

**Stabilizing the
ecological footprint
in the
South East Plan:**

A REPORT TO SEERA

Summary Report

**Final v1.0
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While every effort has been made to ensure accuracy, no responsibility can be accepted for errors or omissions.

The calculations shown in this report are available on Excel spreadsheet, which can be supplied on request to joe.ravetz@man.ac.uk

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1 Overview

1.1.1 Trends in Eco-footprint

- Policy CC3 of the SE Plan calls for a *stabilization* of the SE Eco-footprint by 2010. The research took as its central premise, that this stabilization of Eco-footprint would call for a 'zeroing' of the current growth rate.
- The research shows that the Eco-footprint of the South East is growing at about **0.068** gha/cap per year. The portion of this growth caused by building and operating the built/urban environment was **0.025** gha/cap per year, roughly 40%. The overall annual growth rate of 0.068 gha/cap per year equates to an average growth of 1.11% per annum (doubling time of 60 years).

1.1.2 Policy measures

In order to *stabilize* or *offset* this growth rate of 0.025 gha/cap per year, various policy measures were calculated in aggregate form:

- “40% house” long term programme for upgrading of the existing housing stock: savings of **0.005** gha/cap per year (excluding demolition of any existing houses).
- All new housebuilding to be low energy at the Eco-Homes ‘excellent’ standard: with savings of **0.001** gha/cap per year.
- Low impact construction to be phased in for all housebuilding: giving savings of **0.005** gha/cap per year.
- Low impact construction to be phased in for all other property construction: savings of **0.004** gha/cap per year.
- Low energy building design and operation to be phased in for all other property: savings of **0.004** gha/cap per year.
- Road traffic growth containment: this aims to stabilize growth in road traffic with a rapid increase in public transport provision: savings of **0.006** gha / cap per year
- Waste recovery and recycling: a full programme of minimization and re-use could produce savings by substitution of **0.002** gha / cap per year.

1.1.3 SE Plan options

- These combined measures assume the SE Plan *low growth* option of 25,500 dwellings per year.
- If the SE Plan *high growth* option of 32,000 dwellings per year is chosen then this would add approx **0.005** gha / cap per year onto the baseline growth trends: this would require corresponding higher targets from each of the above.
- The spatial option concerning '*sharper focus*' is likely to increase critical mass of development and the viability of the above targets.

1.1.4 Timing

- A 'basket' of potential policy programmes in urban development and transport (i.e. within the remit of the SE Plan) are the main outputs of the report. These are each calculated on a 20 year SE Plan horizon, e.g. a 20 year programme for upgrading of existing commercial property.
- The timescale for the stabilization of Eco-footprint growth depends on how quickly these programmes can be started, i.e. put into practice on the ground. Depending on the commitment and support from national government, industry and households, it is feasible that each of the programmes could be started within 5 years, and *stabilization achieved by 2011*.
- A more moderate target might be based on a 10-year period for starting each of the policy programmes, with *stabilization achieved by 2016*.

1.1.5 Beyond stabilization, towards reduction

- The question of going 'beyond stabilization' to *reductions* in the Eco-footprint was also raised. This would be a more demanding target for each of the policy programmes. Eco-footprint reduction to *2001 levels by 2010* would require each of the programmes to be in full scale operation by 2006, and then to increase their rates of change over and above that. This might be judged less immediately feasible, given current conditions.
- However, the SE's Eco-footprint, like that of the UK, is large and growing: the processes which have created our Eco-footprint '*overshoot*' are deeply rooted and will take long-sighted to reverse. Achievement of the UK government's Kyoto commitment of 60% reductions of CO₂ emissions by 2050, and hence Eco-footprint, is both essential and challenging. The SE Plan has a vital contribution to make in the necessary first step – the *stabilization of growth* in Eco-footprint – and this is shown to be practical and plausible.

2 Context

2.1.1 Purpose of the study

The South East England Regional Assembly has set out its aspiration in the SE Plan to improve sustainable resource management.

This report provides specific advice on actions required to achieve the target of ‘stabilising the ecological footprint’ of the South East region by 2010, and in the longer term, as set out in ‘Policy CC3: Resource Use’:

Over the Plan period, per capita use of natural resources will stabilize and begin to reduce, supported by increased efficiency of resource use in new development, the adoption of existing development, the extensive use of sustainable construction techniques and corresponding changes in public attitude and behaviour. Relevant authorities will achieve a stabilization of consumption of resources and aim for a reduction in absolute levels of consumption in the long term with an aim to stabilise the South East *ecological footprint* by 2010.

In particular, authorities should require Eco-Homes ‘very good’ as a minimum standards for all new housing and adoption of BREEAM ‘very good’ standards in all new commercial developments.

However, the SE Plan is proposing to increase the rate of housebuilding and infrastructure provision, in order to cope with a projected rate of population growth of 0.5% per year and economic growth of 3% per year. At the same time, personal consumption of energy intensive products, food, air travel and others continues to increase rapidly. This suggests that radical measures may be needed to achieve the target of stabilization.

2.1.2 The ecological footprint measure

The Ecological Footprint (EF) is a resource management and communications tool. It measures how much land and water area a human population requires, to produce the resources it consumes and to absorb its wastes. EF is measured in *global hectares* (gha), meaning that the land required is counted wherever it may be in the world. This can be put as *global hectares per person* (gha/cap), a rough measure of the total impact of our lifestyles and useful for comparisons. There are two main components:

- The “*land footprint*” includes the area required to produce all the crops, forestry and other resources, together with land required to absorb pollution.
- The “*energy footprint*” represents the area needed to grow renewable resources to meet both energy consumption, and the energy in imported goods. This component

The wealthiest 10% of the world’s population, including the UK, have an EF of between 5-10 gha/cap, which is over 5 times the EF of the poorest 10%. At present the total EF of the world’s population exceeds the available land area by 20%. This ‘*overshoot*’ is likely to become much worse, and the damage will escalate, as the rest of the world rapidly catches up with western standards of material affluence.

