



Scotland's centre of expertise connecting climate change research and policy

**ClimateXChange**  
**Centre of Expertise on Climate Change**

**Annual Report 2015-16**

## Table of Contents

<b>1. EXECUTIVE SUMMARY</b>	<b>2</b>
<b>2. PROGRESS REPORTS ON ACTIVITIES</b>	<b>3</b>
<b>2.1 Energy</b>	<b>3</b>
<b>2.2 Transport</b>	<b>7</b>
<b>2.3 Forestry</b>	<b>9</b>
<b>2.4 Natural Environment</b>	<b>12</b>
<b>2.5 Agriculture</b>	<b>14</b>
<b>2.6 Economy</b>	<b>16</b>
<b>2.7 Adaptation</b>	<b>17</b>
<b>2.8 Cross-Cutting Activities</b>	<b>19</b>

## 1. EXECUTIVE SUMMARY

This last year, 2015-16, concludes ClimateXChange's first five year funding programme. Over this period our research and analysis has become increasingly responsive to Scottish policy needs. Internationally, 2015 was an extraordinary year with the Paris Agreement on climate change and the UN Sustainable Development Goals receiving extensive attention. Nationally, the new UK government undertook a policy reset on energy, leading UK energy policy to diverge rapidly from Scottish priorities. In Scotland, the underpinning evidence to support the impending Report on Policies and Proposals (RPP3) was a key driver. At the same time, we have experienced increased demand for our inputs to the policy process in part as a response to public sector funding pressures.

We have also seen an increased focus on adaptation policy, with flooding and adaptation economics emerging as priorities. ClimateXChange (CXC) has worked closely with the Scottish Government in setting up the National Centre for Resilience, and leading the Research and Training Working Group, to ensure a co-ordinated and efficient response to the projected increase in natural hazards. We have also delivered the suite of climate change adaptation indicators that have been a cornerstone of our planned work from the outset.

Energy policy is another area with markedly higher demand for CXC support. We have responded to the Scottish Government's local energy agenda with both social and economic research. Increased focus on energy systems, including productivity and storage, is reflected in the volume of commissioned work and new PDRF posts.

In line with our re-structuring, which gave a smaller number of researchers a greater time commitment to CXC work, we have seen progress on issues like transport and energy through our PDRFs, most notably with a policy note on electric vehicle patterns of adoption and work on energy markets / security.

On the mitigation side we have had renewed engagement with Scottish Government agriculture and climate change policy team to support their approach to mitigation in the agriculture sector.

These examples highlight the increasing responsibility placed on CXC as a model of Knowledge Exchange, and as a trusted centre of expertise. In February 2015, the ESRC, along with DECC, EA, DEFRA, NERC and FSA recognised Scotland's CoE's as models to learn from as they commissioned a new 'Centre for evaluating complexity across the energy environment-food nexus'.

## 2. PROGRESS REPORTS ON ACTIVITIES

### 2.1 Energy

CXC responded to an increased demand for energy research from the Scottish Government in 2015 by establishing four new post-doc positions focussed on energy policy, markets and energy system modelling. These projects have developed over 2015-16 and are assisting the Scottish Government to better understand the likely impacts of changes in Scotland's electricity and heat networks as they are decarbonised. They are also improving understanding of the potential opportunities and risks posed by changes in the Great Britain and international energy markets. We have responded to the Scottish Government's local energy agenda by examining the social and economic impacts of low carbon local energy systems and ownership models. The commissioning budget has continued to provide evidence of the benefits and impacts of renewable energy in Scotland.

#### 2.1.1 Renewables

**Deliverable 1. Commissioned Projects (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- [The Peatland Carbon Calculator: its use and future potential](#) (published December 2015).
- [The comparative costs of community and commercial renewable energy projects in Scotland](#) (published July 2015)
- [Assessing the life cycle costs and carbon emissions of wind power](#) (published June 2015)
- [Citizens' Juries research project: onshore renewables](#) (published May 2015)
- [Wind farm Impacts study](#) (published June 2015)

#### 2.1.2 Local Energy

**Deliverable 1. Local Energy Economies: Measuring the social impacts of local and community energy projects (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- This project is developing a practical and replicable framework for assessing the social impacts of local and community energy that could be employed across a variety of different projects.
- Phase 1 of the project was completed in March 2016, consisting of four one-day stakeholder workshops throughout Scotland.
- Phase 2 has commenced and will include analysis of findings from Phase 1. This will be followed by piloting of the framework developed and the delivery of a final report.
- The project is on track for completion in autumn 2016.

