3.0 Application Case Study: South East England

3.1 Context & Objectives

RAMEA was applied in August 2007 to inform two distinct areas of policy that were under development at that time by the two key bodies involved in regional strategic planning and governance [the South East England Development Agency (SEEDA) and the South East England Assembly SEERA)]:

(i) the development of the Regional Economic Strategy (RES) Implementation Plan[1] for the South East, which sets out a series of actions to achieve the targets set out in the RES (2006-2016)[2] published in October 2006; and

(ii) the production of Regional Carbon Trajectories for the South East, as required by the draft Planning Policy Statement, PPS 1[3], covering the carbon emission rate for the region as an average over time for:

- new dwellings and
- new commercial floor space

Each application used the RAMEA for the South East of England, which was constructed using 2003 data. This was then used in conjunction with the Regional Economy-Environment Input-Output model (REEIO)[4] to project the RAMEA forward in time, under a series of alternative assumptions.

[1]http://www.seeda.co.uk/RES/docs/RES_implementation_plan.pdf
[2]http://www.seeda.co.uk/res/docs/RES_2006-2016.pdf
[3]http://www.communities.gov.uk/documents/planningandbuilding/pdf/147393
[4]http://www.wwflearning.org.uk/scpnet/tools/reeio/

3.2 RES Implementation Plan

3.2.1 Application of RAMEA

This section summarises work around regional CO_2 emissions undertaken to inform the development of the RES Implementation Plan for the South East of England. In particular, the project focused on Target 11 under the RES "Sustainable Prosperity" Objective:

"Climate Change & Energy: Reducing the region's CO_2 emissions by 20% from the 2003 baseline by 2016."

First, the 2003 RAMEA was used to identify those sectors in the region with the highest CO_2 emissions. A 'business as usual' projection was then forecast for the anticipated future pattern of economic growth in the South East to 2015, using REEIO, with the 2003 RAMEA as the baseline. This assumed a continuation of current trends based on historic data and the expected growth of the economy in the region. The outputs from this were then analysed to identify:

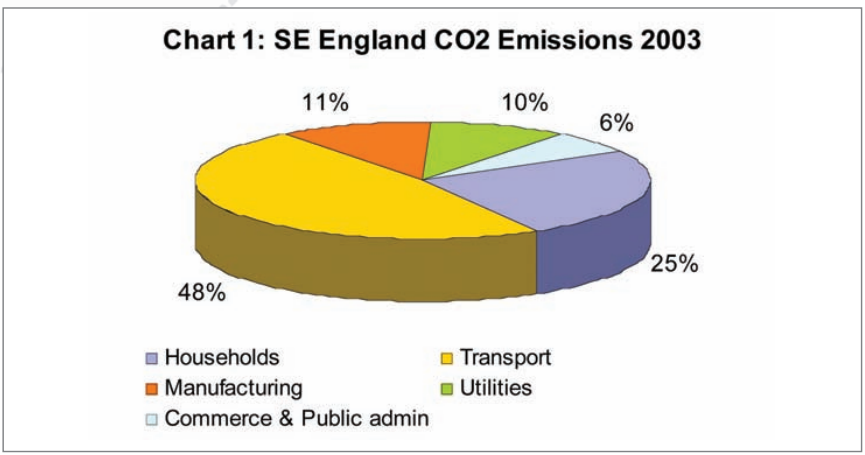
- sectors with the highest CO_2 emissions in 2015;
- the most emission intensive sectors in 2015;
- those sectors with the greatest increase in emissions between 2003 and 2015.