The EF of the South East region is the highest of anywhere in the UK, at an estimated 6.09 gha/cap, well above the national average. This EF is estimated to be growing at approx 1.11% per year, which would bring an increase of 25% over the SE Plan period of 20 years.

2.1.3 The stabilization target

The overall policy target can be interpreted in terms of three main objectives:

- The first objective is to *stabilize the growth in EF from housing*, as the direct remit of the SE Plan.
- The second objective is to *stabilize the EF in the wider built environment*, including other building types and transport, i.e. sectors where the SE Plan would have significant influence.
- The third objective is to *stabilize the EF across all activities and consumption* in the region as a whole: i.e. outside the scope of the SE Plan as such. This third agenda is mentioned only in outline.

The stabilization target is set at a notional 2010: however it is likely to involve the phasing in of an ambitious programme of low impact construction for housing and property, and radical upgrading of the whole of the building stock.

Therefore the stabilization target is calculated in terms of a 5 year and 20 year policy programme. Assuming that a pro-active start is made within a 5 year period on a full scale programme of low energy / low impact construction and rehabilitation, this is likely to result in the stabilization of the EF growth curve by 2010.

If the target is interpreted as “*stabilization by 2010 of the EF at 2001 levels*”, this implies a reduction from 2005 values back down to 2001 values. In this case we could anticipate the EF rising from 2005-6, then levelling off in 2007-8, then starting to reduce back to 2001 levels by 2009-10. On the face of it, this outcome does not appear very feasible, given the inertia of the planning system, construction industry and so on. In practice there is enough room in the current quality and uncertainty of the data, so that changes within the 5 year period are not feasible to measure accurately in any case.

The conclusion is therefore that a strategic policy-oriented approach will be more effective, based on the phased implementation of a 20 year strategy. This can incorporate some ‘easy wins’ in the short term, which may include awareness raising and training, and simple technology initiatives as in section 1.3.

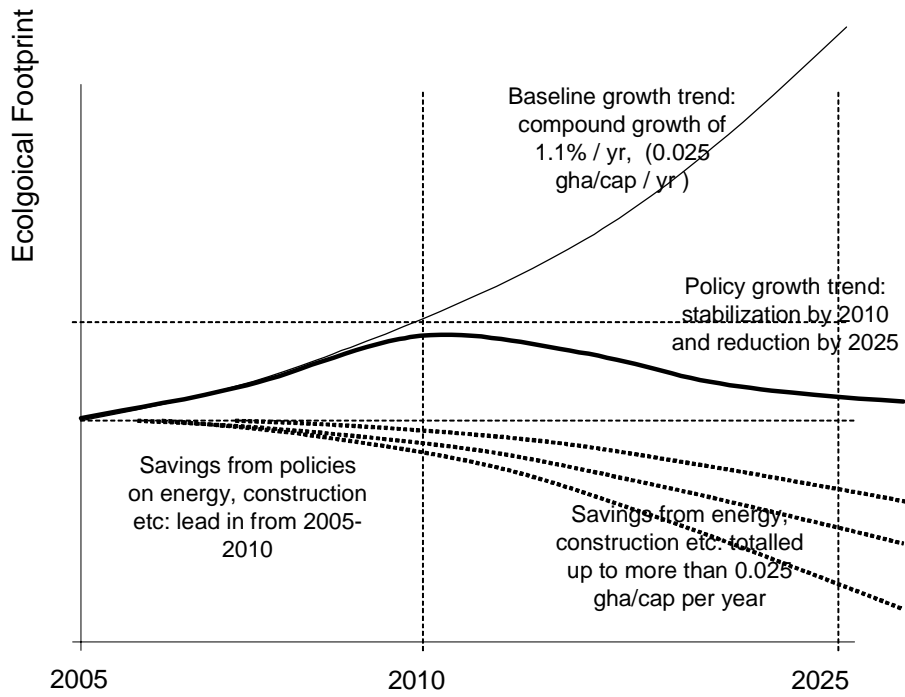


Fig... stabilization framework

3 Policy options

3.1 Trends and targets

3.1.1 General trends in eco-footprint

- The EF of the UK on average has risen from 3.81 gha/cap in 1961 to **5.35gha/cap** in 2001, equivalent to an average annual growth rate of **0.85** percent.
- The EF in 2001 of the SE region was **6.09** gha per person, or 14% higher than the UK average.
- The total amount of land required to sustain the inhabitants of the SE region was 49.2 million ha, roughly 25 times the land area of the region.
- In the SE region, two thirds of the total EF is required to absorb CO₂ and other climate emissions (“*energy land*”). One third of the total EF is actual physical area needed for infrastructure, crops, forestry etc, somewhere in the world (“*real land*”).
- Taken together, shelter (31%), transport (22%), and goods (19%) account for over 70 percent of the “energy land” EF, while sustenance (48%), goods (23%), and shelter (10%) account for over 80 percent of the “real land” EF.
- The total EF is calculated as the sum of shelter, transport etc, and each of these has its own range of growth forecasts. The ‘High’ growth forecasts would result in EF values in 2010 and 2026 of **6.42 and 7.85** gha/cap, respectively.
- The ‘Low’ growth scenario for the same years results in EF values in 2010 and 2025 of **6.33 and 7.38** gha/cap, respectively.
- The growth rate to 2026 under the ‘High’ growth scenario is estimated as 1.27% per annum, the ‘Low’ growth rate is 0.96% per annum (i.e. a slight reduction).
- **The mid-point average can therefore be estimated at approx. 1.11% per annum growth in total EF per capita, or 0.068 gha/cap per year.**