**Deliverable 2. Local Energy Economies: understanding the economic impact of local energy (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- This project focuses on developing an approach to measure the economic impact of local energy initiatives, with a particular focus on projects funded through the Scottish Government's Local Energy Challenge Fund, as well as other local energy projects funded through the Low Carbon Infrastructure Transition Programme.
- This project is being undertaken as a collaboration between the Fraser of Allander and the Hutton.
- Project methodologies have been established. Secondary data analysis is complete. Initial project surveys were undertaken in 2015/16, with further surveys in spring/summer 2016 with the assistance of Local Energy Scotland.

**Deliverable 3. Commissioned Project - The Smart Accelerator: A Qualitative Process Evaluation (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- A review of the success factors of the Smart Accelerator project, which was managed by the Edinburgh Centre for Carbon Innovation. The review highlights transferable lessons. (Delivered March 2016)

### **2.1.3 Energy policy, systems and markets**

**Deliverable 1. PDRF Research Project- Scotland and the European Energy Union (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- This Post Doctoral Research Fellow (PDRF) project is assessing European energy policy developments in terms of their possible implications for Scottish and UK energy system transitions, including markets and trading, infrastructure, and low-carbon investments.
- The first phase of this project has been completed, mapping European energy policy and markets including its key legislation and organisations working in the EU.
- The second stage of work has commenced and will involve 12 participatory expert interviews.

**Deliverable 2. PDRF Research Project- Energy, Electricity and Security of Supply for Scotland (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- This PDRF post, based at the University of Edinburgh, aims to improve understanding of how to define and manage security of supply in Scotland's future energy system. It is modelling the relative impacts of transmission, storage and demand side management, as well as changes in heat demand and delivery.
- Scottish Government have been engaged throughout this project to ensure that its objectives and design are suited to their knowledge requirements, and are aligned with their own modelling approaches.

- An energy storage module for pre-existing power systems software has been developed, allowing users to understand the potential role of energy storage in delivering energy supply in Scotland. This work is complete but there will be a further examination of how the model could be examined alongside the Scottish Electricity Dispatch Model.
- Ongoing work will focus on examining the spatial aspects of carbon emissions reductions across the GB and Scottish power systems, as well as the role of heat.

**Deliverable 3. PDRF Research Project- Energy and Electricity Modelling for Scotland (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- This post, based at the University of Strathclyde, is assessing the security of Scotland's electricity system, considering generation of supply, demand and transmission. To date this work has been primarily focussed on analysing the transmission capabilities required to adequately link Scotland to the rest of Great Britain into the future.
- The post-holder has worked closely with OCEA and National Grid staff to develop and validate a model that enables policymakers to identify the level of security of electricity supply provided to Scotland by the GB electricity system. Policy contact: Mike King, OCEA.
- Consultation with National Grid has led to a subsequent project to analyse transmission requirements for supporting security of supply for Scotland and Northern England based on their working assumptions of demand and generation closures. The results of this work will support the studies already undertaken and will be shared with Scottish Government.
- The post holder has also worked with OCEA and the appointed contractor to inform a major update of the Scottish Electricity Dispatch Model. This input included two full-day meetings and ongoing support over a three-month period.