Finally, alternative scenarios were run with REEIO to identify:

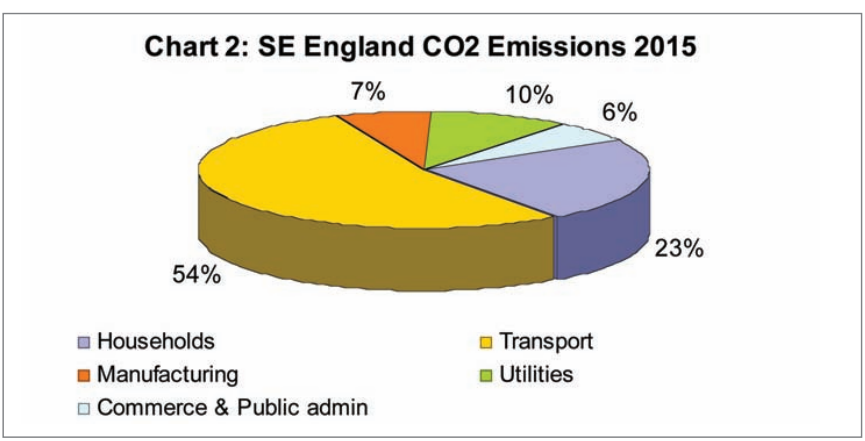
- where the most significant savings could potentially be found
- the order of magnitude of energy reduction required to achieve any significant effect on the region's total emissions.

3.2.2 Analysis of Findings and Outputs from RAMEA

Chart 1 below presents the 2003 RAMEA breakdown of regional carbon dioxide emissions by key sector.



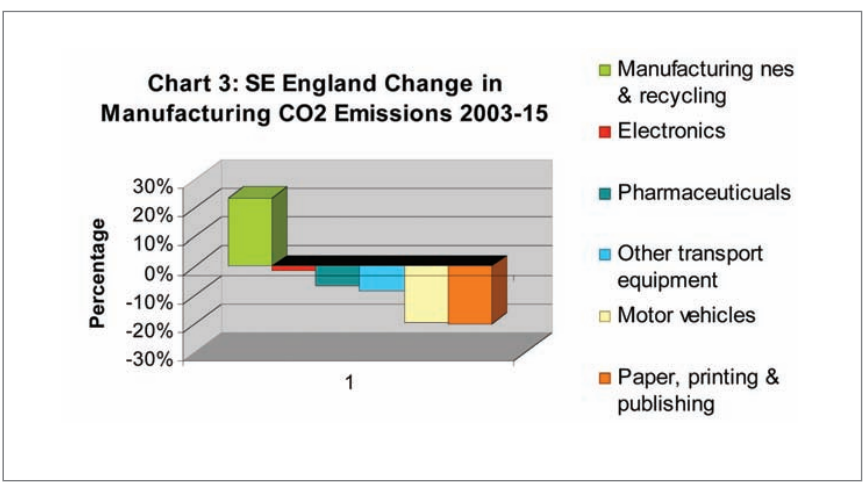
When compared with the same chart for 2015 from the "business-as-usual" scenario in REEIO, the transport sector shows the most significant increase, growing by 40% to become 54% of the total.



With the exception of manufacturing, Chart 2 also indicates a continuing growth in the other sectors, with utilities rising by 30%, commerce and public administration by 19% and domestic emissions by 17%.

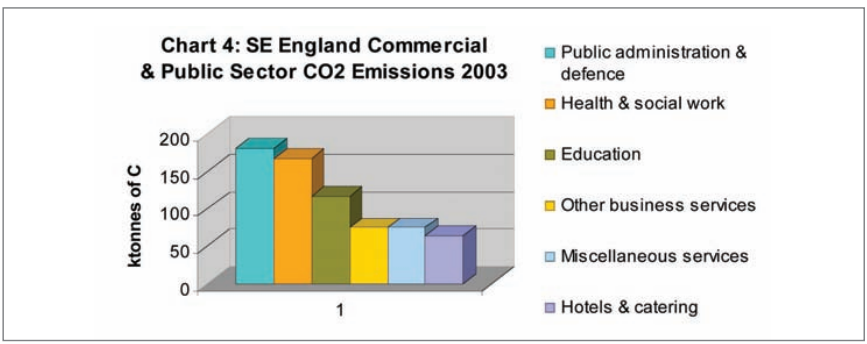
As in other regions, the overall emissions from industry are forecast to decline by 22%. This is further reinforced by a more detailed analysis of the forecast change in the manufacturing emissions, which indicates a general decline across all manufacturing sectors.