SUMMARY OF BASELINE TRENDS			annual growth EF / cap @2005	EF 2005	EF 2010	EF 2025	long range EF 2050	% of total EF in 2005	% of total EF in 2025	compound growth rate 2005-25
Bottom up calculation. All figures per capita unless otherwise stated										
housing energy / cap growth	gha/cap/yr		-0.001	0.59	0.58	0.57	0.56	10%	8%	-0.16%
housing construction / cap growth			0.000	0.23	0.23	0.21	0.19	4%	3%	0.00%
services bldgs energy / cap growth			0.001	0.26	0.27	0.29	0.33	4%	4%	0.50%
services bldgs construction / cap growth			-0.003	0.46	0.45	0.42	0.38	8%	6%	-0.54%
surface transport / cap growth			0.008	0.53	0.57	0.71	1.04	9%	10%	1.50%
air travel / cap growth			0.013	0.25	0.32	0.66	2.25	4%	9%	5.00%
subtotal urban development			0.024	2.32	2.42	2.86	4.75	38%	38%	1.04%
other / food / consumables			0.043	3.77	4.02	4.74	5.26	62%	63%	1.15%
total EF / CAP baseline trend (SE Plan low growth)	gha/cap		0.068	6.09	6.44	7.59	10.01	100%	102%	1.11%
TOTAL EF baseline trend (SE Plan low growth): incorporating population growth	1000 gha		830	49999	54284	69497	101002			1.66%

3.1.2 Trends in urban development

Here we focus on the key features of the ‘urban development’ activities, as these are mainly within the scope and remit of the SE Plan:

- As above, the total EF per capita in the SE region is growing at an estimated 1.11% per year compound growth = **0.068** gha/cap per year (central estimate).
- This total includes **urban development** (energy demand & construction in housing / property: surface & air travel): and **other** (energy supply, food, consumables, other).
- The urban development EF is nearly 40% of the total EF, and is growing at approx 1.06% per year = **0.025** gha/cap per year
- Of this figure of 0.025 growth per year, about half is due to the rapid growth in air travel, and another third is due to surface transport at a somewhat slower rate of growth.
- The remainder of the 0.025 growth is due to energy & construction in housing & property = **0.005** gha/cap per year approx.
- Although the building stock and EF of housing & property is growing, and may grow faster under the SE Plan, the population is also growing, so that the EF per capita change is relatively small.

All the figures quoted above are generally in EF / capita, which factors out any change in the total population: i.e. the population growth has no effect on the EF / capita.

If we include the effect of population growth in the region at approx **0.54% per year**, then this adds about **0.5%** per year on top of the other growth trends. About two thirds of this is due to demographic change, and one third due to inward migration, mostly from other regions of the UK. Therefore the **total EF** in the region is growing at about **1.66%** per year: if this trend continues, the total EF could double by 2050.

Each of the above growth trends has been calculated assuming the **lower growth** option in the SE Plan of 25,500 dwellings per year.

- If the **higher growth** option of **32,000** houses per year is assumed, then the effect on the baseline EF in energy & construction is to add **0.005** gha/cap per year on to the baseline growth trends in housing construction and housing energy demand, i.e. an increase of about one fifth, all other things being equal.

3.2 Policy options and targets

3.2.1 Options for stabilization: energy in housing

This section involves the core activity of the SE Plan in housing policy, and its potential to directly influence the energy efficiency of new and existing housing.

SUMMARY of DOMESTIC ENERGY OPTIONS		annual growth EF / cap @2005	savings growth EF/cap @2005	EF 2005	EF 2010	EF 2025	long range EF 2050	% of total EF in 2005	% of total EF in 2025	compound growth rate 2005-25
Summary of policy options shown as EF / cap: with "savings" from baseline trend										
B2a	existing hsg stock to EEC standard <i>savings on baseline</i>	-0.006	-0.003	0.59	0.56 0.01	0.47 0.05	0.40 0.07	9.6%	6.2%	-1.07%
B2b	existing hsg stock to "40% house" standard <i>savings on baseline</i>	-0.011	-0.007	0.59	0.53 0.04	0.39 0.14	0.39 -0.09	9.6%	5.1%	-2.08%
B3b	new housing @25.5k: to Ecohomes 'excellent' <i>savings on baseline</i>	0.001	-0.001		0.01 0.00	0.03 0.02	0.05 0.04		0.3%	
B3c	new housing @25.5k: to BedZed2 standard <i>savings on baseline</i>	0.000	-0.002		0.00 0.01	0.01 0.03	0.02 0.07		0.1%	
C4	effect of higher growth @32k <i>savings on baseline</i> <i>note negative "savings" = increase</i>	0.025	0.005		0.12 -0.03	0.50 -0.10	1.12 -0.23		6.6%	
C6	total hsg @25.5k combined "40%" & BedZed2 <i>savings on baseline</i>	-0.012	-0.010	0.59	0.52 0.06	0.37 0.20	0.22 0.35	9.6%	4.9%	-2.25%

