



 **THE EUROPEAN HAPPY PLANET INDEX**

An index of carbon efficiency and well-being in the EU

nef is an independent think-and-do tank that inspires and demonstrates real economic well-being.

We aim to improve quality of life by promoting innovative solutions that challenge mainstream thinking on economic, environmental and social issues. We work in partnership and put people and the planet first.



nef's Happy Planet Index (HPI) is a measure of the ecological efficiency with which human well-being is delivered. In an age of climate change, it gives a better picture of the true health and wealth of nations. Using new data this report reveals that Europe is less carbon efficient now than it was 40 years ago at delivering human well-being in terms of relatively happy, long lives to its citizens. The Index explores why some European countries produce well-being at a much higher cost than others. Strikingly, the research reveals that people are just as likely to lead satisfied lives whether their levels of consumption are very low or high. This means there is huge potential to reduce environmentally damaging consumption, and that good lives don't have to cost the earth.

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Executive summary

In 1972, Sicco Mansholt, then President of the European Commission, raised a series of provocative questions that are still resonant today:

“Will the EEC become a powerful agent for improving living standards and opportunity in solidarity with less fortunate countries? Or will it remain a select inward-looking club of some of the world’s richest nations? Will it continue to produce ‘bigger, faster and more’ for ‘some’ to the detriment of the global environment and the welfare of the “rest”?”

Progress since has been shaped by the tension between Europe’s aspiration toward the ‘bigger, faster and more’ economic approach characterised by Mansholt, and its desire to be a good partner for international development and an environmentally responsible global citizen.

Yet today, in an age of climate change, Europe is less carbon efficient at delivering human well-being in terms of relatively happy, long lives to its citizens than it was over 40 years ago. New research in this report shows, however, that people with very low levels of consumption are just as likely to live satisfied lives, as people with very high levels of consumption.

In 2006, **nef** (the new economics foundation) introduced a new metric of international development, the *Happy Planet Index* (HPI), which demonstrated the ecological efficiency with which human well-being is delivered.¹ Europe was revealed to be less efficient than many regions of the world, including Latin America and the Caribbean, much of Asia, the Middle East and North Africa.

Global warming now means it is more important than ever that we use our resources efficiently. However, since around 1986 globally we have been consuming more of the planet’s resources than can be replenished through the regenerative capacity of the biosphere. Given that the EU 27² contains around 7 per cent of the world’s population and yet accounts for a disproportionate 16 per cent of total planetary resource consumption, we need to ask whether current levels of consumption in Europe can be justified by the benefits that are achieved. The present report uses HPI methodology to take a closer look at this question.

The (un)Happy Planet Index

Well-being

Well-being is a combination of subjective and objective factors. The HPI uses life satisfaction – how satisfied people *feel* with their lives overall – combined with life expectancy at birth. This component of the HPI for Europe reveals that:

- Citizens of Northern European countries such as Denmark, Sweden and Iceland tend to report highest levels of subjective life satisfaction, as do the Swiss.
- These countries have similarly high life expectancy, although they are joined in this by some of the Mediterranean countries, such as Italy and Spain.
- The ‘transition’ countries, such as Bulgaria, Lithuania, Latvia, and Romania, have the lowest well-being in Europe, with lower life expectancy and low life satisfaction.

- The UK comes a disappointing 15th out of 30 in rank orders for both life satisfaction and life expectancy. Contrasted with nations such as France and Germany, to whom we are traditionally compared, this puts the UK just ahead in terms of life satisfaction, with Germany 16th and France 19th. But the UK falls behind on life expectancy – the average person born in France today can expect to live just over 79 years, almost a year longer than the average person born in the UK.

Carbon footprint

But well-being is only half of the story. HPI does not ask which nation is the *happiest*, but which uses the earth's resources most *efficiently*? To assess this, we need to consider the amount of planetary resources required by each nation to support the lifestyles of its citizens: this is measured by carbon footprint. Here, an interesting and less obvious picture begins to emerge.

- The UK has the fourth largest carbon footprint per person in Europe, behind only Luxembourg, Estonia and Finland.
- Overall, only one country is living within its fair share: Latvia, a relatively low-consumption country that has made extensive use of its renewable resources. The rest of Europe, overall, is responsible for almost three times its fair share of carbon emissions.
- Luxembourg has by far the heaviest carbon footprint per person in Europe. So heavy in fact that it wouldn't fit on our scale. However, it is not simply the case that the wealthiest nations are the worst culprits. Scandinavian nations have some of the lowest per capita carbon footprints, while Estonia and Greece have among the highest.
- Meanwhile, the Scandinavian nations have some of the lowest per capita carbon footprints in Europe, despite also being amongst the richest nations. Iceland, in particular, does well with the second smallest per capita footprint in Europe. Some of the differences can be explained by access to domestically available renewable energy sources, but not all. For example, Germany has the fourteenth largest carbon footprint and France the sixteenth. Even wealthy, high consuming Switzerland has only the ninth largest.

The European (un)Happy Planet Index

Combining well-being and footprint together, a picture of relative carbon efficiency across Europe emerges, with bad news for the UK.

- The UK comes a poor 21st in our Index of 30 countries, behind France and Germany, with only the transition countries, Portugal, Greece, and Luxembourg doing worse.
- Iceland comes top of the European HPI. Scandinavian countries are the most efficient – achieving the highest levels of well-being in Europe at relatively low environmental cost with Sweden and Norway joining Iceland at the top of the HPI table.
- The transition nations come toward the bottom of the table. However, even here there are clear lessons to be learned from their different experiences. Estonia and Latvia, both lauded as 'Baltic Tigers', are barely separated in terms of life expectancy and life satisfaction. But Estonia's huge per capita carbon footprint, combined with high income inequality and declining social cohesion, marks it out as the least efficient country in Europe in terms of well-being delivered per unit of resource consumption. Latvia meanwhile comes a respectable eleventh.

Time trends

This snapshot shows how Europe is faring now. But how did it get here? Examining trends in well-being and footprint over the last four decades reveals a depressing picture. Modest improvements to well-being, mainly driven by increased life expectancy, can be observed over this period, although – relative to the rest of the World – quality of life in Europe was already good in the 1960s. But over the same time period per capita carbon footprints have risen by as much as 75 per cent. In

other words, marginal gains in well-being have been bought at an unsustainably high environmental price – the efficiency of delivering well-being has actually fallen by around 10 per cent when it should have been rising.

Where do we go from here?

In Europe, reducing our collective carbon footprint is one of our greatest challenges. But this does not mean turning the clock back. We have to negotiate the huge changes required without undermining our quality of life. To do this, we need to look to the example of those European countries that are already the most efficient – some of the most socially progressive and technologically advanced nations anywhere in the world. Notably, it is the countries that have most closely followed the Anglo-Saxon, strongly market-led economic model who in general perform worst.

New data from **nef**, presented in this report, show that there is scope to do even better. These data do not support an unappealing choice between ‘business as usual’ at the expense of the planet and future generations, or compromised well-being to minimise environmental degradation. In fact, they suggest that our well-being has little to do with our level of resource consumption, which allows for the possibility that footprint could be reduced significantly without leading to widespread loss in well-being.

Europe is committed to reducing its carbon footprint to a small enough size that it will meet an EU target of halting global warming to no more than two degrees centigrade above pre-industrial levels. According to Sir Nicholas Stern, author of the Treasury commissioned report on the economic effects of climate change, this means cuts in emissions by industrialised nations compared to 1990 levels of between 70 and 80 per cent by 2050. Compared to this, EU reduction targets of eight per cent by 2012 set out in the Kyoto protocol appear woefully inadequate. On current performance, most of Europe is not remotely close to navigating a path that will produce the scale of cuts in emissions needed to meet this target, let alone the level of cuts that Sir Nicolas Stern believes necessary. Innovative policies will need to be developed that significantly reduce per capita carbon footprints whilst respecting (and, ideally, enhancing) well-being.

Achieving this goal will require comprehensive action. Detailed proposals can be found elsewhere, both in our and others’ materials, that spell out how to reduce consumption of carbon and other resources, and how to design policy to reduce inequality and increase well-being. These include, for example, **nef**’s own *Well-Being Manifesto for a flourishing society*³ and Friends of the Earth’s proposed legislation to mandate year-on-year national reductions in emissions. But the key targets for policy-makers can be summarised as:

- **Reducing consumption overall and setting legally binding targets for carbon reduction**

General over-consumption is at the heart of the problem and the people of Europe need to shift to lifestyles that require less resources to be consumed. Energy is an area where decisive government action can make a real difference. Countries like the UK need to decentralise their energy production and make far better use of their abundant renewable energy resources. Every European government needs to set legally binding targets for reducing carbon dioxide emissions, setting carbon budgets for 3–5 year periods, to ensure each country does its part in keeping global temperature increases below 2 degrees Celsius.

- **Reducing inequalities**

Inequalities – not just of income, but also of education, health and social opportunity – have a damaging impact on well-being. They deplete the social cohesion and social capital required to develop shared solutions to our environmental problems. They help drive the materialistic aspirations of over-consumption. Governments should aim to halt and reverse rises in inequality, and provide more support for local communities to thrive.

- **Support meaningful lives**

Governments should take notice of the emerging science of well-being and its implications for policy. For example, employers should be encouraged to enable their employees to develop full lives outside the workplace, be flexible and make time for them to undertake voluntary work. It is time that European governments invested in and implemented national well-being accounts to inform policy making across government, ensuring that the impact of policy decisions on people's well-being is taken into account.

In summary, individuals, communities, governments and societies at large can afford to greatly reduce their levels of consumption without it needing to undermine the well-being of the citizens of Europe. The impacts of global warming, both within the EU and around the world, means that we can no longer justify the marginal benefits reaped from our current inefficient levels of resource consumption. The price paid by future generations and people alive today in poorer countries with fewer resources to adapt is simply too great.

Europe needs urgently to find a new development path where good lives don't cost the earth.

Introduction: A new metric for an old problem

People across the world strive towards the same ultimate goal: living a good life. Different cultures pursue this goal in myriad ways. However, they share one inescapable characteristic, namely a reliance on the resources of the planet to support their activities.

There is massive disparity in the quantity of planetary resources consumed per head of population in different countries. According to the orthodox model of development, higher levels of consumption are the route to a better quality of life. Yet, because we only have one planet, resources are sustainable only if the rate of consumption is less than the rate at which they can be replenished or repaired. Many of the earth's resources that have a slow rate of repair are, in effect, finite. The widespread call for 'sustainable development' amounts to a recognition that the current model of development is unsustainable. We are already using the planet's resources faster than they can be replaced.

How can the pursuit of good lives, on the one hand, and the need to live within the limits of sustainability, on the other, be weighed against one another? Is it necessarily the case that a good life for all leads inexorably to unsustainability, or is there another way?

In July 2006, **nef** introduced the *(un)Happy Planet Index* to provide a means of comparing the progress of nations toward the goal of *delivering high levels of well-being within the constraints of equitable and responsible resource consumption*. Independently, at around the same time, the IUCN (The World Conservation Union) called for a metric capable of measuring 'the production of human well-being (not necessarily material goods) per unit of extraction from or imposition upon nature'.⁴ HPI does just that.

The first HPI report covered 178 countries of the world.⁵ This report demonstrated clearly not only the huge disparity that exists between countries in terms of their resource use, but also the surprisingly *small* increases in experienced well-being that have been gained by the wealthiest countries despite their spiralling rates of consumption. It also showed that some countries achieve Western standards of well-being at a fraction of the ecological cost.

As the EU struggles towards defining a coherent, uniting vision for the European project, this report presents a special regional version of the influential HPI. The first report showed how well the continent of Europe delivers happy and long lives for its citizens as a function of resource consumption, relative to other regions of the world (Table 1). In this report we focus within Europe. We explore why some countries produce well-being at a much higher cost than others, why the carbon efficiency of delivering well-being has been declining and not increasing, and we consider the steps that must be taken if the nations of Europe are to achieve good lives for their citizens that don't cost the Earth.

Table 1: Rank order of continents by HPI (2006)

Regions	Life Sat	Life Exp	Planets	HPI
Latin America and Caribbean	6.6	71.9	1.1 =	
Asia	5.9	68.1	0.7 =	
Middle East and North Africa	5.6	70.2	1.2 =	
Western Europe	6.9	78.2	2.7 =	
Oceania	7.1	74.9	3.3 =	
Africa (sub Sahara)	4.9	46.6	0.6 =	
North America	7.4	77.7	5.1 =	
Former Soviet Countries	4.3	66.8	2.0 =	

Unsustainable consumption

There is little doubt that material standards of living are higher in the rich West than in the world's poorest nations. If it were possible for everyone in the world to live as we do in the West then this would represent a marked improvement in quality of life for most people. Unfortunately, as has been well known for some time, this is simply not feasible.

The Earth supports some 6.5 billion people and planetary resources are increasingly constrained. One way of illustrating this is to estimate the total biocapacity of the world (the amount of biologically productive land area) and compare this with the actual amount of resources consumed. Biocapacity has been rising gradually as improvements in technology lead to better yield per unit of land in some sectors. But this modest increase is swamped by the increase in demand. According to calculations by the Global Footprint Network,⁶ the world as a whole went into 'ecological overshoot' in about 1986 (Figure 1). Since then, we have been consuming more of the planet's resources than can be replenished through the regenerative capacity of the biosphere. Globally, we have been living beyond our means.

What has led to this situation? Primarily, two trends can be identified. First, it is true that global population has been increasing, putting additional strain on biocapacity. However, the largest population increases have been seen amongst the poorest countries, whose per capita consumption was already, and has remained, very low.

