy tRansition (FAIR): Mari Martiskainen at Sussex University. This involves partners in Sussex, Oxford, Manchester, Edinburgh, Ulster and Liverpool John Moores
- Complete decarbonisation of the steel industry – how do we get there? : W.F. Gale, University of Leeds. This involves partners in Leeds and Sheffield.

These projects will be monitored in the same way as the existing themes and challenges – the PIs will, be asked to join the Executive Board of CREDS where they will contribute to the management responsibility of the programme – they will complete quarterly reports which is how we assess project progress and – their expenditure will be assessed through financial review. In terms of integration into the CREDS consortium, their teams will be added to the mailing list and receive regular news updates and they will be invited to all CREDS events including Whole Centre Meetings and ECR activities.

5.2. Early Career Researchers call

The ECR call was launched on 25th July and will close on 17th December (open for 20 weeks) and is for those who have not held a grant of more than £100K. A webinar was held on 26th September that had 49 attendees and the details of the call were presented and participants asked questions. The call documents, audio recording, presentation and Q&A transcript are available on the website for all applicants to use. To build capacity of the ECRs we are also providing a mentoring circle where mentors who have experience of winning funding have a group of up to 10 people who would like support for their proposal. The mentors are hosting 2-3 remote meetings to discuss concerns from potential proposal writers and to share their knowledge of how to write a strong funding proposal. The training materials from the CREDS ECR event will also be shared with the mentors and mentees and made available on the website.

Each mentoring circle will record their activities and feedback lessons learned so that we can monitor the outcomes of this novel initiative.

5.3. Visitors International: Programme (VIP)

The Visitors International: Programme (VIP) was launched at the ECEEE conference in France on 6th June 2019 (See Impact case study 2.3). The call was out for 3 months (closed 10th September). We had 9 applications and following reviews by both the host and the core team have offered visits to 6 people. We are currently doing the detailed scheduling and paperwork for the visitors.

List of applicants accepted as VIPs in 2019		
Name	Affiliation	Host
Yohei Yamaguchi	Osaka University, Japan	Jacopo Torriti
Selin Yilmaz	University of Geneva, Switzerland	Jacopo Torriti
Max Kleinebrahm	Karlsruher Institut für Technologie (KIT), Germany	Jacopo Torriti
Fatima Khushnud	Independent Power Producers Association (IPPA), Pakistan	Tina Fawcett
Yael Parag	School of Sustainability, Interdisciplinary Center, Israel	Tina Fawcett, Mike Fell
Petra Hofman	Tilburg University, The Netherlands	Jan Webb



About CREDS

The Centre for Research into Energy Demand Solutions (CREDS) was established as part of the UK Research and Innovation's Energy Programme in April 2018, with funding of £19.5M over 5 years. Its mission is to make the UK a leader in understanding the changes in energy demand needed for the transition to a secure and affordable, low carbon energy system. CREDS has a team of over 100 people based at 15 UK universities.

CREDS is funded by UK Research and Innovation, Grant agreement number EP/R035288/1

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