To meet the EF stabilization target in the urban development sectors, we need to identify savings as shown on the summary table above (the results refer to the **low growth** scenario of 25,500 dwellings per year, unless otherwise specified):

- The **existing housing** stock of 3.4 million dwellings contains the largest opportunities for reducing EF. If the stock was fully upgraded with basic energy efficiency measures, the saving would be about **0.003** gha/cap per year, or one eighth of the target.
- For **new housing**, any policy effect is less significant, simply as after 20 years the new housing is still a small fraction of the total housing stock. If new housing was built to the Eco-Homes 'excellent' standard the saving would be **0.001** gha/cap per year, a small part of the target saving.
- If new housing was built to the low / zero energy "BedZed" standard, the saving would be about **0.002** gha/cap per year, or about one tenth of the target saving.
- The most effective policy is the "40% house" upgrading programme, combined with demolition and replacement of a third of existing housing, with all new housing at zero or very low energy standard. This is the full programme recommended by the Oxford University Environmental Change Unit as meeting the UK's climate emissions aspirations, and is envisaged to be phased over a 45 year period. If applied to the SE region it would involve doubling the new build rate to **51,000** new dwellings per year, half of which would then replace existing dwellings. Overall this would result in an EF savings trend of **0.011** gha/cap per year, providing nearly half of the target savings in urban development.
- It is recognized that this rate of demolition and replacement may be politically very challenging. However it might also offer huge opportunities for rebuilding more 'sustainable communities' in both environmental, and economic and social terms, (if there was a clear way forward in doing so).
- If the existing stock was upgraded to the full "40% house" specification of Oxford University, but without any demolition or replacement of existing housing, the savings would be lower at **0.007** gha/cap per year, or nearly 1/3 of the target.

SUMMARY of URBAN DEVELOPMENT OPTIONS		annual growth EF / cap @2005	savings growth EF/cap @2005	EF 2005	EF 2010	EF 2025	long range EF 2050	% of total EF in 2005	% of total EF in 2025	compound growth rate 2005-25
Summary of policy options shown as EF / cap: with "savings" from baseline trend										
D2	low impact construction in hsg @25.5k savings on baseline	-0.007	-0.005	0.23	0.20 0.03	0.10 0.10	0.09 0.09	3.8%	1.4%	-3.93%
E2	low energy services buildings savings on baseline	-0.001	-0.004	0.26	0.25 0.01	0.21 0.08	0.16 0.17	4.3%	2.8%	-1.06%
E4	low impact services construction savings on baseline	-0.010	-0.007	0.46	0.41 0.04	0.27 0.15	0.24 0.13	7.6%	3.6%	-2.66%
F2	road traffic stabilization savings on baseline	0.002	-0.006	0.53	0.54 0.03	0.60 0.12	0.65 0.39	8.7%	7.8%	0.59%
F3	green transport programme	-0.006	-0.012	0.53	0.50 0.07	0.48 0.23	0.40 0.64			
F4	green air travel programme savings on baseline	0.008	-0.011	0.25	0.29 0.03	0.45 0.21	0.95 1.30	4.1%	5.9%	3.00%
Combined total of other options		-0.005	-0.033	1.73	1.69 0.14	1.63 0.66	2.10 2.08	28.5%	21.5%	-0.30%

3.2.2 Options for stabilization: urban development

This section involves domestic construction, other property construction and energy demand, and transport by surface and air. "Other property" includes a wide range of commercial and public buildings (industrial buildings appear only indirectly in the 'consumables' accounts). Transport is allocated on the basis of the location of the consumer: for instance, for 'air travel' we do not include international hub passengers changing at Heathrow, but we do include flights by SE residents from other regional airports.

The logic is that these are activities and sectors where the SE Plan may have significant influence, if not total control (although this may be particularly indirect in the case of air travel). The projections assume that the current rate of property construction continues, and that the SE region generally follows national trends in surface transport and air travel.

- **Housing construction:** a programme of low impact design, specification and demolition waste recycling could be phased in across the industry, over a 20 year period. Although the evidence on construction impacts is very patchy, the savings trend could be approx **0.005** gha/cap per year, or one fifth of the target.
- **Energy demand in property:** there are opportunities in upgrading the existing stock efficiency by 20% over 20 years, and building new stock to the BREEAM 'very good' standard. The result would be a saving trend of **0.004** gha/cap per year, or nearly one fifth of the target.
- **Property construction:** there is a similar logic to domestic construction: the potential efficiency gains are lower, but the volume of construction is higher. The result could be savings of approx **0.007** gha/cap per year, or over one quarter of the target.
- **Traffic stabilization** programme: this relatively moderate scenario assumes that the growth in road traffic is slowed to the point at which it balances the increase in vehicle efficiencies, so that its EF growth is zero. To compensate, public

transport provision would be increased by 5% per year. The overall savings would be approx **0.006** gha / cap per year, or a quarter of the target. .

- **Green transport programme:** this more wide-ranging agenda takes on mode shift, car sharing, demand management, alternative fuels, walking, cycling etc. the result would be that road traffic reduces at -2.0% per year, while public transport increases at 7.0% per year. This would result in savings of up to **0.012** gha/cap per year, i.e. half the target saving in urban development.
- **Air travel** is the most rapidly growing sector of all, and any reduction in supply or demand growth will be very challenging. Therefore any ‘green air travel’ scenario is quite speculative here. If we assume a combination of demand management and enhanced efficiency, then a savings trend of **0.011** gha/cap per year might also be achieved over baseline, i.e. nearly half the target saving.