Secondly, and much more perniciously, the inequality of resource consumption around the world has increased by a staggering degree. Whilst it may be true that quality of life in the West is higher than in many developing nations, so it is also clear that the growing demand for energy, for food, for services and for consumer goods that has characterised economic development in the West at least since the Industrial Revolution has been the key driver of environmental change. The EU-27 contains around seven per cent of the world's population, yet currently accounts for around 16 per cent of total planetary resource consumption.⁷

Figure 1: Global biocapacity and global footprint 1961–present

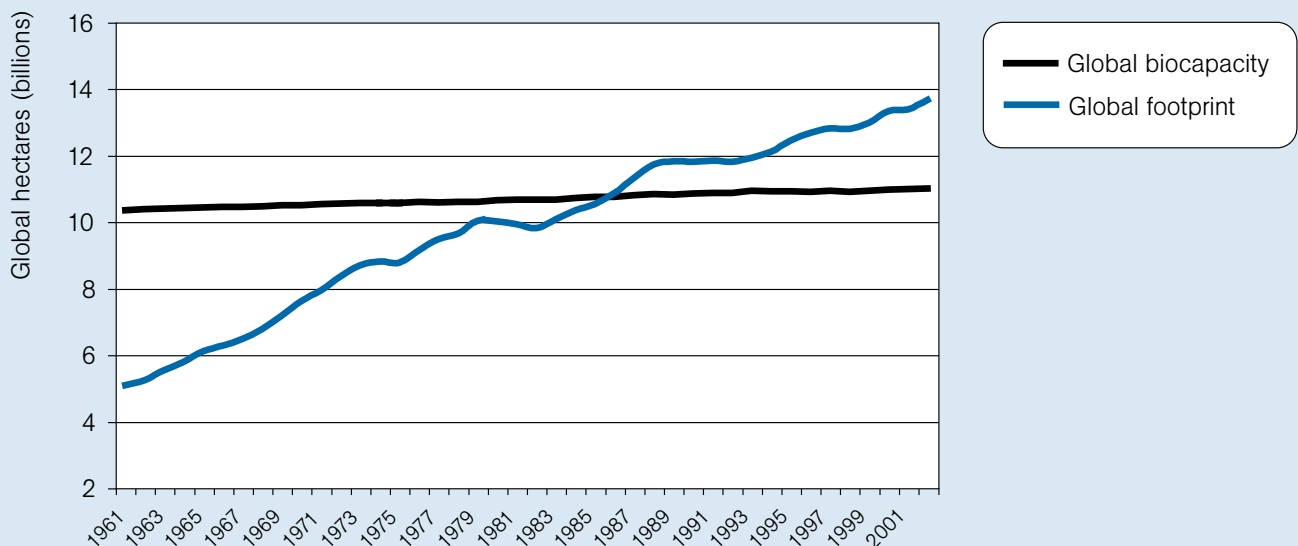
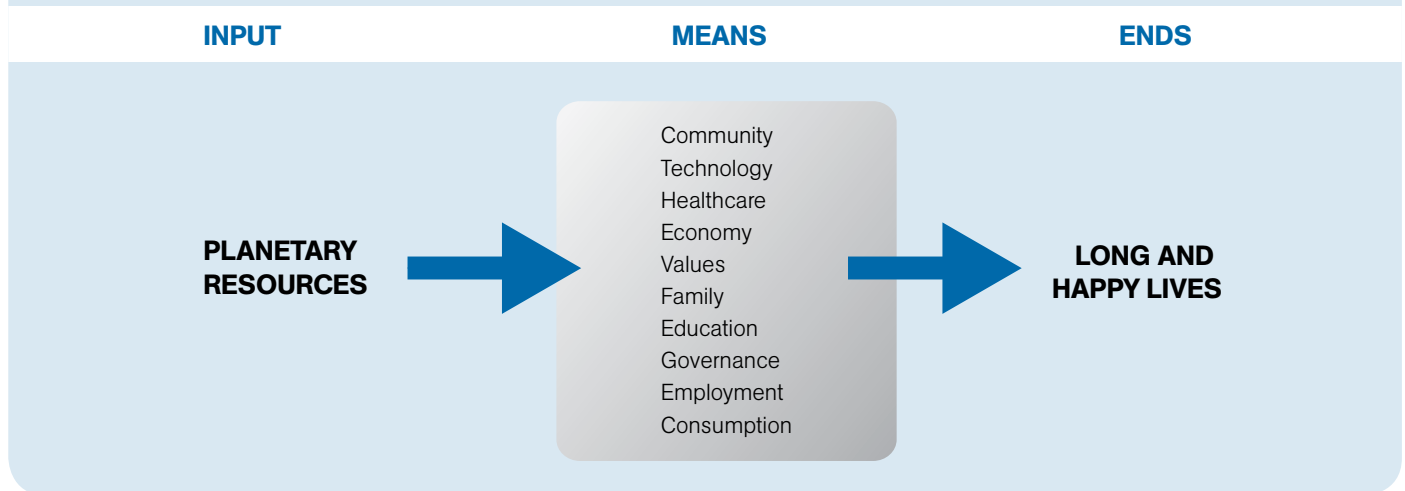


Figure 2: Fundamental inputs, means and ultimate ends



Are we efficient?

Given this unsustainable situation, an obvious question arises: are we using planetary resources *efficiently*?

'Efficiency' refers to a ratio of output to input – the amount of something desirable produced for a given amount of something relatively costly or scarce expended. For instance, we often compare cars by their fuel consumption, using a unit such as *miles per gallon* – the distance that the car can cover for a given amount of fuel consumed. Miles per gallon (or kilometres per litre) is a unit of fuel efficiency and we would say that a car is 'efficient' if it can drive for many miles using relatively little fuel. Although we often talk about efficiency in relation to tangible outputs – miles, hours, widgets – we also use the concept to discuss more subjective matters. For instance, when weighing up possible purchases we often think about 'value for money'. Something is good value for money if we get a lot of 'utility' (to use the economics jargon) for relatively little outlay.

In itself, efficiency is neither a good thing nor a bad thing. But efficiency takes on a value when context is introduced. Efficiency is desirable when *inputs are limited*. Miles per gallon is a useful consideration for most car owners because fuel is costly. Value for money may not be important to multi-millionaires, but it is a critical consideration for most of us who have limited incomes and need to make ends meet.

If we consider efficiency on the scale of human society and human endeavour, the ultimate output of everything that occurs in society – economic transactions, social interactions, education, healthcare, governance and so on – is human well-being. A good, long, healthy, happy, meaningful life for ourselves and our families is the thing that most of us value above all else. To the extent that wealth, material possession, technology and so on are important, it is because they contribute to this ultimate goal (Figure 2).

But good lives don't come for free. They have a cost, in the form of the planetary resources which support all human endeavours. As the economist Herman Daly points out:

*"If the economy is seen as an isolated system then there is no environment to constrain its continual growth. There would be no such thing as an optimal (or even a maximal) scale of throughput. But if we see the economy as a subsystem of a larger, but finite and non-growing ecosystem, then obviously its growth is limited."*⁸

If the planet's resources were unlimited, whether or not we used them efficiently would not matter a great deal. But we know that resources *are* already severely limited and becoming ever more so as population and, critically, per capita consumption grows. If we are to secure good lives for ourselves, for all people around the world and for future generations, the question we need to ask is: are we using planetary resources efficiently?

Good lives that don't cost the Earth – a vision for Europe?

“If our nation took to similar economic exploitation [as the West], it would strip the world bare like locusts... It took Britain half the resources of the planet to achieve this prosperity. How many planets will a country like India require?” – Mahatma Gandhi, 1928

The early 1970s in Europe heralded not only a sudden growth in international environmental concern, but also a deep questioning of Europe's future and its role in the world. In 1972, Sicco Mansholt, then President of the European Commission, raised a series of provocative questions that are still resonant today:

“Will the EEC become a powerful agent for improving living standards and opportunity in solidarity with less fortunate countries? Or will it remain a select inward-looking club of some of the world's richest nations? Will it continue to produce 'bigger, faster and more' for 'some' to the detriment of the global environment and the welfare of the 'rest'?”

Twenty years later, at the conclusion of the Rio Earth Summit in which the European Union played a leadership role, Commission President Jacques Delors was aware that Europe's credibility was at stake if:

“These agreements signed in Rio remain a dead letter and do not give birth to ambitious policies that respond to the scale of the challenge that faces us.”

Progress since has been shaped by the tension between Europe's aspiration toward the 'bigger, faster and more' economic dynamism characterised by Mansholt, and its desire to be a good partner for international development and an environmentally responsible global citizen.

Two agendas: Lisbon and Gothenburg

When the Treaty of Rome was signed in 1957, increases in competitiveness and economic growth were considered to be the primary means of improving living and working conditions for the people of Europe.⁹ At the Lisbon European Council in March 2000, the heads of State and Government launched the so-called Lisbon Agenda, aimed at making Europe 'the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion'.¹⁰ A target was set to achieve three per cent annual average economic growth and to create 20 million jobs by 2010. Progressive liberalisation and deregulation across the economy, but especially in the service sector, were the major tools to be used.

But economic growth in Europe has been dependent on increasing material throughput, with the effect that greater pressure has been exerted on both the European and the global environment. Recognising this problem, the EU also produced a plan for sustainability to complement the Lisbon Agenda, known as the Gothenburg Agenda. Working towards more sustainable production and consumption had been on the EU's agenda since at least 1992, when sustainable development was written into the Maastricht Treaty as an explicit objective of the European Community. A more detailed proposition for 'a long-term strategy (of) dovetailing policies for economically, socially, and ecologically sustainable development' was presented by the European Commission in Gothenburg, June 2001.¹¹ That meeting led to a Sustainable Development Strategy (SDS) based on the principle that the economic, social, and environmental effects of all policies should be examined in a co-ordinated way and taken into account in decision-making.

Cooperation or conflict?

Do the two agendas – Lisbon for growth and Gothenburg for sustainability – actually complement each other, or are they fundamentally in conflict? Both appear to be experiencing problems on their own terms. In February 2005, European Commission President José Manuel Barroso said, ‘Lisbon has been blown off course by a combination of economic conditions, international uncertainty, slow progress in the member states and a gradual loss of political focus.’¹² Growth was less than expected, and fewer jobs were created than hoped for.¹³ But in response there were redoubled efforts to promote, in particular, the liberalisation of services, raising fears of a ‘race to the bottom’ in standards, with high social and environmental costs.

Separately, the sustainable development strategy has also encountered difficulties. One detailed review by civil society organisations in 2004 claimed that many of the 80 commitments made in 2001 had made little or no progress and, moreover, that the demands of the Lisbon Agenda were watering down the original commitments.¹⁴ A public consultation launched by the Commission in 2004 showed that a majority thought that progress to date had been unsatisfactory.¹⁵

In February 2005, the Commission concluded that the strategy for sustainable development had to be reviewed because of a number of new changes in the world since 2001. These included European enlargement, the rise of instability linked to terrorism, new EU international commitments, further globalisation, and, crucially, ‘persistent and increasingly apparent signs of environmental problems in the EU and globally’.¹⁶ The most serious threats to sustainable development in Europe and the world were:

‘Climate change, public health, transport and land use, management of natural resources, the challenges of an ageing society as well as poverty and social exclusion.’¹⁷

The danger is that the economic and policy drivers of Mansholt’s ‘bigger, faster, and more’, will mean that Europe’s bold ambitions towards sustainability become what Delors feared: a ‘dead letter’, incapable of facing up to the scale of the problem.

The best way to avoid this outcome is to promote a more widespread understanding of the real relationship between lived experience, wealth and associated environmental impact. In this way we can move towards a system that supports good lives, without destroying the resources on which we depend. This is a principle aim of HPI.

How is Europe faring?

HPI is an indicator of efficiency. Specifically, it compares the ultimate outcome of human endeavour – experienced well-being – with the ultimate input – planetary resources – at the national level.

HPI as a measure of efficiency

$$\text{HPI} = \frac{\text{Well-being}}{\text{Resource consumption}}$$

HPI poses two important questions:

1. Do high levels of resource consumption *necessarily* lead to high well-being outcomes?
2. Is it possible to achieve high levels of well-being without high levels of consumption?

In other words, do the gains in well-being achieved by the richest Western nations justify the massive additional strain that these countries place on the environment?

The most straightforward way to see how countries in Europe are faring in terms of their resource consumption efficiency – and so to understand the unique perspective which HPI provides – is to walk-through the calculation step by step, comparing nations at each turn.

Human well-being

The well-being zeitgeist

The top half of the HPI 'equation' is human well-being. In the UK, at least, well-being is very much in vogue. From Labour peer Lord Layard's book *Happiness*,¹⁸ to the BBC's television series *The Happiness Formula* and *Making Slough Happy*, to the Conservative party leader David Cameron's claim that we should be 'focused not just on GDP, but on GWB – general well-being',¹⁹ it seems that everyone is talking about it. This interest in well-being is now beginning to influence the way that governments measure their success. In the UK, the Local Government Act of 2000 gave local authorities the power to promote well-being and required them to develop a comprehensive strategy to this end.

In the academic community there has also been renewed interest in the factors that enable people truly to flourish. The so-called Positive Psychology movement in the USA has given rise to much ground-breaking research on the development of character strengths, the role of positive emotions, the determinants of happiness and other related topics.²⁰ Meanwhile, parallel research by economists has problematised the relationship between wealth and well-being and increased our understanding of the concept of 'utility'.²¹

In one sense, the only unusual thing about all this research and political interest is that it did not happen earlier; after all, living a good life has been the goal of people and societies for millennia. It seems reasonable to ask if there is anything about the current well-being debate that distinguishes it from previous discussion of the subject. Is it merely old wine in new bottles? The central difference can be summed-up in one word: *measurement*. There are now established, well-validated approaches to the assessment of people's subjective well-being, at both the individual and population levels. Measurement adds a critical new dimension because what gets measured, matters. With proper measurement, comparisons can be drawn both between people and over time. Measurement enables hypotheses

to be tested, and falsified, about which aspects of social and economic life support well-being and which undermine it. Most importantly of all, it allows some of the really big questions – what is society for? what does real prosperity mean? – to be reframed in terms that give a central place to people’s subjective experience of their lives.

