

# Reducing Wales' Ecological Footprint

*Summary Report*

Stockholm Environment Institute, York



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# Introduction

Our modern way of life has gone far beyond the basic needs of living. In general, we no longer have to worry about the daily provision of food, clean water or shelter; we take them all for granted. Instead, we can indulge in more advanced and sophisticated ways of consumption such as entertainment, fashion, four-wheel drives, or holidays in faraway countries. Nowadays we can enjoy an unprecedented level of wealth, affluence and freedom – even if that wealth is distributed unevenly in Wales.

A high quality of life is generally the ultimate goal for which people and society strive. But there's a problem: current levels of consumption come at a price to the natural environment. Planet Earth possesses only a limited amount of land and natural resources to provide for all humanity's needs and wants. And even if we constantly explore new resources and we use land more efficiently in order to use less of it, the problem still remains that the planet is finite and will struggle to cope with all our waste and emissions. The phenomenon of climate change, for example, is happening because we release more greenhouse gases into the atmosphere than can be absorbed by ecosystems, oceans or geological systems.

Sustainable development requires humanity to live within the carrying capacity of the Earth while allowing economies to develop and bring about a decent quality of life for everyone. This sounds good, but how can we tell whether we are living within the capacity of the planet? Already it's home to more than six billion people, many of whom live in absolute poverty and in the midst of environmental degradation. So... how bad is the situation?

One indicator can give us a clue: the **Ecological Footprint** measures the total environmental burden we place on the planet. It is based on the area of land needed to provide raw materials and crops, and to absorb pollution and waste created by a given population, wherever that land might be. The Footprint is measured in a standardised area unit, the “global hectare” (gha), and is usually expressed as global hectares per person – or per capita – to permit comparisons between countries or regions (gha/cap).

Research shows that we use more land area than is available on Earth – or to put it another way, that our feet are bigger than the shoes given us. Globally, the average Ecological Footprint per person was 2.2 gha/cap in 2001 (the most recent year for which data has been calculated) as opposed to an available estimated capacity of 1.8 gha/cap, suggesting that humanity is using more natural resources than can be sustained in the long term<sup>1</sup>.

This is serious. And it's even more serious if we look at the Ecological Footprints of people living in relatively rich countries such as Wales. An average Welsh person has an Ecological Footprint of 5.3 gha/cap. Put that in relation to 1.9 gha/cap and you will see that we would need almost three planets if everyone on Earth consumed the same quantity of resources as people in Wales.



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<sup>1</sup> WWF (2004) Living Planet Report 2004

During the last two years, researchers from the Stockholm Environment Institute at York have calculated and explored the Ecological Footprint of Welsh residents. In minute detail, they have figured out what activities contribute most to the Footprint and, together with decision-makers from Welsh organisations (including the Welsh Assembly Government), have thought of how to reduce it.

This report is the summary of their endeavour. It can only show a fraction of the results, but nine detailed reports on the various aspects of Wales' Ecological Footprint are available on the internet at [www.walesfootprint.org](http://www.walesfootprint.org)

# Main findings

## WHAT MAKES THE ECOLOGICAL FOOTPRINT?

The Ecological Footprint quantifies all human activity with respect to their environmental impact. Whether you go out for a meal, fly to Spain or even pay your mortgage, every time you leave a footprint on our natural resources. So what are the biggest components of the Ecological Footprint?

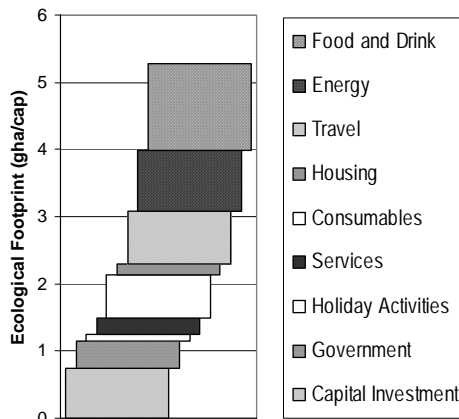


Figure 1: Breakdown of the total Ecological Footprint of Wales

Figure 1 shows a breakdown into main activity categories. The biggest part of the total 5.25 gha/cap is taken up by the consumption of food and drink, which alone accounts for 1.29 gha/cap. This is because the production of food not only needs land, but also a lot of energy. And for energy consumption the Ecological Footprint reserves an extra land area – called “energy land” – that accounts for carbon dioxide (CO<sub>2</sub>) emissions from the burning of fossil fuels. This also explains why the direct use of energy such as gas heating in the house or electricity from

coal power plants make up the second largest part of the Footprint, 0.92 gha per person. We simply use a lot of energy, most of it from fossil fuel sources, and that in turn requires both resources and the absorbing capacity of ecosystems.