3.2.3 Options for stabilization: other regional policies

Here the net is cast more widely, to consider any other issue which has influence on the overall EF per person in the region. For these issues the target is taken as the remainder of the total EF from all non-urban development activity in the SE. The growth trend for this is estimated (in the central scenario) at a growth rate of 1.11% increase per year, or **0.043** gha/cap per year. These options are not modelled in any detail within this study.¹

- **Energy supply** is in a state of rapid change across the UK, and therefore is not modeled in detail in this study: we assume the current national projections of energy supply, as in the UK’s climate emissions strategy (DTI, 2003). There is a SEERA target for 16% of SE regional electricity demand to be generated from renewable sources by 2026: half of these are expected from wind power, and much of the rest from bio-mass. This target is challenging as the SE region is starting from a low baseline of renewable sources. However in practice this development of renewable sources will replace part of the nuclear power capacity which is expected to be de-commissioned by 2025: i.e. the effect of this renewable development is already included in the baseline growth trend. Higher rates of renewables developments are likely to be integrated with buildings via PV panels, heat pumps or other emerging technologies, which are accounted for in the building energy options above.
- **Water supply:** water is clearly a major issue in development in the SE. The present water supply infrastructure has an overall EF of about 1% of the EF of the energy supply. However it is possible that increasing demand, coupled with reducing supply due to climate change, would result in the need for water desalinization, which is highly energy intensive. If the average daily use of 160 litres per person was produced by desalinization, this would require electricity supply of about 0.5 kWh per day per person, with an increase of over 50% in the total EF from household energy.
- **Waste management:** the EF contained in the materials and products which enter the waste stream represents an opportunity cost to the region, of about 8% of the total EF. This can be set out as a satellite account, i.e. extra to the main EF

¹ further details are available in the Taking Stock footprint study on the SE, the ‘Thames Gateway’ study, the UK Sustainable Consumption and Production strategy, and the ongoing development of the Ecological Budget UK 2005-6

accounts for the region. The baseline forecast includes for continuation of current trends in municipal / commercial / industrial waste: against these the current targets of the SE Waste Strategy would represent nearly 30% reduction by 2025, basically through future minimization, i.e. avoidance of the growth trend. There is also a potential of 10% reduction in this EF via comprehensive re-use, recycling and other recovery. If this could be achieved in the timescale of the SE Plan the resulting savings over the baseline forecast would be in the order of **0.002** gha / cap per year.

3.2.4 Other options: lifestyle & consumption

- **Food:** the EF of the food chain is estimated at nearly 20% of the total EF per person, and is growing rapidly at over 1.5% per year, due to the globalization and industrialization of food production. There is potential for this EF growth to be stabilized, through a combination of a shift to vegetarian and organic diets, less wastage and regional production. This is more a lifestyle issue, but is increasing in policy relevance with the rediscovery of regional and niche food markets as a generator for rural development. A 20-year sustainable food programme would aim to reduce food imports, increase organic and vegetarian food, and reduce packaging: this could result in a saving trend of **0.015** gha / cap per year, i.e. a large fraction of the target savings.
- **Consumables and durables:** this category covers all manufactured items, products and materials. Again there appears to be a high rate of growth of 1.5-2% per year, due to the globalization and industrialization of production, coupled with the increase in disposable income, the rate of obsolescence, and the sheer volume of consumption and wastage. Reducing this diversity of consumption will be the most challenging of all policy targets and the most difficult to forecast. We can anticipate the potential for moving towards stabilization of this growth, to be achieved via the agenda set out in the UK Sustainable Consumption and Production strategy. If such a programme was successful at stabilizing this growth over a 20 year period the savings would be in the order of **0.030** gha/cap per year, providing the remainder of the stabilization target.

3.2.5 Recommendations for the stabilization target

Here we make tentative suggestions for the preferred mix of policy options which would serve to stabilize the urban development components of the overall EF. This of course is only a contribution to the policy debate and is not intended to be a final solution.

To meet the urban development EF stabilization target of **0.025** gha/cap per year, the results of this preliminary analysis suggest the following portfolio of policy options:

- “40% house” programme for upgrading of the existing housing stock: savings of **0.005** gha/cap per year (excluding demolition of any existing houses).
- All new housebuilding to be low energy at the Eco-Homes ‘excellent’ standard: with savings of **0.001** gha/cap per year.
- Low impact construction to be phased in for all housebuilding: giving savings of **0.005** gha/cap per year.
- Low impact construction to be phased in for all other property construction: savings of **0.004** gha/cap per year.
- Low energy building design and operation to be phased in for all other property: savings of **0.004** gha/cap per year.
- Road traffic growth containment: this aims to stabilize growth in road traffic with a rapid increase in public transport provision: savings of **0.006** gha / cap per year
- Waste recovery and recycling: a full programme of minimization and re-use could produce savings by substitution of **0.002** gha / cap per year.

These combined measures exceed the target savings of 0.025 gha/cap per year from urban development activity.

These combined measures exceed the target savings of **0.025** gha/cap per year from urban development activity, assuming the SE Plan low growth option of **25,500** dwellings per year. If the SE Plan high growth option of **32,000** dwellings per year is chosen then this would add approx **0.005** gha / cap per year onto the baseline, requiring slightly more demanding targets from each of the above.

For the *transport sector*, it is recognized that the policy targets may be politically challenging, and will depend on the uncertainties of central government funding, lifestyle change, EU vehicle standards and so on.