Although wider recognition that subjective well-being can be measured has only recently begun to seep into political discourse, information on subjective life satisfaction within nations has been gathered from large-scale population surveys for at least 40 years. Typically, people are asked questions such as: ‘If you consider your life overall, how satisfied would you say you are nowadays?’ Responses are given on a 0–10 scale, from ‘not at all satisfied’ to ‘extremely satisfied’. Satisfaction with life overall tends to be more stable over time than other subjective measures of happiness, since it reflects a summary of ‘judgements about feelings’.²²

Research suggests that people answer questions regarding their life satisfaction reliably.²³ There is ample evidence that self-reported happiness and satisfaction is strongly related to various objective measures, including standard measures of mental health, such as suicide rates.²⁴ Happier people tend to be more involved in social and civic life,²⁵ are more likely to behave in environmentally responsible ways,²⁶ have better family and social relationships at home,²⁷ and are more productive at work.²⁸ An extensive recent review of literature notes that experience of subjective happiness and satisfaction are positively associated with various positive health outcomes.²⁹ Levels of life satisfaction have even been shown to predict working days lost through illness five years later.³⁰ Recently, some researchers have suggested that subjective life satisfaction may be the single, most effective measure of poverty, because it is influenced by both economic and social aspects of well-being.³¹

Many of the known predictors and correlates of subjective life satisfaction are already well embedded within existing policy frameworks. Social and economic deprivation, mental health and social mobility, for instance, are all routinely measured in national statistics frameworks. Yet none of these measures fully predict subjective life satisfaction – as such, subjective ratings contain valuable information that is not captured elsewhere. If the majority of people in a country report dissatisfaction with their lives then this seems to be a reasonable indication that something is awry, either with government policy (or at least its implementation), with society, or with both.

Incorporating subjective data on life satisfaction distinguishes HPI from existing development metrics. People’s experience of their quality of life is at least as important as their actual physical circumstances. It is no good, for example, arguing that someone with excellent health, high household income and a good standard of education *must* be satisfied with their life if that is not how they actually feel – many people in just such circumstances suffer from debilitating depression and anxiety, for instance (conditions which, it has been argued, are growing in Western society partly as a function of increasing affluence and the lifestyle changes that it brings³²). Similarly, it should not be assumed that people living in relative poverty or with chronic health conditions must necessarily be dissatisfied with their lives.

Life satisfaction in Europe

Europe is one region of the world where high-quality data on life satisfaction is readily available. To ensure a robust measure of life satisfaction, we took the mean of the national averages from four different cross-national surveys, all of which were conducted in 2003/2004. As well as the World Values Survey,³³ which we used in the original HPI report, these included the Eurobarometer,³⁴ the European Social Survey,³⁵ and the European Quality of Life Survey.³⁶ Agreement between the surveys was very high, with a Cronbach's alpha, the most widely used measure of reliability, of 0.99.³⁷ (A Cronbach's alpha of 1 would indicate complete agreement.) Given that all four surveys were completely independent of one another and taken from different samples of the population, this highlights the robustness of life satisfaction data. In other words, observed differences between countries are likely to be real and meaningful, and not simply the result of poor sample methodology.

So who are the most satisfied people in Europe? Table 2 gives the rank order of countries in Europe by life satisfaction.

Out in front are the Danes, closely followed by Switzerland and then three of the other Scandinavian countries. The UK lies mid-table, along with most other Western European nations. Bringing up the rear are the countries of Eastern Europe.

It is worth noting that even within Europe there is considerable variation. The difference between Denmark at the top, and Bulgaria at the bottom is extremely marked – over four points on a ten-point scale. This is important, for it gives the lie to the idea that life satisfaction is essentially fixed and unvarying. There can be little doubt that this represents a real and significant difference between how the average Dane and the average Bulgarian feel about their lives.

Table 2: Life Satisfaction in Europe

Rank	Country	0-10
1	Denmark	8.4
2	Switzerland	8.2
3	Iceland	8.0
4	Finland	7.8
5	Sweden	7.8
6	Luxembourg	7.7
7	Ireland	7.7
8	Netherlands	7.5
9	Austria	7.5
10	Norway	7.5
11	Malta	7.4
12	Belgium	7.4
13	Cyprus	7.2
14	Spain	7.2
15	United Kingdom	7.2
16	Germany	7.0
17	Slovenia	6.9
18	Italy	6.8
19	France	6.6
20	Czech Republic	6.4
21	Greece	6.3
22	Poland	6.1
23	Portugal	5.7
24	Estonia	5.6
25	Hungary	5.5
26	Slovakia	5.5
27	Romania	5.4
28	Latvia	5.1
29	Lithuania	5.1
30	Bulgaria	4.1

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Life expectancy and Happy Life Years

Most indicators used for making international comparisons do not include subjective data. The UN's Human Development Index (HDI), for instance, is a very widely used metric that combines three different objective indicators: life expectancy at birth, level of education and GDP. HDI is an excellent measure of material welfare; however, it does not take explicit account of the relationship between *experienced* well-being and the material circumstances in a country – rather, it assumes that the one predicts the other. Measures of life satisfaction provide valuable information about how people experience their lives in different countries that is not captured by purely objective indicators of welfare like HDI.

Nevertheless, for the purpose of understanding consumption efficiency in the broadest terms, it is preferable to combine subjective life satisfaction with a robust objective indicator of physical welfare. *Life expectancy at birth* is such an indicator. It is an estimate based on the prevailing social, environmental and economic conditions in a country and is calculated through large-scale data collection of mortality rates at different ages. Life expectancy is popular as a metric of welfare across nations because it is strongly related to material standards of living in a country. For instance, it is extremely sensitive to the rate of infant mortality, which is itself a robust proxy indicator of access to sanitation and the state of healthcare. By including life expectancy as part of the definition of well-being, therefore, we are not suggesting that a long life is necessarily a good thing (although most people would probably say that it is, all other things being equal), but that it captures objective factors about quality of life that are equally important as how people feel about their lives.

Table 3 shows life expectancies for the countries in our sample. As before, it is Switzerland and the Scandinavian countries that perform best, although they are now joined by Mediterranean nations such as Italy. Eastern European countries, particularly the Baltic states, languish at the bottom of the table.

The top half of the HPI efficiency equation combines objective and subjective well-being in an indicator developed by the Dutch sociologist Ruut Veenhoven³⁸ and known as Happy Life Years (HLY). To calculate a nation's mean HLY, ratings of subjective life satisfaction are multiplied by mean life expectancy at birth and divided by ten. Veenhoven describes this as an 'ultimate output measure', because it incorporates both 'apparent' and 'assumed' quality of life.³⁹

Table 3: Life Expectancy in Europe

Rank	Country	Years
1	Switzerland	80.5
2	Sweden	80.1
3	Iceland	79.6
4	Italy	79.6
5	Spain	79.6
6	Norway	79.5
7	France	79.3
8	Cyprus	79.1
9	Greece	78.8
10	Belgium	78.7
11	Austria	78.7
12	Malta	78.7
13	Netherlands	78.5
14	Germany	78.5
15	United Kingdom	78.4
16	Finland	78.4
17	Ireland	78.2
18	Luxembourg	77.9
19	Denmark	77.4
20	Portugal	77.3
21	Slovenia	76.4
22	Czech Republic	75.3
23	Poland	74.6
24	Slovakia	73.8
25	Hungary	72.4
26	Bulgaria	72.1
27	Lithuania	71.9
28	Romania	71.5
29	Estonia	71.3
30	Latvia	70.7



Planetary resource use

If the ultimate output of human endeavour is long and happy lives, then the fundamental input – the bottom half of the efficiency equation – is planetary resource consumption, represented here by carbon footprint.⁴⁰ This is a measure of the land area required to support the plant life needed to absorb and sequester CO₂ emissions from fossil fuels used by a country, based on its levels of consumption. This measure takes account of the fact that in a global economy people consume resources and ecological services from all over the world, and reallocates the carbon costs of such consumption accordingly. It also accounts for the ‘embodied’ footprint that is associated with the production of goods. For example, the carbon emitted in the manufacture of a car produced in Taiwan but bought by someone living in Slovenia will count towards Slovenia’s footprint, not Taiwan’s.

Carbon footprints include estimations of the carbon emissions involved in the production of nuclear energy. Proponents of nuclear energy tend to overlook the energy costs involved in the set-up and decommissioning of nuclear plants, the mining and refining of uranium, and in dealing with radioactive waste. In an attempt to take these costs into account, we considered a recent report by the Irish think-tank Feasta.⁴¹ It demonstrates that, at a very conservative estimate, 1 kW of electricity produced by nuclear power has approximately one-third the carbon footprint of an equivalent amount of electricity produced from gas. For more details on this, and a full explanation of the rationale for using carbon footprint here rather than total ecological footprint (as in the 2006 worldwide HPI), see Appendix 2.

Table 4 shows countries in Europe ranked by the size of their per capita carbon footprint. If we take the world’s total biocapacity measured in global hectares (gha) (1.8 gha per person) and subtract from it all that is required to support our dietary needs (0.8 gha) and built-up land use, we are left with 1.0 g/ha per person available for carbon sequestration.⁴² Countries living within these means can be deemed to have an acceptable carbon footprint satisfying “one-planet living”. Clearly, then, the first thing to note about this table is that Europe as a whole requires very significantly more than its equitable fair share of biocapacity to sustain current levels of consumption. Indeed, by this standard, only Latvia is living within its global fair share.⁴³

We should also note the large disparity in carbon footprint between nations. Even discounting Luxembourg as an outlying case, the difference between top (Estonia) and bottom (Latvia) is a factor of seven. Even amongst the relatively rich nations of Europe, then, there is considerable variation in per capita carbon footprint (for example, a three-fold difference between Finland and Iceland).

Table 4: Carbon footprints in Europe

Rank	Country	Global hectares per capita
1	Luxembourg	6.88
2	Estonia	3.54
3	Finland	3.39
4	United Kingdom	3.32
5	Greece	3.17
6	Denmark	3.17
7	Ireland	3.12
8	Belgium	3.04
9	Switzerland	3.04
10	Austria	2.82
11	Netherlands	2.80
12	Czech Republic	2.72
13	Spain	2.69
14	Germany	2.59
15	Malta	2.53
16	France	2.52
17	Italy	2.52
18	Cyprus	2.26
19	Slovenia	2.10
20	Norway	1.98
21	Portugal	1.96
22	Hungary	1.87
23	Poland	1.83
24	Bulgaria	1.62
25	Slovakia	1.61
26	Sweden	1.60
27	Lithuania	1.34
28	Romania	1.06
29	Iceland	1.06
30	Latvia	0.45

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Putting it all together: HPI

This leads us directly to the question of efficiency considered earlier. Some countries are happier than others, whilst some have better longevity outcomes. Some countries also consume a good deal more than others. What is the relationship between experienced well-being and consumption? Figure 3 gives us some hints. The top-left corner of the graph is where countries should aspire to be – maximising well-being and minimising footprint. Which (if any) countries in Europe consume *efficiently* – that is, support long and happy lives without consuming too much?

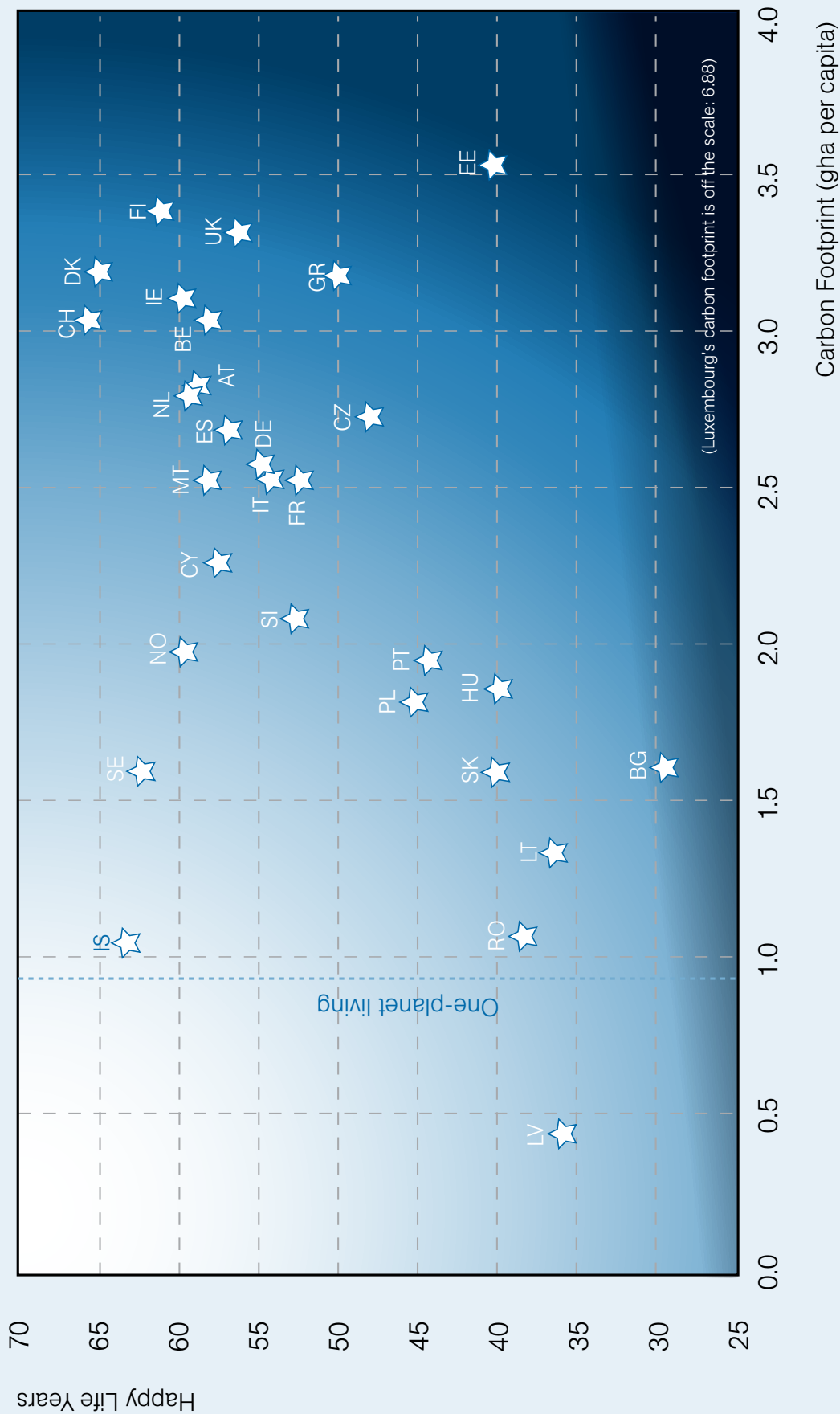
HPI, shown in Table 5, is calibrated so that a country with mean life satisfaction of 10, life expectancy of 85 and a carbon footprint equivalent to 'one planet living' would achieve HPI of 100.