The next two big contributions to the Footprint come from passenger transport (0.78 gha/cap) and capital investment (0.74 gha/cap). Most personal travel is by private car, and flying is increasingly popular. In 2001, a resident of Wales travelled an average 16,500 kilometres, of which 8,700km was by car and 6,700km by air. Both modes of transport are very energy-intensive and explain the high Footprint.

Capital investment does not refer to individual consumption but relates principally to investment in tangible fixed assets such as plant and machinery, transport equipment, dwellings and other buildings and structures. However, everything we do and consume depends on this infrastructure and the Footprint allocates the responsibility back to the final consumer – ourselves.

Consumable items take up another fairly large slice of the Footprint cake. With 0.64 gha/cap, the countless items that surround us in our daily lives – newspapers, clothes, furniture, computers, cars – account for 12 per cent of the total individual Footprint. Not because they take up much space, but because a substantial amount of energy goes into manufacturing these goods. A detailed analysis reveals that recreational items and equipment as well as personal effects have the highest impacts of all consumables, followed by household appliances.

Not only do we buy products, but we also consume services: entertainment, holiday accommodation, financial services, education. In the Wales Footprint project, a new method was developed to allocate Ecological Footprints accurately to different services by using economic input-output analysis. This

procedure ensures that all indirect – or “upstream” – effects of industrial activity, i.e. all processes that enable the provision of a certain service, are taken into account. A good example is eating out. Take-away food and restaurant meals account for about one third of the total Footprint for food (0.41 of 1.29 gha/cap), whereas two thirds are due to eating at home (0.88 gha/cap). However, only six per cent of all food is eaten out. The Footprint of catering is relatively high because it takes account of all energy and material flows associated with the service – the whole infrastructure of a restaurant, for example.

All services together account for an individual Footprint of 0.24 gha/cap. Half of this is due to services we consume on holiday (0.12 gha/cap). When compared with the United Kingdom, there is a significant difference: the impact of the service sector in Wales lies some 23 per cent below that of the UK average.

For other categories – food and drink consumption, housing, holiday activities and consumables – the Ecological Footprint in Wales is also below the UK average. But for energy and travel, Wales has a greater impact per resident. This is mainly due to the fact that on average Welsh people tend to fly more. In total, the Ecological Footprint of Wales is only a little smaller than for UK residents – 5.25 gha/cap (Wales) versus 5.33 gha/cap (UK). The full report of this project shows more details of this comparison.

#### ANALYSING THE FLOW OF MATERIALS IN WALES

A complementary approach to the Ecological Footprint method is a detailed investigation of resource flows – a Material Flow Analysis. The notion behind this is that the economy of a country relies heavily on materials and products that “flow” into and out of it. The analysis looks at the material flows of both production and consumption within Wales to provide a better understanding of the “weight” of certain goods, services and activities.

Figure 2 provides an overview of the total flows. Most of the 63 million tonnes (Mt) of materials and products produced in Wales are also consumed there, but 19 per cent (12 Mt) are exported. Almost 10 Mt of imports contribute to the estimated 61 Mt that are consumed. This means that on average, every resident of Wales consumes almost 21 tonnes of materials and products a year.

The top five materials in terms of their production volume in Wales are stones and aggregates (29 Mt), oil and gas (13 Mt), iron and steel (4 Mt), agricultural products and processed food (3.8 Mt) and coal (3.1 Mt).

As with the Ecological Footprints, it would be interesting to see what material flows are associated with certain consumption activities. During the project, a methodology was developed to allocate material flows to consumption categories using input-output analysis and specific expenditure data for

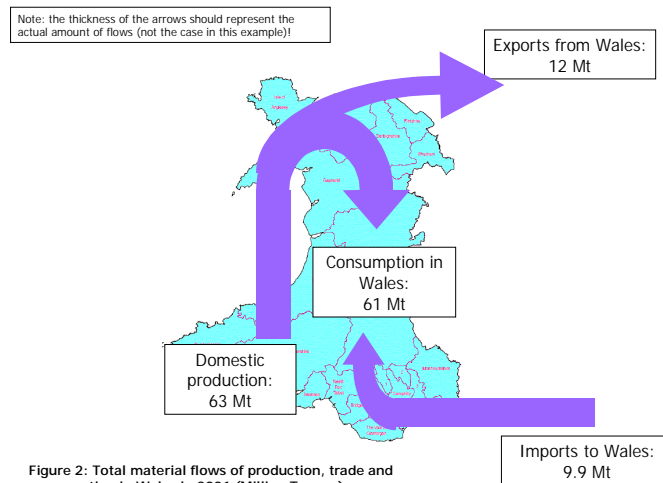


Figure 2: Total material flows of production, trade and consumption in Wales in 2001 (Million Tonnes)

Wales. The results show not only the materials and products that are directly consumed, but also account for the indirect material flows associated with upstream industrial production processes, including waste and energy carriers used for extracting, transporting and producing materials. This demonstrates how material-intensive the provision of products and services can be.