**Deliverable 4. Commissioned Projects (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- [Electricity and heat demand in Scotland](#) – an assessment of the potential for electrifying a large proportion of heat demand in Scotland and development of a user-friendly model for a wider system assessment. (Published April 2016)
- [Energy storage in Scotland](#) - two policy reports reviewing the state of technological and market development in the context of Scotland's energy policy ambitions. These cover thermal energy storage and electrical energy storage. (Delivered February 2016)

## 2.1.4 Energy Efficiency

### **Deliverable 1. Commissioned Projects (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- [Comparative review of housing energy efficiency interventions](#) - a comparative study of international energy efficiency interventions to inform the Scottish Government and its work on energy efficiency in the housing sector. The study included energy efficiency regulations, schemes, support programmes, incentives and fiscal levers in other European countries, top performing American states and selected countries with relevant experience.
- [Effectiveness of greenhouse gas emissions policies in Local Development Plans](#) – an assessment of the effectiveness of greenhouse gas emission reduction policies in Local Development Plans in promoting the uptake of Low and Zero-Carbon Generating Technologies in buildings.

## 2.2 Transport

CXC established a PDRF post focused on transport in 2015 in response to the Scottish Government's identified need to better understand the constraints and opportunities around the adoption and delivery of low carbon transport technologies in Scotland. This post moved from the University of Aberdeen to the University of Leeds in 2016 due to the relocation of the Principal Investigator.

### **Deliverable 1. Decarbonising Passenger Cars (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- A spatial analysis of EV adoption in Scotland was done to understand the relative explanatory value of local demographic, economic, transport system, vehicle fleet and policy characteristics on the rate of uptake.
- A policy note [Exploring the spatial demand for electric vehicles in Scotland](#) was delivered in October 2015. It profiled electric vehicle (EV) adoption levels across Scotland's Local Authorities highlighting areas of relatively high and low adoption. This output is assisting policymakers and researchers to evaluate the spatial variance in EV diffusion by identifying adoption front-runner areas.
- Policy briefs on CO<sub>2</sub> emissions from cars and on hybrid vehicles: in preparation. On track for delivery 2016.

### **Deliverable 2. Shifting Mobility Patterns (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- This work package aims to understand the potential for Car Clubs to contribute to energy demand reduction in Scotland by understanding the current and future market in terms of users, usage patterns and business models.
- Work currently suspended while research priorities are considered in collaboration with Transport Scotland. This resource may be directed to other research (see below).

### **Deliverable 3. Lower Emissions Potential in Transport (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- This work package aims to contribute to assessments of future carbon and energy demands from Scotland's transport sector by developing evidence-based assumptions of potential future mobility patterns.
- Work currently suspended while research priorities are considered in collaboration with Transport Scotland. The work package might be re-orientated to focus on the delivery of a Scottish Transportation Carbon Model which will allow for forecasting of emissions generated by Scotland's transport sector to be conducted and alternative policy

mixes to be assessed. This reorientation is pending formal approval from the Scottish Government.

## 2.3 Forestry

### 2.3.1 Woodland expansion

CXC's woodlands expansion work aims to enable Forestry Commission Scotland (FCS) and other policymakers to make more informed decisions on where and how trees should be planted to help meet Scotland's emission reduction targets. This includes quantifying the carbon benefits of different planting scenarios, as well as identifying the types of incentives that may be required to ensure increased rates of appropriate tree planting by landowners. It is also assessing the impact of woodland expansion on agricultural production, rural livelihoods, and other ecosystem services, to identify the most beneficial planting scenarios for Scotland's environment and economy. This work is delivered through collaboration between researchers from the James Hutton Institute (the Hutton), the University of Aberdeen and Forest Research.

The research team and the Secretariat have continued to pursue a policy-led approach to this work during 2015/16, working closely with FCS to identify priority outputs and policy applications. FCS confirmed during this period that this project will not contribute directly to the development of RPP3 as previously anticipated. However, FCS continue to place significant value on the planned outputs, delivery of which is now expected in June 2016 (as a result of late identification of critical data issues) and will support further phases of input from CXC in identifying the most appropriate approaches to woodland management and expansion in Scotland).

#### **Deliverable 1. Modelling of carbon stock changes following conversion into woodland (Sept 2015 rating: GREEN; April 2016 rating: AMBER)**

- Estimates of above and below ground changes in carbon from afforestation have been integrated.
- Maps of current land use, soil carbon changes over time and yield of four forest management alternatives (FMAs) have been produced and combined.
- The resulting maps were analysed for distribution of carbon stock changes when land use units were repeatedly sampled to make up the 100,000 ha woodland SG targets by 2022.
- During preparation of the final report it was discovered that some of the input data for the modelling work was in error. This is now in the process of being corrected and the models rerun. This has, however, resulted in a three-month delay. The expected completion date is June 2016.