Table 5: The European Happy Planet Index

Rank	Country	HPI
1	Iceland	72.3
2	Sweden	63.3
3	Norway	56.0
4	Switzerland	51.6
5	Cyprus	51.3
6	Denmark	49.8
7	Malta	49.4
8	Slovenia	48.5
9	Netherlands	48.4
10	Austria	47.9
11	Latvia	47.5
12	Spain	47.4
13	Ireland	46.5
14	Italy	46.4
15	Germany	46.3
16	Finland	45.7
17	Belgium	45.5
18	France	44.8
19	Poland	43.9
20	Romania	43.7
21	United Kingdom	42.3
22	Portugal	41.8
23	Slovakia	40.8
24	Czech Republic	39.7
25	Lithuania	39.0
26	Hungary	38.3
27	Greece	38.3
28	Bulgaria	29.7
29	Luxembourg	29.6
30	Estonia	29.3



Figure 3: Carbon efficiency in Europe



AT: Austria – BE: Belgium – BG: Bulgaria – CH: Switzerland – CY: Cyprus – CZ: Czech Republic – DE: Germany – DK: Denmark – EE: Estonia – ES: Spain – FI: Finland – FR: France – GR: Greece – HU: Hungary – IE: Ireland – IS: Iceland – IT: Italy – LV: Lithuania – LU: Luxembourg – LT: Latvia – MT: Malta – NL: Netherlands – NO: Norway – PL: Poland – PT: Portugal – RO: Romania – SE: Sweden – SI: Slovenia – SK: Slovakia – UK: United Kingdom

Winners and losers

Top

The success of the three Scandinavian countries at the top of the table is attributable to similar factors. All three are relatively energy-efficient, with extensive district heating schemes which utilise the energy wasted in other sectors – for example waste heat from electricity generation and industry – removing the need to burn further fuel resources, such as oil and gas, for space heating. Furthermore, under environmentally controlled conditions, district heating utilises the energy contained in complex or local fuels which others are unwilling or unable to use, for example tallow,⁴⁷ waste sludge from pulp mills, and logging residues (including bark, woodchips and sawdust). All three countries have moved significantly away from fossil fuel dependence for producing their electricity.

Iceland 1 – EU HPI 72.3

Leading the HPI table by some distance is Iceland. Its volcanism gives it a distinct advantage, providing an essentially free, easily harvested and sustainable energy source in the form of geothermal energy (located on the Mid-Atlantic ridge, Iceland has over 200 volcanoes and 600 hot springs). The energy security provided by geothermal energy has strongly influenced the standard of living in Iceland – one estimate suggests that using geothermal for space heating instead of fossil fuels saves Iceland about US\$100 million in imported oil annually.⁴⁸ Practically all space heating (89 per cent) comes from district heating schemes fuelled by geothermal energy, and around 99.9 per cent of electricity comes from hydropower or geothermal power stations. The industry, transport and fishing sectors are the only significant emitters of carbon in Iceland. Politically and socially, Iceland fits the Scandinavian model. Its government commits the most resources to health in Europe, resulting in a society with high life expectancy. Iceland's citizens also report high levels of trust and the lowest fear of crime in Europe. It is also interesting to note that, despite the cold, Icelanders watch very little television – 28 per cent less per day than the British, for example.⁴⁹

Sweden 2 – EU HPI 63.3

Low carbon energy is also a high priority in Swedish government policy. Just 27 per cent of primary energy in Sweden comes from fossil fuels, resulting in a low per capita CO₂ emissions and CO₂ intensity factor. (Compare this to the UK, where a massive 89 per cent of primary energy is derived from oil, gas or coal.) Renewable energy contributes to around 26 per cent of Sweden's primary energy (well above the EU-27 average of 12 per cent), the majority of which comes from hydropower. Most Swedes also enjoy high standards of living, with the third-highest life expectancy in Europe and the second-lowest levels of income inequality. Sweden boasts the highest rates of political engagement in Europe, with 45 per cent of the population claiming to have participated in some form of political activity (in addition to voting).

Norway 3 – EU HPI 56.0

As one of the top three producers of natural gas in Europe, Norway's rejection of fossil fuels for domestic energy is notable (90 per cent of the 85 bn m³ produced every year is exported to other countries). Norway has invested in large-scale hydropower projects which produce 99 per cent of its electricity. Norway tops the Human Development Index worldwide indicating that material living standards are excellent. Reported levels of social capital are high, particularly trust and feelings of safety for both of which Norway ranks second in Europe.

Bottom

Bulgaria 28 – EU HPI 29.7

Bulgarians report the lowest levels of life satisfaction in Europe. Whilst Bulgaria has a marginally higher GDP per capita than Romania, household expenditure is also the lowest in the EU, suggesting that Bulgarians actually have less disposable income than Romanians. Low material standards of living also coincide with low scores on measures of good governance and low levels of government spending on health and education (as a percentage of total spending). Bulgaria has a relatively diverse energy mix, but one-third of this is derived from solid fuel, resulting in an above-average carbon intensity.

Luxembourg 29 – EU HPI 29.6

Luxembourg performs poorly for very different reasons. One of the wealthiest countries in the world, levels of life satisfaction are high – though by no means the highest in Europe – but so is per capita carbon footprint (6.9 gha per person⁴⁴). Domestic energy production is 100 per cent renewable, but this accounts for just two per cent of the total primary energy, the rest being imported from carbon-intensive sources. Much the largest contributor to Luxembourg's excessive footprint, however, is its enormous transport sector which is responsible for around 60 per cent of total energy consumption – double the European average.

Estonia 30 – EU HPI 29.3

Bottom of the HPI table is Estonia. Whilst Estonia, one of the 'Baltic tigers', posted the second-highest GDP growth rate in Europe in 2006 and has been praised as one of the ten most liberal economies in the world,⁴⁵ it has not enjoyed comparable gains in well-being. Perhaps well-being increases have been mitigated by declining social cohesion – Estonia has high income inequality, coupled with particularly low levels of political engagement and high fear of crime (the second highest in Europe). Worse than other Eastern European countries, Estonia combines these low levels of well-being with an extremely heavy carbon footprint. This is partly due to its use of oil shale,⁴⁶ a low-grade solid fuel, for 56 per cent of primary energy – far above the EU-27 average of 18 per cent.

National accounts of well-being

In a seminal paper, US psychologists Ed Diener and Martin Seligman noted that:

*'[Economic indicators] ... have glaring shortcomings as approximations, even first approximations, of well-being. We are now in the position to assess well-being directly, and therefore should establish a system of national accounts of well-being to supplement the economic measures. Indeed, it can be argued that the well-being measures should be central, and that the economic indices are best understood in their relation to enhancing well-being...'*⁵⁰

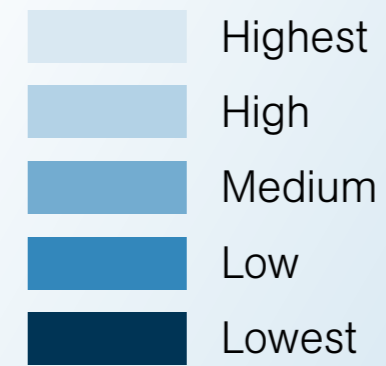
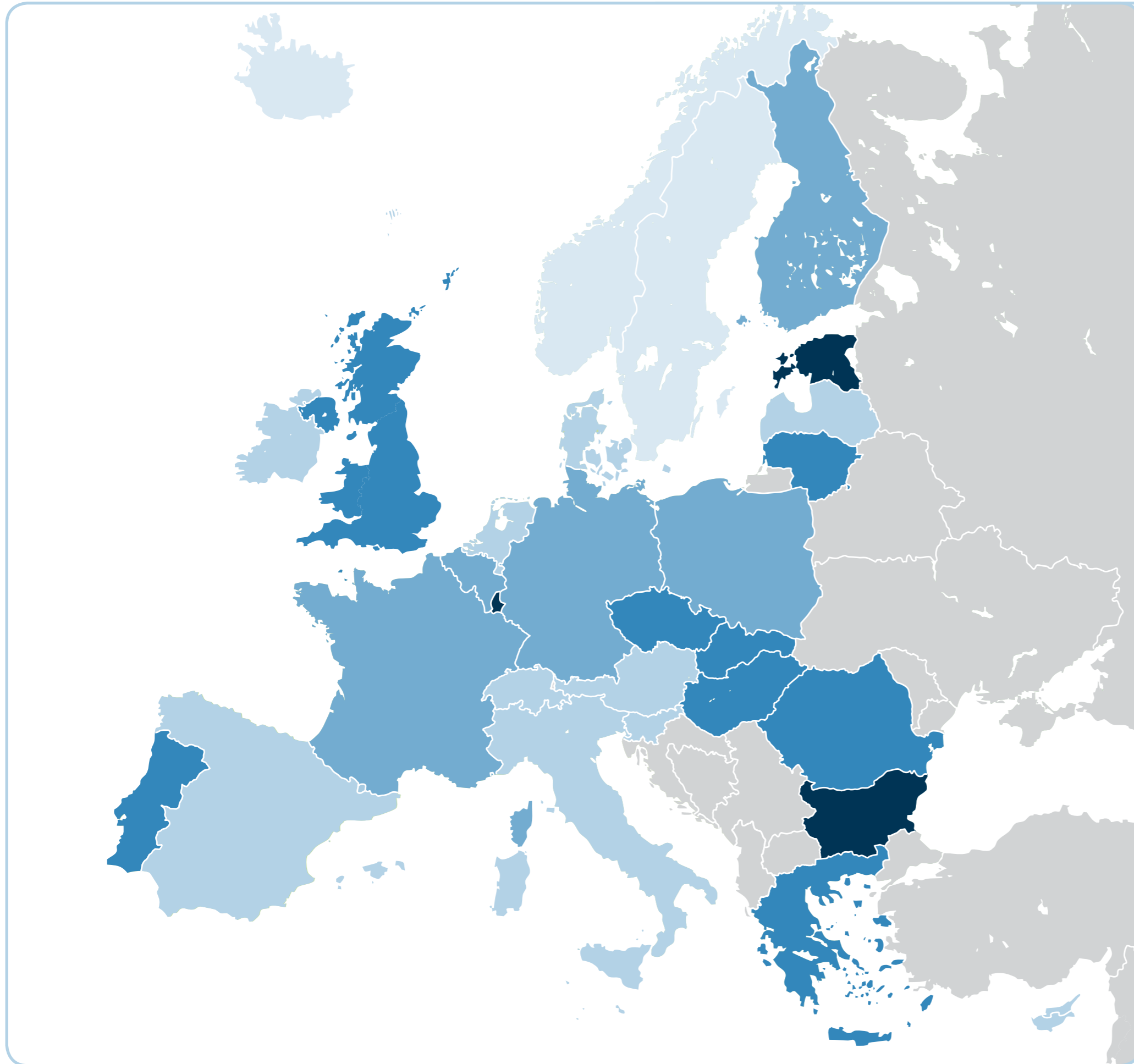
This reflects a growing interest in developing better means of measuring 'progress' than indicators based solely on market transactions that can be observed worldwide. Even the Organisation for Economic Cooperation and Development (OECD), a bastion of free market economics, recently hosted a world forum on 'measuring the progress of societies' with the explicit intention of looking beyond economic indicators.

The nations of Europe all accept the need to develop sustainably. This can only be achieved with a proper understanding of the relationships, and trade-offs, between economic, social and environmental goals. With metrics that measure only economic costs and benefits, however, this will be a tough task. As an important step toward more meaningful measurement, we believe that European governments should invest in and implement national accounts of well-being. This would allow policy-makers to better understand the impact of their decisions on the lives of the people that they affect.

In 2006, a team led by Professor Felicia Huppert of Cambridge University and including **nef**,⁵¹ made a successful application to design a component of the third round of the European Social Survey. This module was designed with the explicit purpose of operationalising Diener and Seligman's vision in a European policy context. Data from this survey, available in Autumn 2007, will allow for fine-grained comparisons of personal and social well-being across much of Europe.

Nic Marks is the founder of **nef**'s centre for well-being

The European Happy Planet Index



Countries in HPI rank order	Life Sat	Life Exp	Carbon Footprint	HPI
1 Iceland	8.0	79.6	1.1	72.3
2 Sweden	7.8	80.1	1.6	63.3
3 Norway	7.5	79.5	2.0	56.0
4 Switzerland	8.1	80.5	3.0	51.6
5 Cyprus	7.2	79.1	2.3	51.3
6 Denmark	8.4	77.4	3.2	49.8
7 Malta	7.4	78.7	2.5	49.4
8 Slovenia	6.9	76.4	2.1	48.5
9 Netherlands	7.5	78.5	2.8	48.4
10 Austria	7.5	78.7	2.8	47.9
11 Latvia	5.1	70.7	0.4	47.5
12 Spain	7.2	79.6	2.7	47.4
13 Ireland	7.7	78.2	3.1	46.5
14 Italy	6.8	79.6	2.5	46.4
15 Germany	7.0	78.5	2.6	46.3
16 Finland	7.8	78.4	3.4	45.7
17 Belgium	7.4	78.7	3.0	45.5
18 France	6.6	79.3	2.5	44.8
19 Poland	6.1	74.6	1.8	43.9
20 Romania	5.4	71.5	1.1	43.7
21 United Kingdom	7.2	78.4	3.3	42.3
22 Portugal	5.7	77.3	2.0	41.8
23 Slovakia	5.5	73.8	1.6	40.8
24 Czech Republic	6.4	75.3	2.7	39.7
25 Lithuania	5.1	71.9	1.3	39.0
26 Hungary	5.5	72.4	1.9	38.3
27 Greece	6.3	78.8	3.2	38.3
28 Bulgaria	4.1	72.1	1.6	29.7
29 Luxembourg	7.7	77.9	6.9	29.6
30 Estonia	5.6	71.3	3.5	29.3
European mean	6.7	77.8	2.5	45.1

Time trends

In itself efficiency is neither a good thing nor a bad thing. The level of efficiency which is desirable depends both on the availability of inputs and the optimal level of outputs achieved. If inputs are unlimited then maximising efficiency is of little importance – if they are constrained then it becomes vital.

What is optimal efficiency?

In the case of efficiency, inputs clearly are limited due to the unavoidable fact that we only have one planet. Figure 1 shows that even as global biocapacity has increased slightly over the last 40 years or so, the rate of increase in demand has significantly outstripped it. Since the mid-1980s, we have been consuming the planet's resources faster than they can be replenished through natural processes. Worse, the gap between consumption and biocapacity has been widening and the trend shows little sign of reversing.