However there is one notable exception; miscellaneous manufacturing (nes), recycling (such as furniture, jewellery and sports goods), is showing a marked increase of 24% between 2003 and 2015, as indicated in Chart 3 below.



This may well be influenced by the increase anticipated in recycling activity. This would indicate that it is perhaps an area worthy of further review for the RES Implementation Plan.

A further analysis was carried out for the commercial and public sector. Chart 4 shows the top six emitters in 2003, together representing 85% of the CO_2 emissions from this sector.



An analysis of the 'business-as-usual' scenario for 2015 shows a similar grouping in the top six, as indicated in Chart 5.

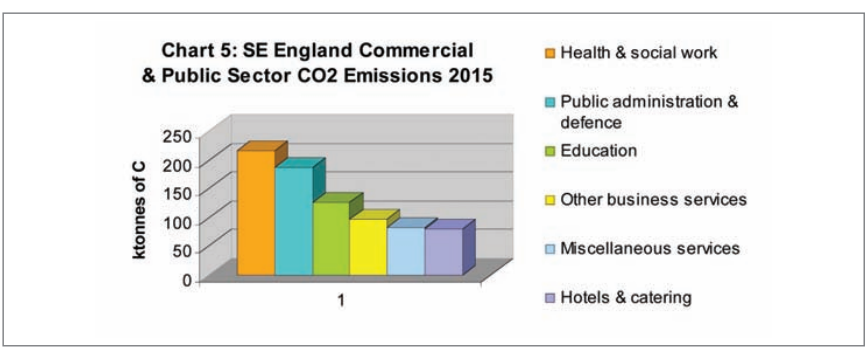
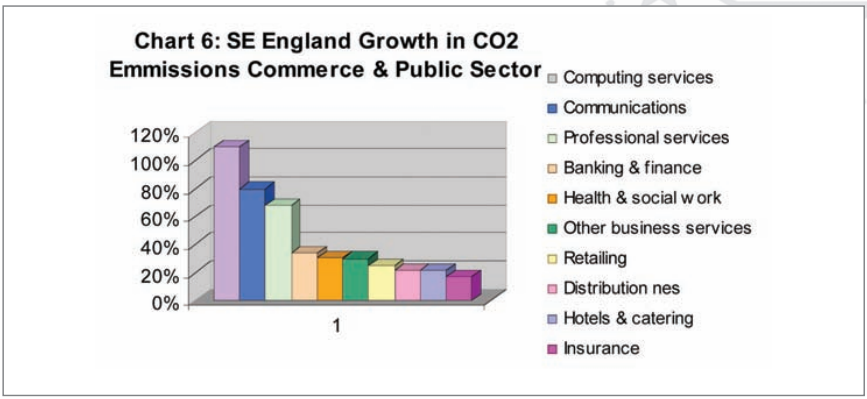


Chart 6 shows those sectors likely to show the greatest increase in emissions between 2003 and 2015.



This indicates the greatest emissions growth from the computing services, communications and professional services sectors.

3.2.3 Implications of Findings and Outputs

The key findings of the study are:

(i) achieving the magnitude of savings proposed (20% by 2016) is unlikely unless the emissions from transport and domestic households are significantly reduced, however both are shown as continuing to grow significantly during this period;

(ii) it may be possible to improve freight efficiency in the region by encouraging a reduction in the number of empty loads entering and leaving the region and through an increase in local sourcing. Further scenario modelling with REEIO could identify what degree of change would be necessary to achieve a meaningful contribution towards the overall goal of a 20% reduction;

(iii) passenger transport and household emissions are less easy to address at a regional level, being heavily influenced by user behaviour on the one hand and the energy efficiency of the existing housing stock on the other. However partnership working with the Regional Assembly and local authorities could achieve some progress in this area;

(iv) manufacturing emissions are generally in the decline, with the exception of small scale manufacture (furniture, jewellery, etc) and recycling. This sector therefore deserves some further investigation to see how this trend might be reversed, e.g. by examining the fuel used and energy intensity of plant and equipment used;

(v) emissions in the commercial and public sector are expected to grow by almost 20%, with the top six out of fourteen sub-sectors accounting for 84% of the emissions in 2003. These include the public administration & defence, health & social work, education and hotel & catering. However increases in excess of 50% are also expected in communications, computing and professional services. Improved energy efficiency in these sectors may be able to deliver further emissions savings.