**Deliverable 2. Scenarios of future land use change and climate change (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- Following discussions with FCS eleven Forest Management Alternatives (FMAs) were agreed.
- A target for 100kT carbon mitigation has been set and paired scenarios run in a matrix of FMA types.
- Maps of net carbon storage considering soil and above ground storage have been generated at national and regional scale for the eleven agreed FMAs. These have used outputs from a revised version of the ECOSSE model combined with data from the Woodland Carbon Code.
- The datasets have also been presented in graphical forms to show the range of possible outcomes for FMAs and the most likely outcomes in the absence of positive targeting interventions.
- Initial discussions have been held with FC to interpret the outputs with key questions being raised on the most appropriate strategic balance of broadleaf to conifer planting and the desirability of seeing new woodlands on better quality land.

**Deliverable 4. Quantifying woodland loss from planning consents (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- Rates of afforestation/deforestation/non-change for the whole of Scotland have been mapped and calculated using publicly available National Forest Inventory (NFI) (2011-2013) datasets.
- Forests and woodlands where permission or implementation (across all different stages of the planning process, from scoping to installation) of wind turbines is recorded by SNH were mapped and rates of change calculated against three time periods (2007-11, 2011-12 & 2012-13).
- Forest loss has been mapped and calculated in relation to a series of relevant factors influencing the planning process, including: forest habitat networks; designated areas, landscapes and woodlands; wildness; landscape sensitivity, and character; ecological connectivity; and land capability of forestry. This has been done for the whole of Scotland, but also per local authority area (to better relate our results with the planning process at the spatial scale/institutional level at which this ultimately occurs). The outputs have been shared with Perth & Kinross Council prior to discussion in 2016 on their potential to inform the planning process.

### 2.3.2 Forest adaptation

The forest adaptation project is communicating key learning on adaptation to the sector, including forest managers and policy leads. The work is led by a post-doctoral research fellow based at Forest Research. The focus of this work was narrowed over the 2015/16 in response to the post holder taking maternity leave. The position was back-filled during this period, however, her working hours have been significantly reduced since returning from leave.

**Deliverable 1. Ecosystem services delivery in Cowal and Trossachs Forest District under future climate scenarios and adaptation management options (Sept 2015 rating: AMBER; April 2016 rating: AMBER)**

- This project is examining the impacts of future climate scenarios and changes in forest management on the delivery of goods and services provided by Scotland's forests. It aims to inform policymakers about the direction of adaptation management strategies and their impacts on economic, social and cross cutting issues. This includes examination of forest management impacts on carbon storage, timber outputs, operational inputs, recreation index and forest biodiversity.
- A draft report on this work is currently under internal review and expected to be published early in 2016/17.
- The post holder has been working with FCS planners through the Climate Ready Demonstration Forest to apply models developed by this project to specific Land Management Plans. These will be further developed during 2016/17 to assist forest planning decisions and to validate climate change policymaking.

## 2.4 Natural Environment

### 2.4.1 Peatlands

Our peatlands project aims to deliver practical tools to support the achievement of Scotland's emissions reduction targets and the aims of the 2020 Biodiversity Challenge. Project aims for 2015-16 were to provide relevant data to aid the implementation of the 2013 IPCC Wetlands Supplement, by providing better estimates of abatement potential achievable through peatland restoration, better emission factor estimates and better maps of the condition of peatlands and/or land cover of converted peatland.

The project was impacted by staff shortages during the 2015-16 financial year as a result of two key researchers, including the Principal Investigator, being on maternity leave. This required deliverables to be re-prioritised and led to the delay of some outputs.

**Deliverable 1. WISE Peatland Decisions Tool (Sept 2015 rating: RED; April 2016 rating: N/A)**

- As agreed with the CXC Directorate, staff time was diverted away from this project in response to staffing constraints. These resources were instead focused on higher impact work: delivering inputs to the Scottish TIMES model team, Scottish Government (see Revised Deliverable 1 below).