As resources have become increasingly constrained over the years, we might hope that this would have been accompanied by an upwards trend in efficiency. In fact, as Figure 4 shows, this has not been the case in the countries of Europe for which we have reliable data. Rather than increasing, the efficiency of the nine oldest EU members is around 10 per cent lower now than it was in 1961 (the earliest point where adequate data is available).

What has happened? As can be seen clearly from Figure 4, HLY has improved modestly. This has been largely driven by life expectancy, which has increased in all nine countries (by an average of eight years). Meanwhile, there has been very little notable increase in subjective life satisfaction in any of these countries over the last 40 years – the mean increase is just four per cent and some have experienced a mild decline. Yet over the same period, footprint per capita increased much more dramatically – by around 70 per cent on average.

Figure 4: Trends in Happy Life Years, footprint and resource efficiency in Europe, 1961–present

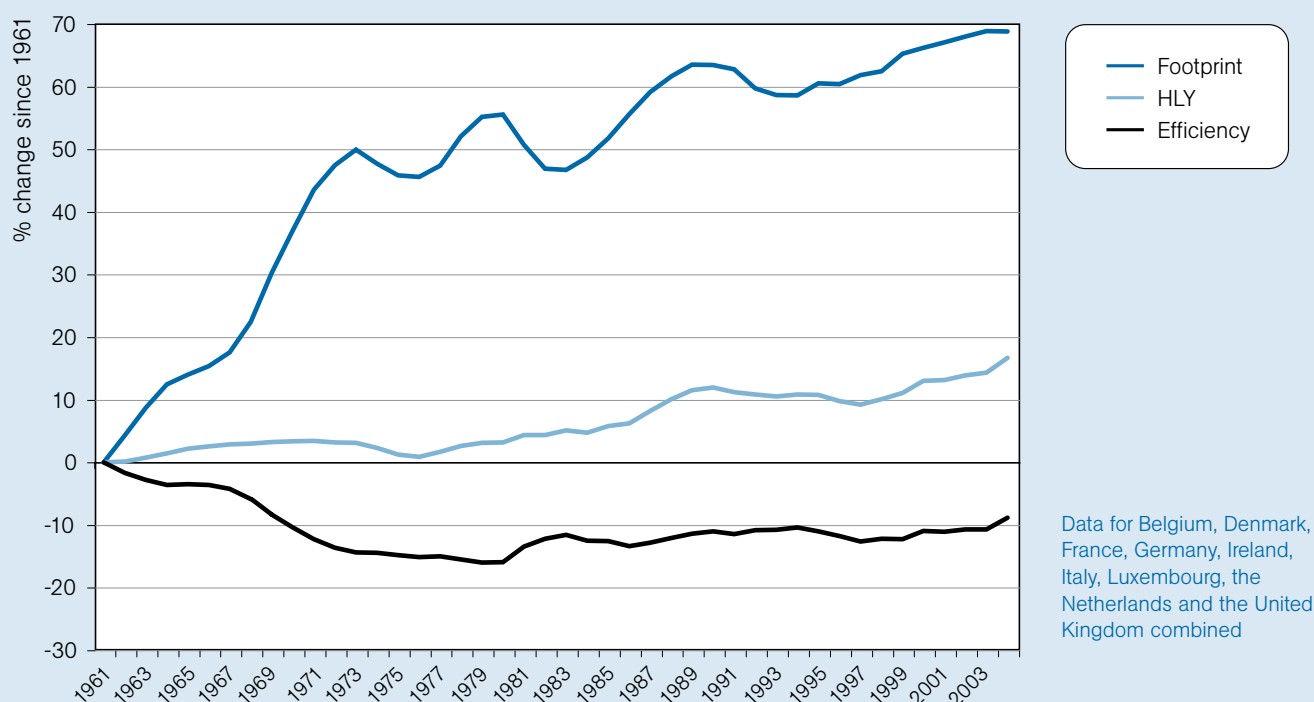
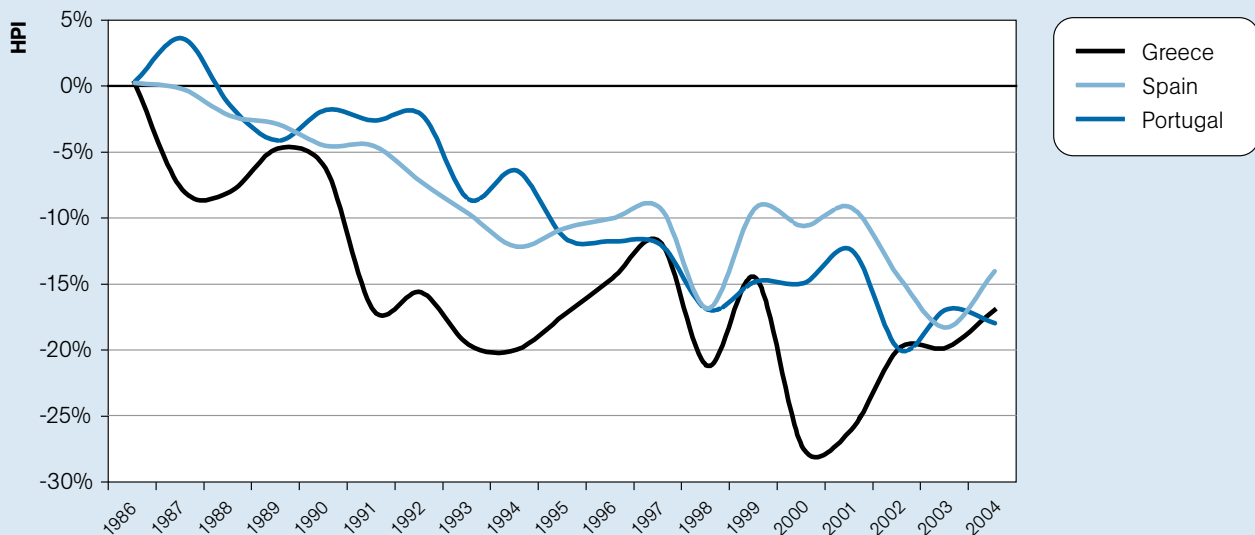


Figure 5: Declining resource efficiency of well-being in Spain, Portugal and Greece



Late developers

Not all countries in Europe have industrialised and experienced economic growth at the same rate, or over the same period. The last 40 years have seen considerable changes in Europe, with some countries emerging from the shadow of oppression. Greece, Portugal and Spain were all military dictatorships as recently as the 1970s.

The economies of all three countries have grown markedly in recent times and with it their consumption of resources. Availability of data does not allow us to consider consumption efficiency for these countries further back than the mid-1980s. However, even this comparison is instructive, as Figure 5 shows. In Spain, for instance, GDP per capita has increased by around 175 per cent since 1986, but this has been accompanied by a 75 per cent rise in per capita footprint, roughly the same proportional increase observed in Old Europe since the 1960s. The average Spaniard born now can expect to live three years longer than his elder *compadre* born in 1986. However, no such increase has been observed in subjective life satisfaction over the same period. The story is similar in Greece. Footprint has risen by 76 per cent since 1986, no doubt driven by the 140 per cent growth in per capita GDP. Life expectancy at birth is just three years longer than it was in 1986. Mean life satisfaction has remained unchanged.

Close up on the UK

Compared to data from the early 1960s, modest improvements in mean life expectancy in the UK have actually been accompanied by a slight decline in average life satisfaction of around six per cent. Per capita footprint, meanwhile, has increased by well over 50 per cent. The result has been to push the UK to the point where conservatively, it would take over three planets like earth to support the whole world at the UK's level of consumption per person. As a consequence, the pattern of change in consumption efficiency at delivering well-being is unimpressive. Following a sharp decline throughout the 1960s and early 1970s, efficiency has stagnated.

What does this mean in practice? Average UK citizens can now expect to live slightly longer than was the case in 1961, which implies that they can also expect better healthcare and may tend to eat a better diet. They will certainly have a more carbon-intensive lifestyle, with more consumer goods, more cars, more foreign holidays and more imported food. And yet, perhaps oddly given that they somehow manage to consume almost double the amount of planetary resources per person than in 1961, they will probably *feel* – if anything – less satisfied with their lives overall. Perhaps it is no wonder that in a recent survey conducted by the BBC asking in which decade since the 1950s people would most like to live, the winner (with almost one-third of the 31,000 votes cast) was the 1960s.⁵²

Gains and losses

What do we learn from this detour into the past? There is no doubt that life has changed, in some cases very dramatically, for many people in Europe over previous decades. The gains in life expectancy experienced did not happen by accident – they imply real, tangible improvement to material standards of living, and we should not be churlish about acknowledging this. But it is also true that the material standard of living in much of Europe was already very good indeed in the 1960s, by comparison with the rest of the world. Such gains as have been made represent the ‘icing on the cake’ rather than fundamental increases in welfare, and they have come at an unsustainably high environmental price.

And this is the nub of the argument. Efficiency – as we have argued – is important when resources are limited and trade-offs must be made. By using considerably more than their fair share of planetary resources, European nations have made some, limited, gains to their quality of life. But can citizens of Europe look at these improvements to well-being achieved in recent times, compare them with the ecological costs incurred, and claim – hand on heart – that this was an *efficient* use of the planet’s resources?

Energy choices in a warming world

Nuclear power is being promoted as the answer to climate change and energy insecurity. But it is too slow, too expensive, too centralised, and too much of a security risk.⁵³

Some argue that nuclear power could happily co-exist with renewables. But with limited financial resources available there is a real danger that nuclear will continue to ‘crowd out’ cleaner, renewable alternatives. A report produced by a UK government department concluded that ‘A sustained programme of investment in currently proposed nuclear power plants could adversely affect the development of smaller scale technologies.’⁵⁴ Moreover, nuclear power relies on the inefficient national grid, whereas renewables lend themselves to a more efficient decentralised system.

Neither is nuclear power as ‘low carbon’ as commonly believed. A full life-cycle analyses of nuclear plants by retired nuclear physicist and former advocate of nuclear power Philip Bartlett Smith, concluded that in the worst-case scenario where low-grade ores are used, nuclear was actually less climate friendly than a gas-fired power station. Even more conservative estimates suggest that total carbon emission may be around one-third those of conventional fossil fuel plants.⁵⁵

Another frequently overlooked problem is that uranium is an extremely scarce resource. The International Atomic Energy Agency (IAEA), a UN body that promotes peaceful uses of nuclear power, suggests that known conventional, recoverable resources of uranium are enough to last only another 85 years at the current rate of use. It also observes, ‘The period for which resources are sufficient decreases the more nuclear power is assumed to grow in the future.’⁵⁶

Despite decades of blank cheques from government (on a scale that the renewable sector can only dream about) the nuclear industry has consistently failed to demonstrate economic viability. In the USA no new nuclear power stations have been ordered for over 25 years. In Europe, Germany, Belgium, the Netherlands and Sweden are committed to closing existing plants. The UK Government faces real and costly problems with its existing stock, including court action from the European Commission for safety failures and having no reliable figure for the amount of plutonium and uranium contained in waste tanks at Sellafield.

On top of these issues, of course, there is still the unsolved problem of nuclear waste – surely an unacceptable risk in the current security climate.

Nuclear power is not the solution to the world’s problems.

Andrew Simms is nef’s policy director

Energy in Europe

Both post-industrial Western Europe and late-industrial former Communist Europe consist of highly developed countries that consume far more than the world average, in terms of energy, food and manufactured goods. As a result, European citizens have a carbon footprint of 2.5 g/ha per capita compared to the world average of 1.1 g/ha per capita.

The EU directly produces around 22 per cent of the world's CO₂ emissions. To reduce this impact, Europe has to do two things: consume less and re-source its energy. In this section, we consider the second of these, exploring energy policy across Europe.

Cutting the carbon

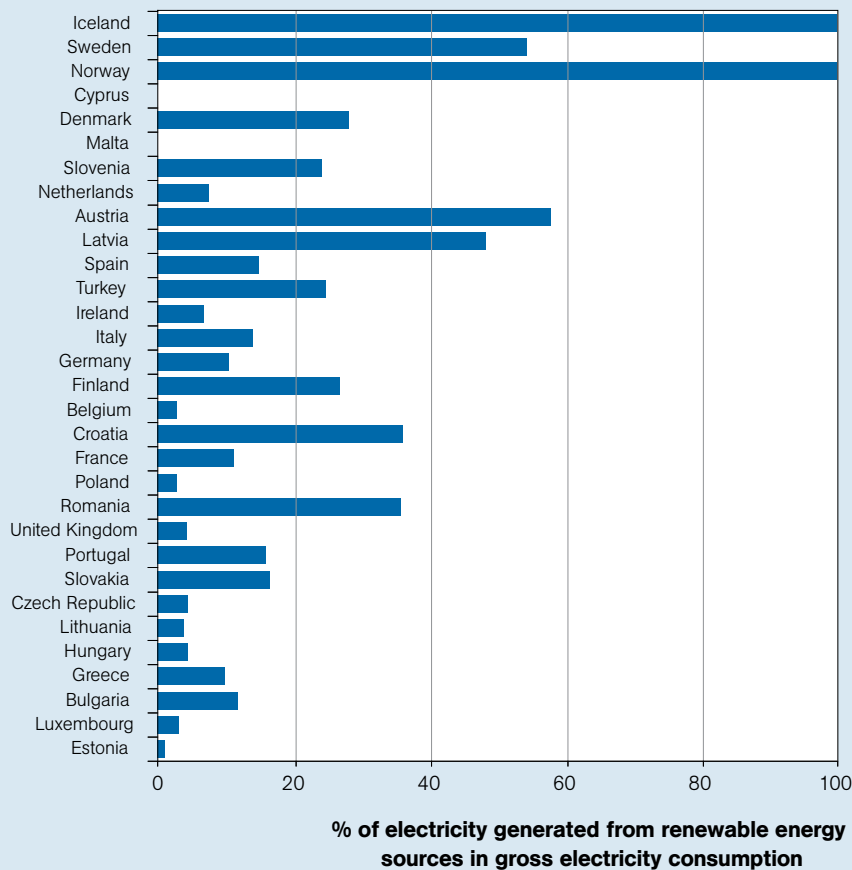
The role of CO₂ in anthropogenic climate change is now largely undisputed. The most recent report of the Intergovernmental Panel on Climate Change (IPCC) expressed 'very high confidence'⁵⁷ that the net effect of human activities since the 1750s has been to increase average global temperatures. Growth in global carbon emissions has been largest in the energy supply sector, with an increase in emissions of 145 per cent over the period 1970–2004. If Europe is to meet its commitment to reducing its carbon footprint to a small enough size that it will meet the target of halting global warming no more than 2 degrees above pre-industrial levels, significant movement will have to be made towards low-carbon sources of energy. What this means in practice is cuts in emissions by industrialised nations of between 70 and 80 per cent by 2050, according to the economist Sir Nicolas Stern.