3.2.4 Use of the Findings from RAMEA

The findings were discussed with representatives from SEEDA, reviewing:

- the numbers and size of companies that make up the various sectors;
- the relationship between these sectors and SEEDA's key sectors;
- possible actions SEEDA might want to take to help achieve Target 11.6 through the regional Carbon Action Plan and Target 12.4 through Business Link and its providers.

The South East region is the largest (in population terms) in England and has the most successful regional economy. Compared globally with national economies, in terms of GDP, the South East region is in the top 20, just above Austria.

As such it is under considerable growth pressures, in terms of development, population and use of resources, all of which impact on the environment of the region and beyond.

It is therefore critically important for SEEDA to include environmental accounting in its strategic planning, to help develop an understanding of the environmental costs of the region's economic activity, in terms of both monitoring and assessing the sustainability of current performance.

So far SEEDA has used RAMEA to identify the economic sectors with the highest carbon dioxide emissions, including emissions intensity (emissions/GVA). This will be used as the basis for agreeing with regional partners a series of actions in the RES Implementation Plan and will also help inform the ongoing development of a regional Climate Change Action Plan.

3.3 Regional Carbon Trajectories

3.3.1 Application of RAMEA

Planning policy within England is guided by Planning Policy Statements (PPS). The UK government has recently published a draft amendment to PPS 1: Delivering Sustainable Development, updating it to consider Climate Change. The PPS highlights that Regional Planning Bodies, such as the South East England Regional Assembly, should be monitoring the carbon emissions associated with their Regional Spatial Strategy (RSS) – the South East RSS is called the South East Plan.

Regional Planning Bodies need to establish a baseline from which data collection and monitoring can be carried out annually to determine the effectiveness of Climate Change mitigation policies in the RSS. The case study illustrates how RAMEA is being used to help provide this baseline.

The RAMEA baseline (2003) framework and the REEIO model were used together to gain a better understanding of the effect that changes in Building Regulations could have on household emissions of carbon dioxide associated with domestic fuel use. The projections were based on a set of stylised assumptions and forecasts, including the energy efficiency of the housing stock, rates of demolition and housing starts.

It was beyond the resources available to this project to develop a detailed model of the housing stock in the South East. However, the application provides an illustration of how such models and their outputs can be utilised. The key assumptions in this application are:

- Housing is split into three types, based on their relative performance in terms of energy use for heating.
  - o 'standard' houses have the average energy-use performance of the existing housing stock in 2003
  - o houses of 'Type X' are 15% more efficient to heat than a standard house
  - o houses of 'Type Y' are 40% more efficient than standard houses over 2006-09, 55% more efficient than standard houses over 2010-12, and 65% more efficient than standard houses over 2013-15, reflecting the targets identified in the Government's report "Building a Better Future; Towards Zero Carbon Development" (Energy improvement as compared to energy use performance of standard house in 2003)
- The rates of conversion between different types are:
  - o Standard to Type X, 0.5% of the Standard housing stock pa (approx 17,000 houses pa)
  - o Standard to Type Y, 0.05% of the Standard housing stock pa (approx 1,700 houses pa)
  - o Type X to Type Y, 0.5% of the Type X housing stock (approx 500 houses pa)
- All new build houses are of Type Y
- The rate of demolition of the Standard housing stock is 0.5% pa
- Assumptions for population, households and housing starts come from Cambridge Econometrics (CE) forecasts for the South East.

[5]Relative energy performance of 'upgraded' existing housing stock is based on calculations in http://www.woking.gov.uk/council/planning/planningapplications/energy/compliance.pdf.