**Revised Deliverable 1. Deliver data for the TIMES model for the estimation of carbon abatement potential from peatland restoration to 2050 in RPP3 (Sept 2015: Green; April 2016: Green)**

- Excel-based model with updated emissions categories and emissions factors delivered by the deadline of December 2015. This update included the addition of emissions estimates for methane, nitrous oxide and dissolved organic carbon, as well as carbon dioxide.

**Deliverable 2. Analysis of the public **payments** for peatland restoration (Sept 2015 rating: AMBER; April 2016 rating: AMBER)**

- The deliverable was initially delayed as specialist staff with capabilities to undertake this work had to be assigned to other higher priority work under the Strategic Research Programme. Work resumed on this in early October 2015 and the final output is expected in Spring 2016.

## 2.4.2 Biodiversity – Assessing climate risk to Notifiable Features

From 2012, CXC developed an analytical procedure for prioritising climate change adaptation measures for Scotland's protected areas. This is a priority for SNH, and a goal within the Scottish Climate Change Adaptation Programme. Working closely with SNH staff, the research team took the list of Notifiable Features in Scotland and ranked it according to the risk posed to these features by climate change. Adaptive management actions were then identified for the most highly ranked features within that list.

The focus of this work during the 2015/16 period has been to disseminate the research results and analytical process developed with stakeholders and the user community within SNH. This has included workshops with the Uplands and Woodlands team, iteratively handing over the data analysis and providing training in the analytical process to SNH staff. An end of project report was provided to SNH and the CXC Secretariat at the end of March 2016.

This collaborative project was delivered by the Hutton, RBGE, University of Aberdeen, University of Edinburgh, SNH and Dundee University. Deliverables 1-3 have all been completed on time.

**Deliverable 1.** Jointly develop handover work plan with SNH (Sept 2015: Green; April 2016: Green)

- Completed

**Deliverable 2.** Undertake engagement workshops with SNH's Uplands and Woodlands teams (Sept 2015: Green; April 2016: Green)

- Completed

**Deliverable 3.** Continue engagement with SNH's Earth Science and Fresh waters teams (Sept 2015: Green; April 2016: Green)

- Completed

**Deliverable 4.** Work towards project completion including handing over CXC data and analyses to the SNH team (Sept 2015: Green; April 2016: Green)

- On track to be completed and published in May 2016

## 2.5 Agriculture

CXC's agriculture work aims to increase knowledge of the mitigation potential in Scotland's agricultural sector, and to improve understanding of the potential impacts of climate change on agricultural production and food security. In-house resources have been focussed on assessing the potential to reduce emissions from cropping practices, as well as the impact of climate change on where particular cropping practices may be feasible into the future. Discrete projects have been commissioned to provide policymakers with accessible insights into current knowledge on the potential to reduce emissions through changes in technology, land use and livestock health.

### **Deliverable 1. Crop modelling (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- The project has developed a model to assess the geographical spread of greenhouse gas emissions from cropping activities. The model has been used to assess the impact of changes in cropping practices on emissions from the agricultural sector. Initial analysis has been focussed on the intensive, high-value cereal crops, including barley and wheat, as well as potatoes.
- Modelling has also been undertaken to assess the potential for climate change to alter where particular cropping activities will be feasible into the future.
- The modelling capability developed will be applied in 2016/17 to address key policy questions, including the consideration the trade-offs between emissions reduction and maintenance of agricultural production.

### **Deliverable 2. Soil carbon in Scotland (Sept 2015 rating: N/A; April 2016 rating: AMBER)**

- The potential of soil and changes in land use to increase or decrease carbon emissions is a priority for the Scottish Government, across several policy areas. This [study](#) is assessing the current state of knowledge on soil carbon and land use in Scotland, with a primary focus on rural land use in Scotland and soils which carbon is a significant component. The report is expected in May/June 2016.