- For *surface transport*, a comprehensive ‘green transport’ programme of public transport investment, demand management, vehicle efficiency etc could produce savings of **0.012** gha/cap per year. This is set out here as an extra option, which may or may not be achieved.
- A similar argument applies to the agenda for *air travel*, where the influence of the SE Plan is even more indirect. Therefore the potential savings of **0.011** gha/cap per year are set out again as an extra option, which may or may not be achieved.

4 Timing & phasing

4.1.1 Policy pipeline

Each of the above EF ‘savings’ has been calculated on an annual growth basis, therefore in principle they apply equally to the targets in both 2010 and 2025. For instance, the recommended programme for low-impact construction would involve re-training across the industry over a 20 year period, and this might be assumed to have a practical effect from the date it starts.

However in practice, there is a lag effect or a *policy pipeline*, whether in changes to the building stock, innovation in design, or construction site practices. This lag effect or policy pipeline will determine the feasibility of achieving EF stabilization by 2010, or any other target date. Achievement of practical results lies at the end of a chain of social, economic and organizational barriers, such as:

- New housing energy efficiency: new technologies and market development: specifications and design standards: utility grid protocols: householder lifestyle patterns.
- Existing housing energy efficiency: mortgage / social landlord procedures: builder accreditation: householder awareness:
- New property energy efficiency: new technologies and market development: specifications and design standards: utility grid protocols: CHP and energy services companies: tenant & user awareness.
- Existing property energy efficiency: property tenure barriers / incentives: construction certification: engineering methodology: operational training
- Construction in general: establishing an industry training programme: building materials supplies: professional practices and liability management: contract & procurement specification practice.

Generally it is anticipated that each of these are major policy agendas, which will take at least 20 years to implement. Many are also national or international agendas in which the SE Plan may have an influence, but not necessarily the lead role. For calculation purposes we have assumed that this phased approach will occupy the whole of the 20 year period of the SE Plan. Some actions could be running and delivering practical results by 2010, while others may still be at the talking stage.

This suggests the key role of planning, targeting, modelling and monitoring, to provide the detailed action planning and the evidence base, to inform as to how far real progress is made by the year 2010.

4.1.2 Short term actions

The conclusion from above is that a strategic policy-oriented approach will be more effective, based on the phased implementation of a 20 year strategy. This can incorporate some ‘easy wins’ in the short term, which may include awareness raising and training, and simple technology initiatives such as:

- Distribution of free low energy light bulbs to all existing households and businesses.

- Householder awareness / employee training / building management promotions for lighting and equipment standby functions.
- All public buildings and social housing to purchase electricity from renewable sources.
- All public procurement and contracting to specify the highest energy efficiency standards as a criterion for selection:
- Reducing all road speed limits by 10 mph: (this is an example of an apparently simple measure which could be highly controversial).

4.1.3 Longer term horizons

In the longer term it is clear that stabilization of the EF is only a first step towards ecological sustainability.

- The context is the UK Government's target of **60% reductions** in climate emissions by 2050, as in the Energy White Paper 2003. This is based on the scientific advice for reductions necessary between all nations.
- However the Taking Stock project recognizes the inequalities between rich and poor nations, and their different contributions to climate change and other impacts.
- So for the SE region, one of the richest in the world, it sets out a target of '**Factor Four**': a **75% reduction** in the Ecological Footprint.
- This is likely to require not only a step change but a transformation of infrastructure, markets, technologies and lifestyles.

The scale of the challenge is shown by the chart and table below, which contrast various growth trends:

- GDP growth at 2.75% per year
- Baseline growth in EF at 1.1% per year
- Population growth at 0.54% per year
- Stabilization EF target: at 0% per year change
- Factor Four EF target: -3.4% reduction per year (2010-2050)

It is not the task of this report to demonstrate in detail for each sector the actions and policies which are needed for this more radical long term solution (as per the Taking Stock reports). There is also a great debate as to whether such a transformation may bring overall negative or positive outcomes. However we can forecast from UK government policies and other evidence, that the problems of climate change and resource depletion are likely to increase in the next 20 years. Assuming the SE region takes on board its responsibilities, then this agenda will need to be pursued.

	2000	2005	2010	2025	2050	growth rate
GDP growth (indexed to 6.09 at 2000)	6.09	6.97	7.99	12.00	23.64	2.75%
Population growth (indexed to 6.09 at 2000)	6.09	6.26	6.43	6.97	7.97	0.54%
baseline growth	6.09	6.44	6.80	8.03	10.58	1.11%
stabilization target	6.09	6.44	6.80	6.52	6.09	-0.28%
Factor Four target	6.09	6.44	6.80	3.60	1.50	-3.44%