In this summary we can highlight only a few results. Details about material flows can be found in the full report.

The total material flows of household consumption add up to approximately 37 Mt. The largest material flow is associated with the provision of food, amounting to more than 12.4 Mt of materials over a one-year period. This equates to 4.3 tonnes per person. Of course, these are not food products alone. One person eats about 600kg of food per year. The remaining 3.7 tonnes are other materials that are indirectly needed to provide the food, such as packaging, construction materials for warehouses and supermarkets and transport fuel. These indirect flows of materials often – as in this example – exceed the direct flows.

Other material-intensive categories are domestic energy and electricity consumption at 5.9 Mt (2 t/cap) and private cars, including fuel, at 4.7 Mt (1.6 t/cap). When looking at non-household consumption categories, capital investment (gross fixed capital formation) makes up the most material-intensive component with almost 16 Mt. This is because a large part of capital is invested in construction and machinery, both of which are very material-intensive.

## HOW MUCH CARBON DIOXIDE DO WE REALLY PRODUCE?

Carbon dioxide is a gas naturally occurring in the atmosphere. Human activities, such as driving a car or using electricity, are responsible for releasing extra carbon dioxide and hence increasing the concentration beyond its naturally occurring level. Carbon dioxide is widely known to be one of the major greenhouse gases. By increasing the concentrations in the atmosphere, we are subjecting the planet to the consequences of future climate change.

In order to do something about this, it is important not only to identify fuel consumption as the main source of these emissions, but also to identify where these gases are emitted, why they are emitted and which economic sectors are responsible for the emissions. More attention should be drawn to the need for a fair accounting method and to assign responsibility for emissions. This would enable informed decisions, more efficacious and fair policies and more specific abatement strategies.

In this project we looked at the amounts of carbon dioxide that are both produced and “consumed” in Wales. The results are shown in Figure 3 together with the UK results for comparison. On one side we look at all the carbon dioxide released within the boundaries of the country, i.e. the territorial emissions. This is also known as the “producer responsibility” principle as most of the emissions come from the production of goods. In Wales, they add up to 42 million tonnes or 14.5 tonnes per capita, which is much higher than the UK’s 10.3 tonnes. That’s because in Wales there is a higher density of heavy, emission-intensive industries such as refineries, iron and steel manufacturing and electricity production.

The picture is different if we look at the emissions associated with actual consumption in Wales. This principle is called “consumer responsibility” and looks at the ecological impact of the process that has generated the consumed product or service. This is particularly important for imported goods because the emissions to produce them occurred outside Wales, even though it can be argued that the buyer (the ultimate consumer) bears the responsibility for the emissions. Both producer and consumer responsibility have their justification and assessments should be made by taking both into account.

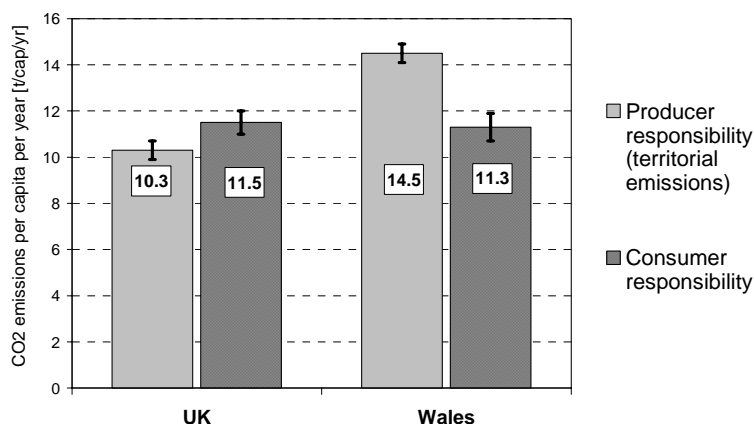


Figure 3: Comparison of actual (territorial) CO2 emissions and CO2 emissions for which consumers are responsible.

Consumer responsibility emissions amount to 11.3 tonnes of CO<sub>2</sub> per person in Wales – slightly lower than in the UK (11.5 t/cap/yr). The fact that these emissions are lower demonstrates that in terms of carbon dioxide emissions, Wales is carrying the environmental burden for consumption that occurs outside its territory.

The emissions figures can be broken down further in order to acquire a deeper understanding of the underlying causes. The biggest contribution to climate-relevant emissions for which people in Wales are responsible comes from energy consumption. Whenever we use energy, whether through the direct combustion of fuels or indirect as with electricity, we are releasing carbon dioxide into the atmosphere. Emissions from energy consumption in Wales total 2.8 tonnes per resident. The second largest contributor, 2.4 tonnes of CO<sub>2</sub> per resident in 2001, is from private transport. Here, Welsh

residents emit more than the average UK resident (2.2 t/cap). This is compensated by the impact associated with consumables where Welsh emissions are lower – 1.3 and 1.5 t/cap for Wales and the UK respectively.