### **Deliverable 3. Benchmarking the emissions intensity of Scottish Livestock**

- [This project](#) examined the approaches for quantifying emissions. It reviewed recent studies and provides recommendations on benchmarking. The aim was to inform how comparisons of the emissions intensity of Scottish agricultural commodities with other countries might be confidently repeated. Delivered February 2016.

**Deliverable 4. Rapid evidence assessment: livestock health (Sept 2015 rating: N/A; April 2016 rating: GREEN)**

- A rapid assessment of the available evidence on the potential contribution that can be made to reducing the intensity of greenhouse gas emission by eradicating or controlling the livestock diseases in Scotland. Delivered: March 2016.

**Deliverable 5. Rapid evidence assessment: agricultural technologies (Sept 2015 rating: N/A; April 2016 rating: GREEN)**

- A rapid evidence assessment to understand the potential for technological developments to reduce greenhouse gas emissions from agriculture, which could be exploited through government support via financial mechanisms, such as interest free loans. Delivered March 2016.

## 2.6 Economy

CXC's economy work supports understanding of the macro economic effects of current and potential low carbon policy changes in Scotland. In-house resources have been increasingly focussed on assessing the economic impacts of local energy developments, through the collaboration of researchers at the Fraser of Allander Institute and the Hutton (see section 2.1.2 above). CXC researchers and the Secretariat have continued to engage with policy teams within Scottish Government to ensure the CXC's economic research is responsive to policy needs. This has included collaborative consideration of model improvements and extensions to address issues of particular concern to Scottish Government. The commissioning budget has also been used to respond to specific requests from policy teams.

### **Deliverable 1. Energy-environment-economy modelling (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- Examining consequences of improving energy and resource efficiency, for both household and industries in Scotland.
- Enhance model capability to address questions of importance to Scottish Government. Ongoing discussion with OCEA staff to consider extension and alignment of modelling with Scottish Government models and priorities, includes the Scottish TIMES model.
- Understanding employment in low carbon and renewable activities in Scotland. This work was completed in 2015. The results were presented to Scottish Government economists and statisticians at a seminar organised by OCEA. Findings will also be published in a policy brief for the International Public Policy Institute, University of Strathclyde.

### **Deliverable 2. Commissioned Projects (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- Improving Energy Productivity in Scotland – report on Scottish and international case studies (Published January 2016)

## 2.7 Adaptation

In 2012/13 ClimateXChange was asked by the Scottish Government's Directorate for Energy and Climate Change to develop indicators to build understanding about how Scotland is adapting to our changing climate. The indicators will inform the independent assessment of the Scottish Climate Change Adaptation Programme (SCCAP) and support decision making by Scottish Government policy teams and others.

A significant proportion of CXC's in house resources have been focussed on finalising the indicators during the 2015/16 period, including natural environment, built environment and social researchers from multiple institutions. The commissioning budget has also been employed to fill discrete knowledge gaps identified throughout the project. Core work has been delivered as a collaborative project between the CXC Secretariat, University of Dundee, RBGE, the Hutton, SRUC, Forest Research, Heriot-Watt University and the Crichton Carbon Centre.

The indicators developed by this project will assist policymakers to monitor the effect of adaptive actions, understand how actions are impacting on outcomes and adjust adaptation measures in response to changes.

### **Deliverable 1. Adaptation Indicators (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- Over 100 indicators have been developed across the themes of Natural Environment, Buildings & Infrastructure Networks, and Society.
- Fifteen narratives have been developed to provide a 'route in' to the indicators; each narrative presents a group of indicators within their adaptation and policy context.
- The narratives and indicators were published on the CXC website in April/May 2016.
- Indicator documents have been presented and communicated with the Adaptation Sub Committee through ongoing engagement.
- The research team has undertaken extensive and ongoing engagement with policy teams, agencies, and other key stakeholders to ensure the indicators capture the best and most useful data available and are coherent with current and planned policy and practice. This has included Scottish Government Agriculture, Biodiversity, Water and Flooding, Planning and Building Standards policy teams, as well as key agencies such as SEPA, SNH and Marine Scotland. Key infrastructure owners and network operators have also been engaged throughout the project.