Table... longer term trends & targets

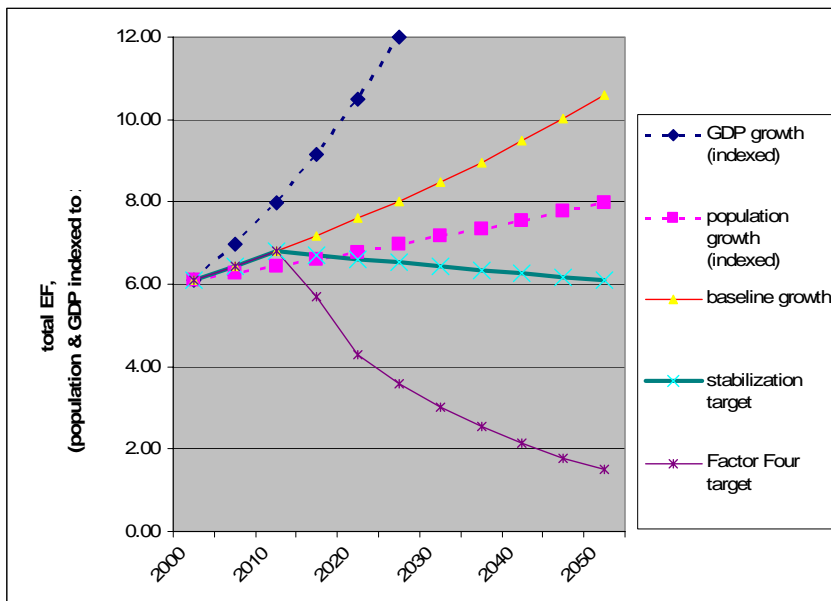


Fig.... longer term trends & targets

4.1.4 Recommendations: timing and phasing

The SE Plan is a composite of very specific actions and targets, and wider aspirations and inducements to other partners. The overall recommendation here is for a business planning approach to short term tactics and long term strategies:

- **Shorter term: 2005 – 2010:** identify viable short term actions as ‘easy wins’ above: develop research and institutional capacity for medium term: identify goals and targets for longer term.
- **Medium term: 2010 – 2020:** implement the full scale programmes for stabilization of the EF in urban development across the region: develop research and institutional capacity for the longer term
- **Longer term: 2020 and beyond:** implement full scale programmes for stabilization and reduction of the EF across all activity in the region.

5 Regional planning issues

5.1 Spatial levels

5.1.1 Spatial policy options

The SE Plan is mainly focused on regional spatial strategy, so there are issues on the effects of spatial policy options in terms of the EF stabilization target. The analysis here has considered in outline the likely differences in EF effects between the two options (there are no specific locations analysed in this study).

- **Option 1: ‘continuation of existing policy’:** this appears to be more likely to continue the ‘baseline’ projections for urban development and their EF impact.
- **Option 2: ‘sharper focus’:** this option is likely to provide greater rates of development and thereby critical mass in selected locations. Therefore it would have more potential for radical changes in the construction, servicing and infrastructure of new dwellings, new properties and new neighbourhoods.

An outline calculation of the effects of Option 2 of increasing densities and reducing travel demand shows that the direct effects are very small, bringing at best EF savings in the order of 1% of the urban development target. However it is estimated that the indirect effects could be much greater, if the potential for neighbourhood infrastructure is taken up, especially the critical mass needed for the viability of public transport.

While it may or may not be more politically challenging, Option 2 is recommended in terms of the EF stabilization target.

5.1.2 Neighbourhood level agenda

The above critical mass effects from Option 2 at the neighbourhood level would help to increase the viability of most forms of sustainable urban infrastructure:

- Targeting new development so that it contributes to the sustainability of existing settlements, helping to achieve viability for local shops, education, health and other services.
- Energy for new housing and other property may be supplied by combined heat and power and district heating (CHP-DH), the most efficient of all forms of energy supply.
- Energy and environmental best practice is encouraged by householder incentives, employee training and other forms of social marketing.
- Higher densities tend to promote fixed route public transport, especially conventional rail, light rail and multi-modal interchanges.
- New flexible forms of public transport, including the Dutch ‘train-taxis’, demand responsive minibuses, and internet shopping logistics.
- Car sharing clubs and networks, and employer’s green travel plans for demand management.

- Waste management through re-use, recycling and energy recovery is much enhanced by clusters of committed users.
- Social economy networks such as Local Economy Trading Schemes, child care, equipment sharing, skills exchange etc.

Each of these options has been assumed in the estimates of the results from policy options in energy, construction, transport and waste management.

5.1.3 Sub-regional and local effects

There are clearly huge differences across the region in terms of personal EF or the impact of the sub-regional development agenda: while the SE is the wealthiest region, it is also one of the most unequal. Such questions include relative wealth and poverty, and relative growth or containment.

The EF per person is closely linked with the average household expenditure per person. Across the SE region there is a range of EF between 5.68 and 6.37 gha / cap, i.e. even the poorest authorities in the region have an EF per person greater than the UK average, with a 12% difference between the lowest and highest.

This suggests that if all of the areas below the regional average were ‘levelled up’ to the regional average of 6.09 gha / cap, there would be a 6% rise in the EF per person. It might be assumed this was to take place over the period of the Regional Economic Strategy. If so, the growth trend from that levelling alone would be of the order of **0.018** gha/ cap per year, or nearly one third of the total growth trend.

In reality the growth is likely to be concentrated in the growth areas identified in the SE Plan and the Sustainable Communities Plan, i.e. Milton Keynes, Ashford and the Thames Gateway authorities. Each of these has an average EF per person less than the regional average. Although there is no direct connection between the local economy and the EF of local consumption, it could be assumed that the influx of newcomers, construction and general investment would tend to confirm this levelling up effect.

5.2 Policy programmes

5.2.1 General policy issues

The implication for the SE Plan is that to meet its stabilization targets, it will need to exert strong and substantial influence on all sectors and industries in urban development, right across the SE region. This is likely to require some radical enhancements to the role and scope of “regional planning”. Such changes might include:

- Active coordination with other sectors such as mortgage lenders, agents and social landlords, to provide incentives and inducements for best practice in existing and new housing.
- Similar range of incentives and inducements for housebuilders to innovate and achieve best practice.

- A more active role in market development, for technologies such as energy efficiency products and technologies
- Public procurement programme to facilitate this market development, and demonstrate best practices for housing and other property
- Coordination of economic development via SEEDA, with construction best practices via SEERA.
- Dissemination and replication of best practices, such the energy management at Woking Borough Council, across the region.