In addition to helping combat climate change, however, nations have other good reasons to diversify their energy mix and increase their proportion of renewables.⁵⁸ A diverse mix of energy sources increases security of supply – no small consideration in an age of complex geopolitics, terrorism and market uncertainty. Making good use of renewables can protect economies against the price shocks to oil and gas supplies as we move closer to Peak Oil⁵⁹ and Peak Gas.⁶⁰

Individually, renewable energy sources like wind, solar and geothermal could, in theory, meet all of the world's energy needs. But the jump from theory to practice would face many obstacles. Practically, a diverse energy mix with a combination of renewable energy sources and a range of micro, small-, medium- and large-scale technologies applied flexibly and delivered in a more decentralised fashion, should be the aim of European energy policy.

Within Europe there is very considerable variation between nations in terms of how energy is produced and sourced. However, as Figure 6 shows, countries which perform best in terms of consumption efficiency tend to make significant use of renewable energy.⁶¹ This contributes to their below-average carbon footprints and thus to their high consumption efficiency. At the other end of the spectrum, however, the reverse is true. The countries with the heaviest footprints are characterised by an energy mix with a high percentage of fossil fuels, particularly solid fuels, such as coal, and lower grade solid fuels, such as lignite⁶² and oil shale.⁶³ The UK fares particularly badly when compared with Western European nations, producing very little of our electricity from renewable sources.

Figure 6: Percentage of electricity generated from renewable energy sources in gross electricity consumption for countries of Europe in HPI rank order



Distribution

A diverse energy mix consisting primarily of renewables at different production scales favours a distributed energy system. Yet there is a perplexing reluctance to embrace the idea of decentralised energy. Some countries in Europe seem to be moving towards a nuclear revival, yet by doing so are committing themselves to an inefficient energy system for decades to come. Centralised energy systems (like, for example, that of the UK) lose an average of seven per cent of all electricity generated through transmission and distribution losses.⁶⁴ A Greenpeace report estimates that as much as two-thirds of potential energy from fuels is wasted as a result of inefficiencies. Moving to a decentralised energy system in the UK could contribute at least 15 per cent to the government’s carbon reduction targets.⁶⁵

Decentralised energy generation is mainstream in some European countries, particularly Denmark, the Netherlands and Sweden, but also Germany, Austria, Finland, Italy and Spain. A decentralised approach refers both to district heating, which is extremely common in Scandinavian countries and also to private wire electricity (i.e. not from a centralised grid) from power stations close to demand, so that energy is generated close to the point of use and both heat and power can be used locally. In cities and urban areas, district heating is the most economical and environmentally competitive alternative to individual heating from oil or gas. When coupled with generation of electricity in CHP (combined heat and power), district heating is clearly a preferable energy solution.

Denmark exemplifies how European countries can benefit from moving to decentralised energy. In 1973, 94 per cent of Denmark’s fuel supply came from oil imports and, as a consequence, it was hit hard by the oil crises of the 1970s. Following this, Denmark embarked on an aggressive CHP development programme. According to statistics from the Danish Energy Agency, CHP now has a share of 50 per cent of the electricity production and provides around 60 per cent of space heating.

Making the most of what you've got

No other country in Europe is blessed with the natural energy endowments of Iceland. However, many make far too little use of their potential capacity. Greece, for instance, has a relatively high carbon footprint which is in part due to its heavy reliance on lignite mined from an abundant domestic resource. Lignite-fired power stations account for around 60 per cent of electricity generation.⁶⁶ Meanwhile, just five per cent of primary energy is sourced from renewable energy capacity and this is mainly derived from large-scale hydro.⁶⁷ In addition to its lignite, however, Greece also has substantial onshore wind capacity, estimated as the tenth-largest in the EU,⁶⁸ along with enormous potential for solar thermal energy.

The UK, too, has an abundance of resources with which it could meet its stated targets for cutting greenhouse gas emissions and increasing the uptake of renewable energy. Without even taking account of savings from energy conservation, increased efficiency and demand management, wave power could provide around 15 per cent of UK electricity demand and tidal power approximately 6.5 per cent.⁶⁹ The UK has 40 per cent of the total available wind energy resources in Europe – theoretically enough to meet the country's electricity needs eight times over.⁷⁰ But even given the current limiting structure of the national grid system and the nature of demand, a combination of offshore and onshore wind could provide up to 35 per cent of the UK's electricity.⁷¹ Micro wind generators might provide a further 10–15 per cent of the electricity needed at household level, rising in prime locations up to 80 per cent. Indeed, if just around one-third of the UK's electricity customers installed 2kW microgen PV or wind systems, the resulting energy yield would match the capacity of the UK nuclear programme.⁷² Solar cells, though currently still expensive, are thought to be ultimately capable of providing 5–10 per cent of the UK's electricity needs, with solar thermal units providing around half of a UK household's annual hot water requirements.⁷³

Well-being and nature conservation

The World Health Organisation's *Millennium Ecosystem Assessment* estimated that approximately 60 per cent of the world's ecosystem services are being degraded or used unsustainably.⁷⁴ This has serious implications for human well-being.

Biodiversity underpins the provision of a huge array of ecosystem services which contribute to the well-being of individuals and societies in different ways. In addition to essential goods, such as crops, timber and fish, nature provides us with other services that are directly beneficial to well-being, from clean water and fresh air to beautiful landscapes. Significant loss of biodiversity could have knock-on effects by damaging natural ecological processes, such as pollination and pest control.

Psychologists have shown that access to natural environments improves physical and mental health, and there is some evidence that the presence of green space contributes to social cohesion and desirable social outcomes, such as lower crime rates. Biodiversity also supports economic activity – the presence of unique and varied wildlife, for instance, can generate significant benefits for local economies and help to support rural livelihoods.

Despite their benefits, environmental services are routinely taken for granted. It is clear that continued biodiversity loss and the unsustainable management of ecosystem services will reduce the ability of future generations to meet their needs. But protecting nature is also in our interests *now*. We should safeguard the environment in all its richness and variety because we depend on it for our quality-of-life and because we have a moral duty towards it.

Aniol Esteban is **nef's** head of environment

Living fairly, living lightly

Many nations in Europe now require a vast amount of planetary resource consumption merely to maintain standards of experienced well-being that are only marginally higher than they were 40 years ago. Meanwhile, as the rate of consumption grows unabated, so do the attendant costs to the planet.

Consumption inequality

The challenge of sustainable development has always been – in part – a challenge to address the issue of *equity*.⁷⁵ Sustainable development places a premium on reducing inequalities: of incomes, of resources, of impacts and (by extension) of well-being across different sections of society. This is referred to as *intra*-generational equity and arises from the basic assumptions that all people share the same basic needs and rights, whilst none have greater *a priori* right to use of global resources than others. But there is also a time dimension to equity. True sustainability demands that we look to the well-being of future generations as well as that of the current generation – to *inter*-generational equity. A society in which people pursue their own well-being without regard either to the well-being of other people today, or to the well-being of future generations, is not sustainable.

Some recent data gathered by **nef** illustrate the point about equity very clearly. At the launch of the first Happy Planet Report in 2006, a web-based survey was conducted containing questions about lifestyle – consumption patterns, diet, health, family history – as well as subjective life satisfaction. Using these data, estimates of footprint and life expectancy could be calculated, and thus a 'personal HPI'. Some 34,000 people in Europe completed the survey.⁷⁶

Figure 7: Results from HPI online survey: Life satisfaction and consumption in Europe

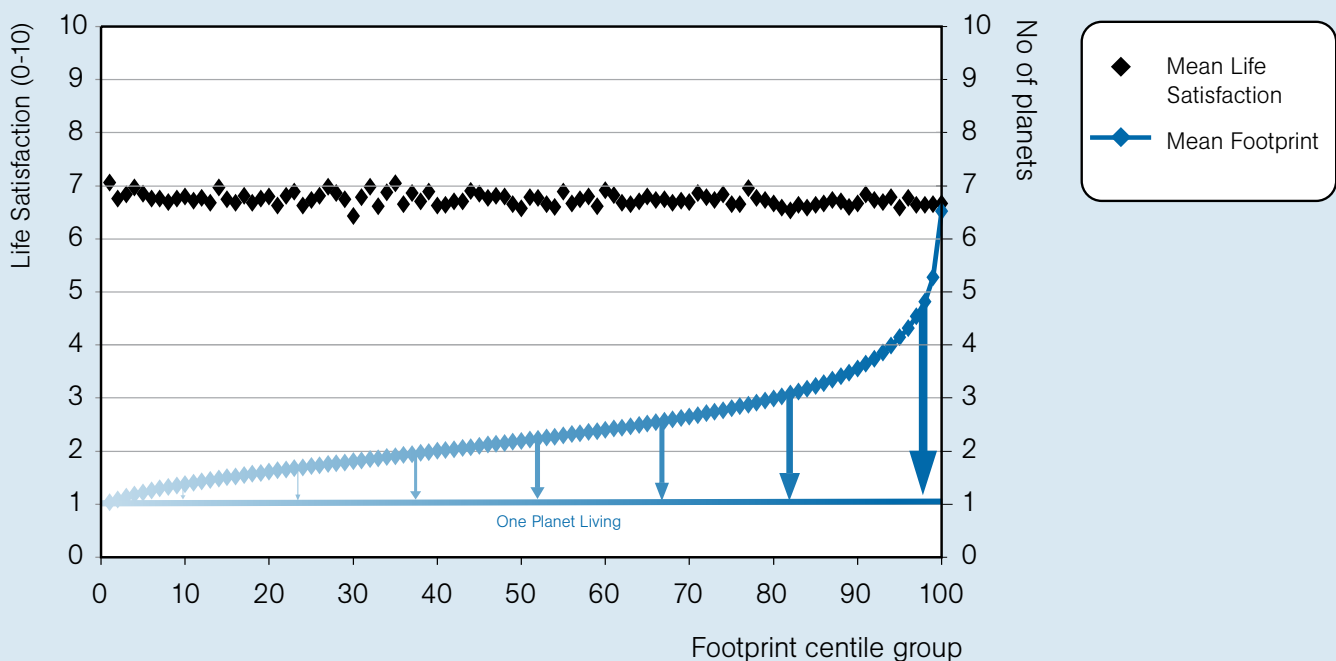


Figure 7 shows this data. The blue line represents the distribution of footprint across the total sample, expressed in terms of the number of planets worth of resources that would be required if everyone on the planet were to live the same way. To the rightmost end of the distribution are those people with high consumption lifestyles, approaching 'seven planet living'. To the left are those whose lifestyles have the least environmental impact, approaching the planetary fair share 'one planet living'.⁷⁷ The arrows depict the nature of the transition that is required both to level and lower the consumption playing field towards equitable and sustainable use of the earth's resources.

These data represent both a challenge and an opportunity. They are challenging because they show starkly the sheer extent of European over-use of planetary resources. Not only is the distribution of footprint extremely unequal in this sample, it is also far too high in absolute terms.

Where is the opportunity in this bleak message? It lies in the lack of any significant relationship between well-being and footprint. These data do not support an unappealing choice between 'business as usual' at the expense of the planet and future generations, or compromised well-being to minimise environmental degradation. In fact, they suggest that well-being has little to do with consumption; which, in turn, allows for the possibility that footprint could be reduced significantly without leading to widespread loss in well-being.

Social factors

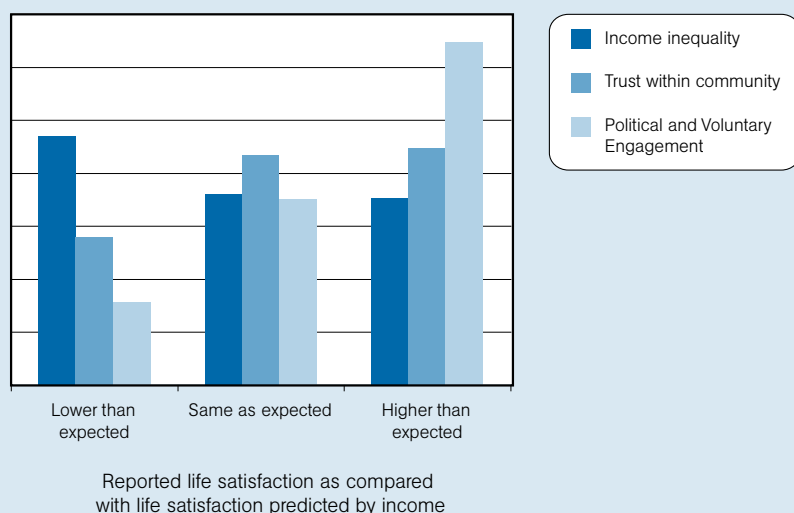
This finding is well-supported by evidence from the research literature. Although economic conditions undoubtedly play a role in determining well-being, they are far from being the only important factor. Why, for instance, do Cypriots report a mean life satisfaction of 7.2 whereas Portuguese only score 5.7 – despite the fact that the two countries have similar levels of per capita household expenditure?

Figure 8 shows the relationship between life satisfaction and three key social variables – income inequality, trust within the population, and voluntary and political engagement – when the relative effect of wealth is statistically factored-out. Life satisfaction is at its highest in countries with low income inequality. It is also relatively higher where survey respondents believed that most people can be trusted, and have been engaged in political activity or voluntary work – good proxies for what might be termed 'social capital'.⁷⁸ Those countries with lower life satisfaction than would be predicted by wealth alone tend to have lower social capital, whilst those that have higher-than-expected life satisfaction tend to have higher levels of social capital.

Personal consumption

In addition to these kinds of social factors, there are hidden aspects of personal consumption that complicate the relationship between income and well-being. To understand this, we need to ask not how much we consume, by *why* we do so.