[6]Relative energy performance of new build housing is based on figures in *Building a Greener Future: Towards Zero Carbon Development*, (p14) Communities and Local Government, December 2006.

These assumptions can be altered to assess the relative sensitivity of the outcome to each of the scenarios.

Scenario 1: no growth in per capita energy-use for heating (although average per capita incomes are projected to rise 'enabling' more people the option of improving the heat efficiency of their homes, it can also result in people increasing their 'comfort').

Scenario 2: reduction in per-capita energy-use for heating is assumed to be 1% pa over 2005-15. This is broadly equivalent to assuming a 10% increase in the energy efficiency of all housing over this period.

3.3.2 Findings & Outputs from RAMEA

Scenario 1: The key findings in terms of energy demand are indicated in the table opposite and can be summarised as follows:

- energy used for heating would be 0.36 mtoe (8%) lower than is projected in the baseline by 2015
- overall energy use by households would be reduced by 4.8% by 2015
- the rate of increase of domestic energy use would be reduced to 0.8% pa, from 1.2% pa

SUMMARY OF DOMESTIC Energy Demand IN THE SOUTH EAST – SCENARIO 1

	2003	2010	2015	2003-15
Baseline			mtoe	% pa
Energy used for heating	4.30	4.45	4.54	0.5
Other energy use	2.22	2.62	2.98	2.5
Total	6.52	7.07	7.52	1.2
Scenario			mtoe	% pa
Energy used for heating	4.30	4.28	4.18	-0.2
Other energy use	2.22	2.62	2.98	2.5
Total	6.52	6.90	7.16	0.8
Scenario differences from base			mtoe	
Energy used for heating	0.00	-0.17	-0.36	
Other energy use	0.00	0.00	0.00	
Total	0.00	-0.17	-0.36	
			% of base	
Energy used for heating	0.00	-3.87	-7.97	
Other energy use	0.00	0.00	0.00	
Total	0.00	-2.44	-4.81	

Source: Cambridge Econometrics.

The key findings in terms of CO_2 emissions are set out in the table below and can be summarised as follows:

- CO_2 emissions from domestic energy use would be reduced by 570 tonnes, or 4.4% of the baseline projection by 2015. This is equivalent to a reduction of around 1.0% in total CO_2 emissions in the South East by 2015. In calculating the reduction in direct CO_2 emissions, it has been assumed that the fuel mix of energy used for heating is the same as that for the overall use of energy from the household sector. In practice there is reason to believe that this may underestimate the use of gas (and other fuels other than electricity) and accordingly, underestimate the reduction in CO_2 emissions.

SUMMARY OF DOMESTIC CO_2 EMISSIONS IN THE SOUTH EAST – SCENARIO 1

	2003	2010	2015	2003-15
			tonnes	% pa
Baseline	11193.57	12238.51	13099.57	1.3
Scenario	11193.57	12037.46	12529.83	0.9
Scenario - difference from baseline				
Tonnes	0.00	-201.05	-569.74	
% of base	0.00	-1.64	-4.35	

Source: Cambridge Econometrics.

SUMMARY OF DOMESTIC ENERGY DEMAND IN THE SOUTH EAST – SCENARIO 2

	2003	2010	2015	2003-15
Baseline			mtoe	% pa
Energy used for heating	4.30	4.45	4.54	0.5
Other energy use	2.22	2.62	2.98	2.5
Total	6.52	7.07	7.52	1.2
Scenario			mtoe	% pa
Energy used for heating	4.30	4.07	3.78	-1.1
Other energy use	2.22	2.62	2.98	2.5
Total	6.52	6.69	6.76	0.3
Scenario differences from base				
			mtoe	
Energy used for heating	0.00	-0.38	-0.76	
Other energy use	0.00	0.00	0.00	
Total	0.00	-0.38	-0.76	
			% of base	
Energy used for heating	0.00	-8.58	-16.77	
Other energy use	0.00	0.00	0.00	
Total	0.00	-5.40	-10.13	
Baseline	11193.57	12238.51	13099.57	1.3
Scenario	11193.57	11739.86	11890.47	0.5
Scenario - difference from baseline				
Tonnes	0.00	498.65	1209.10	
% of base	0.00	4.07	9.23	

Source: Cambridge Econometrics.