Generally, there are few simple formulas which will guarantee that regional policy will achieve its stabilization targets – in reality there is great complexity and uncertainty in regional governance, in public infrastructure, in public lifestyles. For each of the ‘policy incentive’ menus outlined below, there is a combination to be worked out of partnerships across sectors, lobbying national government, inducements to the private sector, awareness raising to householders, demonstrations of best practice, and so on. Many of these actions reside at the local authority level as main providers of many services, but clearly there is much to be gained through critical mass and coordination at the regional or sub-regional level.

5.2.2 Policies for energy efficiency

While energy supply has not been the role of local or regional authorities for a long time, it is clear that to achieve their targets, a more active role will be needed. Some of these actions are forthcoming through national legislation, however their progress could be speeded in the region.

Various *financial incentives* include:

- Public procurement and contracting by social landlords to select tenders by energy performance criteria.
- Pilot scheme for ‘domestic tradable quotas’ for energy or carbon: as in a Bill currently tabled for late 2005:
- Lobbying government to reduce VAT on refurbishment and energy efficiency installations.
- Inducing mortgage companies to offer differential and better rates for energy efficient housing with lower future bills.
- Grant and subsidy regimes to schools and other public services to reflect energy performance and related targets.

Various new forms of *energy supply* include:

- Partnership energy services companies (ESCOs), which supply both energy and demand management efficiency together.
- CHP and CHP-DH as the preferred mode of utility infrastructure in new developments.
- Public building electricity supply to be from renewable sources as far as possible.

Various forms of *regulation* and other inducement include:

- Use of planning permissions, building regulations and all forms of grants and subsidies, to encourage highest standards of energy efficiency and construction best practice.
- Publication of energy performance data by area, building type, and providers, as a guide to purchasers and tenants.

5.2.3 Policy incentives: construction

Various *financial incentives* include:

- Public procurement and contracting to select tenders by construction environmental performance criteria.
- Differential business rates to reflect energy performance and tenants' future energy bills.
- Grant and subsidy regimes to schools and other public services to reflect construction performance.

Various forms of *market development* include:

- Industry cluster and targeted support for construction firms supplying low impact materials.
- Demonstration best practices showing low impact construction for housing and property.
- Larger construction and refurbishment programmes to form partnerships for market development in sustainable materials and techniques.
- Training for construction best practice, for clients and building managers, designers and specifiers, construction operatives, and material suppliers.
- Public support for re-used / recycled materials markets and transfer stations.

Various forms of *regulation* and other inducement include:

- Use of planning permissions, building regulations and all forms of grants and subsidies, to encourage highest standards of construction best practice.
- Building and engineering material specifications to be revised to encourage higher recycled content.

5.2.4 Policy incentives: transport

The agenda for sustainable transport is well known but increasingly challenging, in the face of funding constraints, privatization / franchising, and the sheer success of private car travel. Here we focus only on some key financial options which may be open to local / regional authorities, without any increase in overall funding:

- Public procurement and contracting to reflect employer's green travel plans.
- Building regulation and planning permission to encourage low impact transport to the maximum possible.
- In-house employers' car parking charges / offsets to reflect true costs of car travel
- Recycling of parking and other charges into low impact transport initiatives including:
- Demand-responsive minibuses and other public transport

- Cycling networks and parking provision
- Community –based or employer-based car clubs

5.2.5 Policy challenges

The overall implication of the EF stabilization target is profound, if the SE Plan and SEERA are realistically committed.

- The first question is on governance, planning and management: how far the SEERA and its member authorities mobilize and build capacity to achieve their goals, given the complexities and uncertainties of regional and local authority powers and resources.
- A second question is on resources i.e. public finance for investment, and the role of the public sector in the market and in market development of technology and infrastructure. If the whole of public procurement in the region was to commission both the solar panels and the factory to produce them, the price would fall rapidly and the renewables programme could achieve viability.
- A third question is how far the general public and business community are committed to the stabilization target, and what it would take to build commitment. Many of the more radical options are dependent on the actions of householders and businesses. There is also evidence to say that the most cost-effective action to reduce climate emissions is in fact public awareness and business training campaigns.

This study provides an outline of how each of the policy options can be addressed in the short, medium and longer term. A typical target for EF will contain both ‘demand side’ and ‘supply side’ components: both ‘physical’ actions and ‘human’ actions: and will need both technical and economic resources. The ‘next steps’ are the actions which cost little, use available technology, gain political viability and generate social benefits – the ideal win-win situation. In general these will include:

- vision: generate scenarios, projections and visions in combination with all stakeholders
- resources: build institutional ‘capacity’ for cohesion, cooperation and longer term thinking
- action: strategic business planning for short, medium and longer terms

5.2.6 Recommendations: next steps

For regional and local authorities, there are some practical ‘horizontal’ actions in the shorter term which prepare the ground for the longer term programmes above:

- corporate policy and mission: promote LA21 and other vision and consensus building exercises
- information and management: full state of the environment & social audits
- in-house measures: green purchasing policies, environmental management systems, targeting and monitoring.

- Policy integration between sectors, levels and agencies, to implement the regional sustainable development framework.

To enable this there is a need for further more detailed research on questions such as:

- Comparison of the SE Plan options with the economic strategy and its environmental impacts.
- Localized impact assessment of the growth areas in the SE Plan
- Detailed evaluation of construction, energy efficiency and transport options
- Comparison of EF analysis with other social and economic assessments.