Figure 8: Relationships between social factors and life satisfaction



The answer is not as obvious as might first appear. The relationship between consumption and well-being in rich countries is of a different kind than in poorer countries. In the latter, people have basic needs for subsistence and survival that are met (or, all too often in many countries, unmet) by the commodities they purchase. The majority of consumption is essential for survival. In richer countries, however, it is social context that to a large extent determines what a person feels they must have for a good life. A much smaller proportion of our consumption in the West is essential in any 'basic needs' sense – this is true even for those who are poor by the relative standards of their society.

Bringing home the disparity between lived experience and resource consumption is not easy because prevailing norms and expectations play such a large role in determining what we *think* we need to lead a good life. As the respected development economist Amartya Sen has noted, our 'needs' in the West have little to do with any serious deficits in physical welfare and everything to do with cultural factors:

"To lead a life without shame, to be able to visit and entertain one's friends, to keep track of what is going on and what others are talking about, and so on, requires a more expensive bundle of goods and services in a society that is generally richer and in which most people have, say, means of transport, affluent clothing, radios or television sets, and so on..."⁷⁹

The irony is that this ever 'more expensive bundle of goods and services' does not seem to make people any happier. National trends in subjective life satisfaction stay stubbornly flat once a fairly low level of GDP per capita is reached.⁸⁰ US psychologist Sonja Lyubomirsky and her colleagues have argued (on the basis of an extensive review of research) that only around 10 per cent of the variation in subjective happiness observed in Western populations is attributable to differences in actual material circumstances, such as income and possessions. Once people have enough to survive with reasonable comfort, they tend to adapt quickly to further improvements in their material standard of living. When you receive a pay rise, move house, buy a new television set or the latest must-have fashion item, you'll probably feel happier for a while (although, in fact, probably not as happy as you expected you would⁸¹). All too soon, however, the novelty wears off and with it any lasting psychological benefit. This is not to say that having these things is not desirable, or that acquiring them is not pleasant. It is just they make very little fundamental difference to the things that really matter to our lasting happiness: the company of good friends, the love of close family, participating in enjoyable and challenging activities.⁸² This 'hedonic treadmill' is responsible for the rising expectations that come with wealth.⁸³ But as the economist J. K. Galbraith once remarked,

"There are many visions of the good society; the treadmill is not one of them."

Meanwhile, the effect of constantly running on the hedonic treadmill may not be benign. Copious evidence points to a significant relationship between low levels of satisfaction and placing a high personal emphasis on material acquisition and wealth.⁸⁴ It is possible to see evidence of this relationship in the data from countries across Europe. The European Social Survey (2004) included questions asking people to rate the importance of certain values in their own lives. Three of the twenty values in the survey are traits of a materialistic orientation: valuing visible success, being admired, and wealth. National averages for these values correlate *negatively* with national levels of trust – that is, in countries where people place more personal value on wealth and being admired, people are less likely to trust one another (even when the effect of individual wealth is factored-out⁸⁵).

Psychological hurdles...

The idea that more consumption leads to greater happiness is a dominant myth in Western society. We have seen, however, that subjective life satisfaction is highly sensitive to various social and personal variables even when the effects of wealth are controlled for. In other words, countries and individuals that consume more are not necessarily happier – indeed it seems to be the case that materialistic consumerist habits can lead to lower levels of life satisfaction and impact upon social capital and social cohesion.

Nevertheless, from a psychological point of view, losses are felt more acutely than gains.⁸⁶ Some people fear that being more environmentally conscious and adopting a

sustainable lifestyle would mean a decrease in their standard of living. But if there is no strong relationship between consumption and subjective well-being, then the evidence suggests that this would not be the case in practice. After all, consumption *per se* is not the principal object of people's aspirations, it is a means to an end; namely, well-being. Indeed, people who actively choose to downshift often do so for precisely the opposite reason – to shed the excess baggage of consumerism, increase their well-being and live richer, more satisfying lives.

... and how to jump them

There are encouraging signs that a message extolling the merits of reduced consumption from a well-being perspective could find a receptive audience. Evidence suggests that, over the last 10 years, 25 per cent of Britons and aged 30–59 made voluntary long-term lifestyle changes which resulted in their earning less money, placing less emphasis on consumption and having more free time.⁸⁷ Contrary to popular belief, these were not exclusively middle-aged and wealthier people but were spread across age groups and social classes. The means of lifestyle change included cutting back work hours, taking a lower-paid job, stopping work, changing career, and consciously changing their consumption patterns. Reasons for making these changes included spending more time with family, living a healthier lifestyle, seeking more balance or fulfilment, and leading a less materialistic and more environmentally friendly life.

However, unilateral action by the individual is not always possible, or sufficiently effective. Deciding to work less when everyone else is working more may hinder one's chances of career development. Even an entire nation can find re-adjustment to be a challenge, as the case of France's 35 *heures* scheme suggests.⁸⁸ In terms of consumption habits, sacrificing one's car may not be an option where public transport is scarce. It may even seem rather pointless if everyone else is stubbornly carrying on as before. One company might try to reduce its carbon footprint by avoiding flying to meet foreign clients. However, as a recent British Airways advertisement tries to suggest, they may lose out to another company that continues to fly and therefore manages to build a better rapport.⁸⁹

These so-called 'collective action' problems can seem intractable.⁹⁰ But governments can play an important enabling role in co-ordinating societal solutions. The cap-and-trade scheme for personal carbon quotas, for instance, is one suggestion which has been put forward to deal with the difficulties of collective action. However, decisions cannot be entirely top-down. Research on collective action problems suggests that solutions work best when citizens feel they have consented to them, or better still, played a role in their development.⁹¹ In other words, jumping the psychological hurdles requires both top-down and bottom-up change.

Three steps to a more efficient Europe

● Reducing consumption overall and settings legally binding targets for carbon reduction

General over-consumption is at the heart of the problem and people in Europe need to shift to lifestyles that require less resources to be consumed. Energy is an area where decisive government action can make a real difference. Countries like the UK need to decentralise their energy production and make far better use of their abundant renewable energy resources. Every European government needs to set legally binding targets for reducing carbon dioxide emissions, setting carbon budgets for 3-5 year periods, to ensure each country does its part in keeping global temperature increases below 2 degrees Celsius.

● Reducing inequalities

Inequalities – not just of income, but also of education, health and social opportunity – have a damaging impact on well-being. They deplete the social cohesion and social capital required to develop shared solutions to our environmental problems. They help drive the materialistic aspirations of over-consumption. Governments should aim to halt and reverse rises in inequality, and provide more support for local communities to thrive.

● Supporting meaningful lives

Governments should take notice of the emerging science of well-being and its implications for policy. For example, employers should be encouraged to enable their employees to develop full lives outside the workplace, be flexible and make

Notes from the North

Scandinavian nations occupy the top three positions in the European HPI because they perform well on all three components of HPI. They have the highest levels of life satisfaction in Europe, amongst the highest life expectancies and some of the lowest footprints.

What can other countries learn from studying the Scandinavians? Probably quite a lot. Looking at data from a range of sources, it seems that these countries lead Europe on a range of indicators that are associated with high levels of well-being and/or good environmental governance, including:

- High levels of social capital and low levels of distrust.⁹²
- Low income inequality.⁹³
- High public investment in health and education.⁹⁴
- Relatively low levels of materialistic values.⁹⁵
- Strong governmental stewardship on environmental issues.⁹⁶
- Strong civil society engagement on environmental issues.⁹⁷

There are undoubtedly many ways of achieving this cluster of characteristics and it would be dangerous to attribute them to any single factor. Clearly, however, there are differences in the political and economic model pursued by the Scandinavian nations and the rest of Europe. Political scientist Robert Cox identifies three core values that run through the 'Scandinavian model': universalism (a belief in state provision for all); solidarity (breaking down of social divisions); and decommodification (widely understood limits to the role of markets).⁹⁸ Whilst others have argued that economic models are beginning to converge somewhat in Europe, Cox maintains that these values have remained present in the political psyche of these nations, and continue to play a role in the structure of civil society.

In addition, it is important to dispel the widely-held view that Scandinavia has only been able to develop in the manner it has because it is richer than the rest of Western Europe. Scandinavian nations were economically 'poor' at least until the end of the First World War and were still far from 'wealthy' before the Second World War. Social democratic policies, based on ideals that were becoming dominant in these countries in the 1920s, began to be enacted as the depression set in. These policies softened the impact of the depression, helping to establish their legitimacy after the war. In other words, rather than being a luxury affordable to a wealthy nation, the egalitarian core values of Scandinavian nations took hold whilst they had less economic resources than other European countries, and their current wealth has been achieved in spite of (or even as a result of) them.⁹⁹

time for them to undertake voluntary work. It is time that European governments invested in and implemented national accounts of well-being ensuring that the impacts of policy decisions on people's well-being is taken into account.

Detailed proposals can be found elsewhere, both in our and others' materials, that spell out how to reduce consumption of carbon and other resources, and how to design policy to reduce inequality and increase well being. These include, for example:

- *A Global Manifesto for a happier planet. The 2006 (un)Happy Planet Index* (www.neweconomics.org) included a ten point 'global manifesto for a happier planet' outlining ways in which governments the world over could take action to improve life satisfaction and life expectancy and reduce environmental impact.
- Friends of the Earth (www.foe.co.uk) have proposed legislation to mandate year-on-year national reductions in emissions in the UK. Every European government must set legally binding targets for reducing carbon dioxide emissions and regulate the total amount of carbon dioxide emitted by introducing carbon budgets for a 3–5 year period.
- *Mirage and Oasis: Energy Choices in an age of global warming* (www.neweconomics.org) set out a range of proposals for a fundamental shift of public support from fossil fuels and nuclear power, to renewables and microgeneration.
- *A Well-being Manifesto for a flourishing society.* nef's 2004 manifesto (www.neweconomics.org) suggested eight clear areas where government could act to promote well-being from refocusing the health system to promote complete health to strengthening civil society and active citizenship.

Conclusions

For all that some European countries are significantly more efficient than others, the bottom line is that Europe is living beyond its means. Without the rest of the world to rely on, Europeans could not support the lifestyles they do today.

But maintaining current levels – not to mention inequalities – of consumption is not only deeply unfair in the context of a resource-limited world; it is also short-sighted. We devour an ever larger share of the planet's biocapacity with little consideration for the future consequences.

But the saddest, strangest part of the story is that we have so little to show for it. Whilst Europe's footprint has grown dramatically since the 1960s, levels of well-being have increased only at the margins. In some countries, subjective life satisfaction even appears to have declined. Why don't we feel any better?

Simply, because consumption is not the only (or even the main) route to well-being. The first HPI report showed that other countries around the world achieve similar levels of well-being whilst exerting much less environmental pressure. For instance, Costa Rica's per capita carbon footprint is less than one-quarter that of the average European nation, and yet levels of subjective well-being and life expectancy are both higher. In a world of real environmental limits and impending climate change, Europe is squandering the world's resources on drastically diminishing returns.

Forwards, not backwards

It is easy to caricature arguments about the ever more marginal benefits of consumption as somehow Luddite, anti-progress or even anti-human. But this is a straw man.

By considering the carbon efficiency of delivering well-being – HPI – we see very clearly that the most efficient countries in Europe are some of the most socially progressive and technologically advanced nations anywhere in the world. Rather than turn the clock back to pre-industrial times, we need to look forwards to a post-consumption, 'been there, done that' era that learns from the mistakes of the past, is aware of the false promise of materialism and utilises wealth and technology to deliver more *efficiency*, rather than just *more*.

And at the end of the day, it is for individuals, communities, governments and societies at large to reflect on their own carbon efficiency. We need to decide whether the marginal benefits reaped from our current resource consumption are sufficient to justify the heavy price paid. We need to take advantage of other less destructive routes to well-being.

The twenty-first century is already becoming defined by a developing understanding of our negative impact on the environment and a widespread recognition of the need to act before the damage becomes irreversible and catastrophic. It is critical, in this context, that we ask ourselves whether the price we pay for marginal improvements to well-being can possibly justify the costs to others, to future generations and to the planet.

We *can* live more lightly. We *can* live more fairly. And in doing so, we *can* live better lives.

Appendix 1: What is Europe?

Although Europe is one of the seven traditional continents of the world, defining which countries are in and out is not a straightforward matter. Europe can be characterised by political, economic, judicial, cultural and geographical criteria, each of which yields a different list of constituent countries.

Classically, the geographical continent of Europe is defined by the Ural Mountains at the East, with the south-eastern border following the line of the Ural River to the Caspian Sea, then along the watershed of the Caucasus Mountains and the northern coast of the Black Sea. The main difficulty with this criterion is that it creates 'transcontinental' countries, Russia and Kazakhstan, which straddle Europe and Asia. The bulk of Russia's land mass, for instance, lies east of the Urals but the majority of its population live west of them. It also excludes Turkey, which is these days widely considered as a European nation.

The Council of Europe, an international organisation established in 1949 to promote democracy and protect human rights and the rule of law in Europe, takes a wider perspective. Its 47 member states include Turkey, Armenia, Azerbaijan and Georgia which are excluded by the standard geographical definition, along with Russia. The UN identifies four distinct regions of Europe – northern, southern, eastern and western – which have a geographical scope broadly similar to that of the Council of Europe (although Turkey, Armenia, Azerbaijan and Georgia are considered to be transcontinental nations between southern Europe and western Asia).

A rather narrower definition of Europe is afforded by considering its central political institution, the EU. Although having expanded considerably from its original six members (when founded as the European Economic Community in 1956), the EU currently consists of 27 nations, with three more – Turkey, Croatia and Macedonia – official candidate countries.

For various historical and political reasons, Iceland, Norway, Liechtenstein and Switzerland have remained outside the EU; however, together they comprise the European Free Trade Association (EFTA). Wishing to participate in the single market without the requirement of full EU membership, Iceland, Norway and Liechtenstein became members of the European Economic Area (EEA). Under this agreement freedom of movement of goods, persons, services and capital are ensured between countries of the EU and EFTA. (Switzerland is not party to this agreement, but has negotiated bilateral trade agreements with the EU that ensure comparable status freedoms without official membership of the EEA.)

So, what is Europe? Clearly there is no single answer to this question. In this report, therefore, we have opted for a pragmatic delineation based on political and economic criteria and availability of suitable data. We include the 27 countries that are already full members of the EU, plus three of the four members of the EFTA.