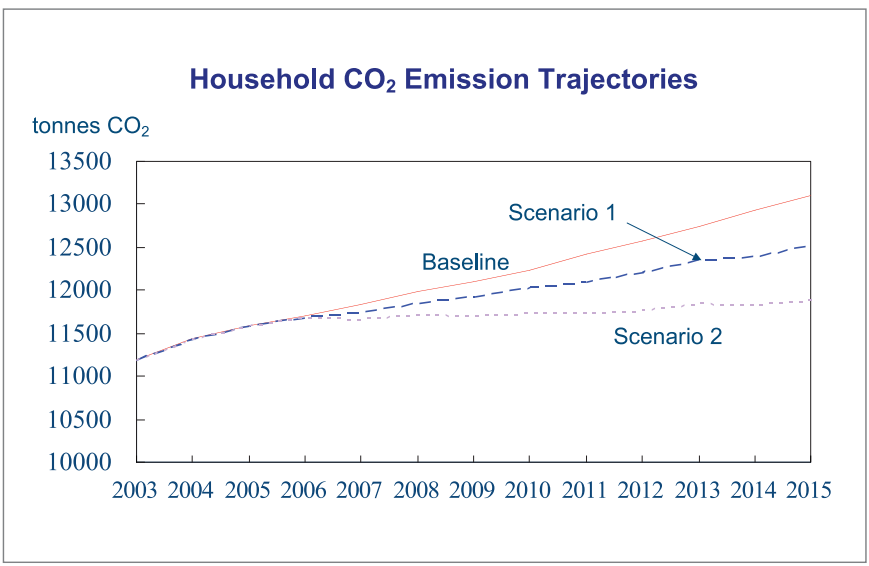
Scenario 2: The key findings on energy demand, as shown in the table below, are:

- energy used for heating would be 0.76 mtoe (17%) lower than is projected in the baseline by 2015
- overall energy use by households would be reduced by 10% by 2015
- the rate of increase of domestic energy use would be reduced to 0.3% pa, from 1.2% pa

For CO_2 emissions the key findings are:

- CO_2 emissions from domestic energy use would be reduced by 1,209 tonnes, or 9.2% of the baseline projection by 2015. This is equivalent to a reduction of around 2.1% in total CO_2 emissions of the South East by 2015.

These results are summarised in the trajectories below:



3.3.3 Implications of Findings and Outputs

The findings illustrate that the proposed changes to Building Regulations in isolation are likely to achieve a reduction in the regional CO_2 emissions of 2%. As the new housing will only form 1% of the total housing stock, in order to achieve a significant improvement in overall CO_2 emissions, a significant proportion of the existing housing stock will need to be improved to a higher standard of energy / CO_2 performance.

3.3.4 Use of the RAMEA Findings

The Regional Planning Bodies in the UK are likely to be required to measure performance against the Carbon Trajectories based on the anticipated carbon performance of new residential and commercial development for each region.

RAMEA can be used to provide the baseline against which the relative carbon emissions from different spatial distributions of new development in the region can be compared. This can then be used to inform the Strategic Environmental Assessment of the RSS. The case study further illustrates how, when the baseline produced by RAMEA is combined with the modelling capabilities of REEIO, a Carbon Trajectory for residential development can be produced.

In the future it is anticipated that a baseline and the trajectory will be further developed and used to both measure the carbon emissions associated with new development and inform policies on the spatial distribution of residential development in the South East.

3.4 Future Monitoring Proposals

The project partners have agreed to monitor the success or otherwise of the application of the findings of the RAMEA Case Studies in the South East of England over the next three years and to disseminate the results through SCPnet, the Sustainable Consumption and Production network which consists of all of the English Regions, the Environment Agency and WWF.