**Deliverable 2. Wider adaptation projects (Sept 2015 rating: GREEN; April 2016 rating: GREEN)**

- [Assessment of the consideration of flood risk by Scottish local planning authorities](#) – a study of how current and future flood risk is being accounted for in land-use planning decisions in Scotland. The project is focusing on the two stages of land-use policy: development planning and development management. The final report was delivered at the end of April.
- Assessment of the rate of development in flood risk areas – detailed analysis was undertaken to support development of indicators on the rate of property development in flood risk areas in Scotland. Three indicators are proposed, and reporting has been discussed with SEPA and the Adaptation Sub-Committee. Analysis completed March 2016.
- [The economics of climate change adaptation](#) - a pilot project in partnership with Aberdeenshire Council to examine the costs and benefits of managing the risks arising from climate change. Phase 1 was completed in February 2016, and a report of phase 2 focusing on insights from recent flooding events is expected by the end of May.
- [Mapping Change in Impermeable Surfaces in Scotland](#) – as part of the indicators to monitor adaptation to climate change, digital mapping has been used to examine the change in area of impermeable surfaces in Scotland, between c. 2008 and 2014. The project assessed the extent of urban green and open space as a proportion of the urban area, by local authority, and change in this proportion. Report completed April 2016.
- Analysis of SEPA freshwater Algae data for climate change signal – the aim of this work is to investigate whether environmental data held by SEPA shows any climate change trends. The results will be used to understand likely future changes and underpin adaptation activity in Scotland. Initial report expected May 2016.

## 2.8 Cross-Cutting Activities

### 2.8.1 Behaviours

A multi-disciplinary research team has been established at the Hutton to research behavioural changes required to transition to a low carbon economy. The research covers transport and energy behaviour, land management and climate change adaptation. This cross-cutting research will inform various Scottish Government policies requiring behavioural change.

#### **Deliverable 1.** Transport Behaviour (Sept 2015 rating: GREEN; April 2016 rating: GREEN)

- Literature review of the barriers and enablers to behavioural uptake of car sharing with particular focus car sharing in rural areas. Analysis completed March 2016.
- Collaboration with University of Aberdeen's CXC PDRF and Professor Jillian Anable to examine the uptake and experience of electric vehicles.

#### **Deliverable 2.** Energy Behaviour (Sept 2015 rating: GREEN; April 2016 rating: AMBER)

- Synthesise self-report and objective data on the performance of, and users' interactions with, heat pumps installed in housing association households in a remote rural setting. Delivery date postponed until early 2016-17 reporting period due to data constraints and pending discussion of the utility of the dataset for policy makers.
- Synthesise findings on workplace energy behaviour from recently completed EU-funded workplace-focused energy projects for relevance to Scotland. Few new insights were gained from this activity. It was therefore curtailed in agreement with the Secretariat.

#### **Deliverable 3.** Visualisation techniques for behaviour change (Sept 2015 rating: GREEN; April 2016 rating: GREEN)

- Provide an overview guide for policy teams interested in using visual representation (visualisation) to raise awareness of climate change impacts with a view to influencing behaviour change. Published April 2016.

#### **Deliverable 4.** Adaptation and Transitions to a Low Carbon Future (Sept 2015 rating: GREEN; April 2016 rating: GREEN)

- Review the [impact of community climate change initiatives](#) on behavior change in the Aberdeenshire region. Published March 2016.

## 2.8.2 Commissioned Project - Climate Change Public Conversations Series

The Scottish Government asked ClimateXChange to develop and pilot a framework for a [Climate Change Public Conversations Series](#). The framework provides materials and a guide holding conversations about climate change with the public. It includes a methodology for collecting and analysing data from these conversations to inform policymaking.

**Deliverable 1.** Develop a framework that enables the Scottish Government to initiate constructive conversations with publics across Scotland about climate change (Sept 2015 rating: N/A; April 2016 rating: Green)

- On track for delivery in May 2016

**Deliverable 2.** Develop a guide and materials to assist communities to hold conversations about climate change (Sept 2015 rating: N/A; April 2016 rating: Green)

- On track for delivery in May 2016