Appendix 2: Data sources and calculating HPI

The European Happy Planet Index covers 30 nations, including all 27 EU members and three of the four members of EFTA (Liechtenstein, with a population of less than 40,000, was not included). This appendix provides details on the data sources used both for the main analysis and the time trends analysis. It also explains how the HPI was calculated for the main analysis.

Life expectancy

Life expectancy data was taken from the World Bank's *World Development Indicators*,¹⁰⁰ which offers a continuous data series back to 1961. For the main analysis, we used data from 2003.

Life satisfaction

The life satisfaction figures in the main analysis are the average of scores from four surveys asking variations of the following question:

'All things considered, how satisfied are you with your life as a whole these days?'

The most comprehensive dataset we have, also used in the original HPI report, is Ruut Veenhoven's collation of national life satisfaction averages,¹⁰¹ which in itself is an average of several waves of the World Values Survey carried out between 1995 and 2005.¹⁰² To corroborate this, we used three surveys from around 2003/2004: the autumn 2004 Eurobarometer,¹⁰³ the second round of the European Social Survey, also in 2004,¹⁰⁴ and the first European Quality of Life Survey, carried out in 2003.¹⁰⁵ Whilst the World Values Survey and the European Social Survey asked for responses on a scale of 0–10, the other two surveys did not and as such had to be recalibrated.¹⁰⁶ Where countries were missing from a particular survey (for example, Italy was not covered by the European Social Survey), their scores were estimated linearly based on the only entirely comprehensive dataset – that from the World Values Survey. These estimates were then combined with real data to produce an average.¹⁰⁷

Agreement between the surveys was very high, with a Cronbach's alpha of 0.99.¹⁰⁸ Given that the four surveys were completely independent of one another, this highlights the robustness of life satisfaction data. In other words, observed differences between countries are likely to be real and meaningful, and not simply the result of poor sample methodology.

Eurobarometer data was used for the time trends analysis as this is the only continuous and consistent data series available for Europe.

Carbon footprint

For 26 of the 30 countries included in the main analysis, carbon footprints were based on a subset of the 2003 Ecological Footprint, presented in the Global Footprint Network's *Living Planet Report 2006*.¹⁰⁹ The carbon footprint is a measure of the land area required to support the plant life needed to absorb and sequester CO₂ emissions from fossil fuels used by a given country (minus the amount absorbed by the oceans) based on the estimate that over a year, one global hectare is capable of absorbing all the CO₂ emissions produced in the consumption of 1,450 litres of petrol.¹¹⁰ The fundamental advantage of using the carbon portion of the Ecological Footprint, over using raw CO₂ emission data, is that it captures the *embodied* footprint of goods and services. This is important in a global economy where production and consumption often take place in different geographical locations. For example, a TV manufactured in Taiwan would add to that country's raw CO₂ emissions, no matter what happened to it afterwards. On the other hand, the carbon footprint methodology takes account of what happens to it afterwards – if it is exported to Slovenia then it will be added to Slovenia's carbon footprint and not to Taiwan's.

One contentious issue is how to account for the embodied costs of energy produced in nuclear power plants. Proponents of nuclear energy tend to overlook the energy costs involved in the set-up and decommissioning of nuclear plants, the

mining and refining of uranium, and in dealing with radioactive waste. On the other hand, the Ecological Footprint costs nuclear energy on a par with energy produced from fossil fuels. In this way, a country that has converted its energy production entirely to nuclear, all other things being equal, would be calculated to have exactly the same footprint as one that produces its energy entirely from fossil fuels.

This is obviously a simplification, which the Global Footprint Network acknowledges.¹¹¹ However, the environmental impacts of nuclear energy, whilst they may be considerable, cannot so easily be converted into the Ecological Footprint's metric. The picture is genuinely complex. While the mining of uranium takes a minimal amount of space, accidents can be devastating and have long term effects. Also, while Nuclear scores better than fossil fuels on carbon emissions today, as high grade ores are exhausted and lower grade ores substituted, its carbon efficiency will decline, some suggest, to a level comparable to natural gas.

The methodology for calculating the Ecological Footprint is undergoing revision by the Global Footprint Network and should be complete in 2008.¹¹² In the meantime, given that nuclear energy is a significant part of the energy make-up of Europe, we have explored the option of sizing its footprint by accounting for the energy consumed in the current, complete lifecycle of nuclear energy production. A study cited in a report by the Irish think tank Feasta calculates that 1 kW of energy is required to generate 3kW of electricity from nuclear power.¹¹³ This takes into account the energy required to extract and refine the uranium ore, to build, maintain and decommission the nuclear power plants, and then to deal safely with the waste by-products. If this is true, then one can estimate that electricity produced from nuclear power has roughly one-third the carbon footprint of an equivalent amount of electricity produced from gas.

Our focus on the carbon footprint of a nation represents a difference from our approach for the 2006 worldwide Happy Planet Index, which was calculated using the entire Ecological Footprint. As well as carbon and nuclear (which, as discussed, is assumed to have the same impact as fossil fuel energy), the total footprint also attempts to capture the land required to supply a nation's dietary requirements, harvested forests, and built-up land. This suited the worldwide HPI which aimed to paint a broad picture of ecological efficiency and focused on the large differences between regions, rather than on the smaller differences between individual nations. However, we decided it was less appropriate for this report.

There were two particular concerns that led to this decision. The first relates to the inclusion of forests used to produce timber in the full Ecological Footprint. This method seems to penalise countries which, owing to the abundance of local resources, continue to use timber for construction purposes rather than concrete or brick. The result is to add, for example, 1.6 global hectares to Finland's per capita footprint vis-à-vis the UK, when it is arguably the case that Finland's use of local materials and good forest management policies render it *more* sustainable and resource efficient. After all, cement production accounts for around four per cent of CO₂ emissions worldwide.¹¹⁴ A second concern was with global hectares dedicated to food. Countries with high fish consumption per capita suffer artificially high footprints. Moreover, there was little clear sense of what other variations in food footprint across Europe might mean – for instance, according to the Ecological Footprint, Spain has the highest food footprint in Europe whilst Germany has the smallest. Awaiting a better understanding of what these components of the Ecological Footprint means, we decided to exclude them from the main analysis.

Given these two exclusions, and the earlier discussion on nuclear power, we decided to slim the ecological footprint for a given country to just its carbon footprint, adding one-third of the footprint from nuclear energy as a further embodied carbon cost. Note that whilst the carbon footprint is decidedly lower than the total footprint, this does not automatically lead to higher HPI scores for a given country. HPI is calibrated so that a country achieving 'one planet living' (i.e. using no more than its fair share of the world's resources), a life satisfaction score of 10 and a life expectancy of 85 would score 100. In the original HPI, one person's fair share of the world's resources was taken to be the planet's total biocapacity (11.2 billion global hectares) divided by its total population (6.3 billion) – approximately

1.8 global hectares per capita. In this report, we set aside the portion of the planet's total biocapacity used to satisfy our food and built-up land requirements (5.4 billion global hectares), and assumed that the rest, including harvested forests, is capable of sequestering carbon emissions and thus of absorbing carbon footprints. This leaves, worldwide, 0.92 global hectares per capita. This is a generous allowance for two reasons: first it assumes harvested forests sequester carbon at the same rate as wild forests, and that they maintain their full biocapacity even after being harvested. Secondly, it ignores the fact that our current use of global biocapacity for food does not in fact satisfy the world's dietary requirements and that over 854 million people worldwide go undernourished.¹¹⁵ If everyone were to have the same food footprint as Europeans do, there would actually only be 2.1 billion global hectares left over for carbon sequestration – a mere 0.34 per capita.

As a result of all of this, this year's HPI is not directly comparable with last year's. The more minimal measure of consumption means an increase in HPI for those countries that make extensive use of their forest resources or have inexplicably large food footprints. Our attempt to size the nuclear footprint at one-third the fossil fuel energy carbon footprint leads to a slight improvement in performance for countries such as France, that make extensive use of nuclear power. And the re-calibration of 'one planet living' might have led to an overall shift in HPI scores. Table 6 shows how various nations, both European and otherwise, fared in the old HPI and in the new one, in terms of 'one planet living'.

For four countries (Cyprus, Iceland, Luxembourg and Malta), ecological footprint data was not available. Carbon footprints were estimated using a statistical regression model driven primarily by CO₂ emissions,¹¹⁶ but also taking into account the effects of GDP per capita,¹¹⁷ population density, and whether the country is predominantly an island nation or not. The model predicted lower footprints for nations with lower CO₂ emissions, but also with lower GDP per capita, lower population density and those based on islands.¹¹⁸ This last factor echoes the finding in the original *Happy Planet Index*, that island nations tend to have higher HPI scores.¹¹⁹ The figures generated were deemed appropriate for three of the four countries. However, we needed to recognise the exceptional circumstances present in Iceland, given that 99.9 per cent of its electricity is generated from renewable resources and 89 per cent of its space heating needs are satisfied by geothermal

Table 6: Full Ecological Footprint methodology vs Carbon Footprint: A comparison

Country	Footprint (in terms of numbers of planets)	
	...based on Old HPI (entire footprint from the Living Planet Report 2004)	...based on New HPI (carbon and 1/3 nuclear from the Living Planet Report 2006)
United States	5.3	6.4
Estonia	3.8	3.8
United Kingdom	3.0	3.6
Spain	2.7	2.9
Germany	2.7	2.8
Japan	2.4	2.8
France	3.2	2.7
Italy	2.1	2.7
Norway	3.4	2.2
Poland	2.0	2.0
Iceland	2.7	1.2
China	0.8	0.8
Costa Rica	1.2	0.7
Latvia	2.4	0.5
India	0.4	0.3

energy. As a conservative estimate, we assumed that Iceland's per capita carbon footprint is the same as Sweden's – another nation that barely produces any electricity from fossil fuels: 1.06 global hectares per capita. However, it is very possible that Iceland's footprint is even lower, as Sweden still uses fossil fuels for space heating.

For all nations, for the section on time trends, backcast Ecological Footprints were provided courtesy of the Global Footprint Network, using the same methodology as that in the *Living Planet Report 2006*. Note that separate carbon footprint figures were not available, meaning we used the total Ecological Footprint for these backcasts.

Calculating the HPI

As described in the main text, HPI is an efficiency measure: how much well-being (in 'happy life years') does a country get out of the amount of carbon that can be sequestered by one global hectare of land? A straight division would be the simplest approach. However, in the actual calculation, two constant terms are also incorporated.

One, added to the footprint, ensures the coefficients of variance of the top and bottom halves of the equation roughly match. As was discussed in the first HPI, this is very important as it ensures that variation in HPI is not driven by the much greater variation in carbon footprint, at the expense of the more subtle, but equally important, variations in happy life years.¹²⁰ Whilst this report focuses on Europe, the coefficients of variation were matched taking the whole world into account, to ensure that idiosyncrasies within Europe did not distort the results.

The second constant, a multiplier, scales up the final figure so that a country living within its global fair share, with a life satisfaction score of 10/10 and a life expectancy of 85, achieves an HPI score of 100.

The final equation is as follows:

$$\text{HPI} = \frac{\text{Happy Life Years}}{\text{Carbon Footprint} + \alpha} \times \beta$$

$$\alpha = 3.3; \beta = 5.0$$

Adopting a similar standard for a reasonable ideal as in the first HPI gives us a target of 80.7.¹²¹ As our results show, no European nation has been able to achieve such a score in this report – even Iceland only achieves 72.3.

Endnotes

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- 77 These figures should be interpreted with due caution, as Footprint was assessed using only 10 lifestyle questions. This is not uncommon practice and leads to estimates that are 'ballpark' accurate. However, it is likely to underestimate the extremes of the distribution, at both ends.
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- 107 Admittedly, this methodology lends a little more weight to the World Values Survey data than the other three sets. For example, only the World Values Survey and European Social Survey covered Switzerland – figures for the other two surveys had to be estimated from the World Values Survey. Taking the average of the two real figures and the two figures estimated from the World Values Survey inevitably weighs against the European Social Survey data. However, it was necessary to control for the fact that overall some surveys lead to slightly higher scores than others.
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- 118 This was a logarithmic regression model, determined using a stepwise algorithm and including as potential predictors several other factors including urbanisation and latitude. For further information and for precise coefficients please contact Saamah Abdallah.
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- 120 *ibid.*
- 121 Based on a country achieving the highest life satisfaction in the world (Denmark's 8.4), the highest life expectancy in the world (Japan's 82 years), and a carbon footprint within fair limits (0.92 g ha per capita).

The centre for well-being at **nef**

The centre for well-being at **nef** aims to enhance individual and collective well-being in ways that are environmentally sustainable and socially just. Set-up in 2006, the centre builds on **nef**'s established well-being programme and significantly expands our work in this area. The centre promotes well-being as legitimate and useful objective of policy and gives individuals, communities and organisations the understanding and tools to redefine their wealth in terms of well-being. We believe it is possible to lead long and happy lives that don't cost the earth.

The centre advances understanding of well-being by undertaking research and consultancy, measuring well-being and the factors that influence well-being, and by providing the training and tools for others to assess and positively influence well-being. We undertake pioneering work on psychological well-being, capturing how people feel and how they function, as well as working simultaneously on environmental, social, and economic well-being to deal with the conflicts and trade offs between them.

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One of the other things we do

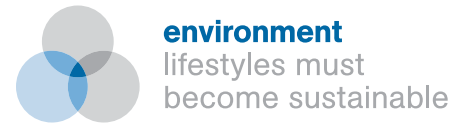


Photo: Marcelo Alves



Tackling climate change: We are living beyond our means. Conventional economic growth based on the profligate use of fossil fuels threatens to bankrupt both the global economy and the biosphere during this century. **nef** believes that improving human well being in ways which won't damage the environment is real growth. Only that can ensure the planet is a fit place to live for generations.

nef works for the environment by promoting small-scale solutions such as microrenewable energy. **nef** is also working to challenge the global system. At the moment the rich become richer by using up more than their fair share of the earth's resources, and the poor get hit first and worst by consequences such as global warming. **nef** pushes for recognition of the huge 'ecological debts' that rich nations are running up to the majority world.

nef works to confront the destructive reality of climate change in many ways: building coalitions to halt climate change and get those under threat the resources they need to adapt; proposing legal and economic action against rich countries who refuse to act; calling for protection for environmental refugees, and for a worldwide framework to stop global warming based on capping dangerous emissions and equal per person entitlements to emit. With original research we expose new problems and suggest solutions.

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