For a more detailed breakdown of the results please refer to the full project report, which can be downloaded from [www.walesfootprint.org](http://www.walesfootprint.org)

## COMPARISON OF INDICATORS

Figure 4 shows a comparison and overview of the indicators discussed above. Other indicators related to specific activity categories have been developed for the project. These can be found in Chapter 3 of the main project report.

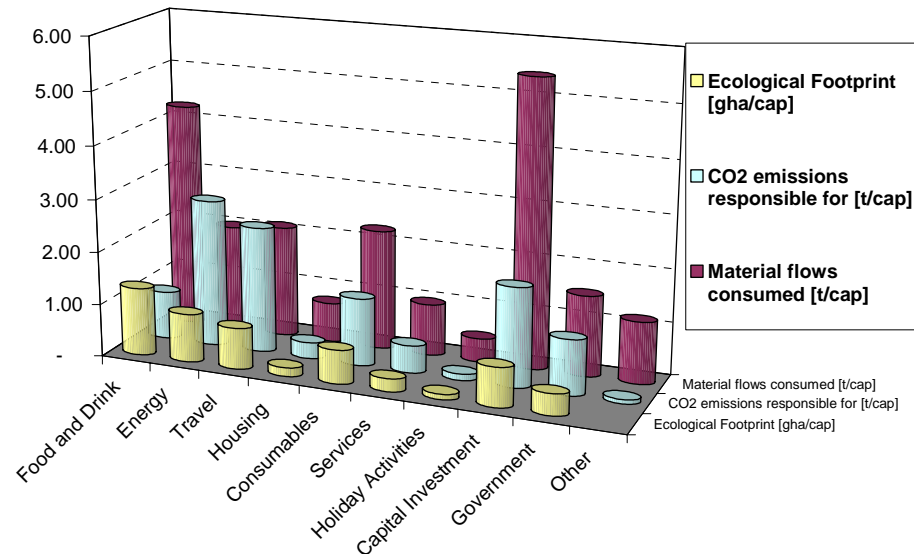


Figure 4: Comparison of indicators by component

As can be seen, different indicators bring out the implications of different activities. The Ecological Footprint demonstrates that food and drink consumption requires the most land area of any activity, whereas the energy sector is responsible for the most carbon dioxide emissions. The biggest impact in terms of material flows comes from the construction sector; this is represented in terms of “capital investment”.

These results indicate a need to reduce our Ecological Footprint and curb rising CO<sub>2</sub> emissions. But what can we, as consumers, producers, policy-makers and government officials, do to change the situation? How can we achieve the necessary transition from current unsustainable levels of consumption to the required sustainable medium?

Everyone has to contribute – the government needs to set the legal framework, introduce fiscal changes and support environmentally-sound solutions; businesses need to take responsibility not only for sustainable production processes but also for their products after they have been sold; and every one of us has to try and adopt a sustainable lifestyle. The following sections of this report illustrate and explore some of the options available to us.

# Changing lifestyles

Reducing our Ecological Footprint requires everyone to examine their lifestyle. In this section we explore five different lifestyles to provide an insight into the ways our daily decisions resonate negatively on the ecological sustainability of the planet. Case study 5 shows that a difference *can* be made.

Case Study 1 – ACORN<sup>2</sup> Type 6 “Agricultural villages, home-based workers”  
 CERYS, 45, FARMER’S WIFE FROM LLANIDLOES, POWYS

*“I live near the agricultural village of Llanidloes, with my husband and teenage children. My husband runs a large organic dairy farm, I give him a hand while also looking after the house and driving the children to school. We also run a fruit and veg box scheme, so I’m responsible for delivering the produce to our various customers in the area. Our working days are long and our business is demanding, which makes it difficult for us to venture far from home throughout the year.”*

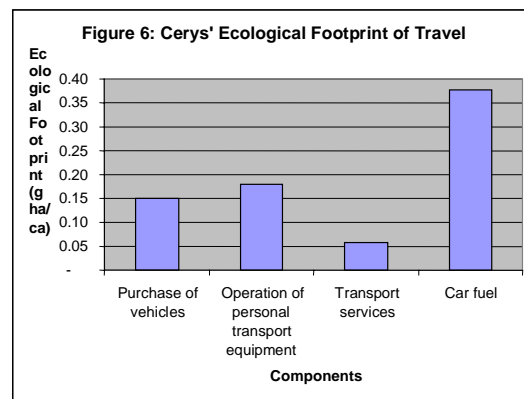
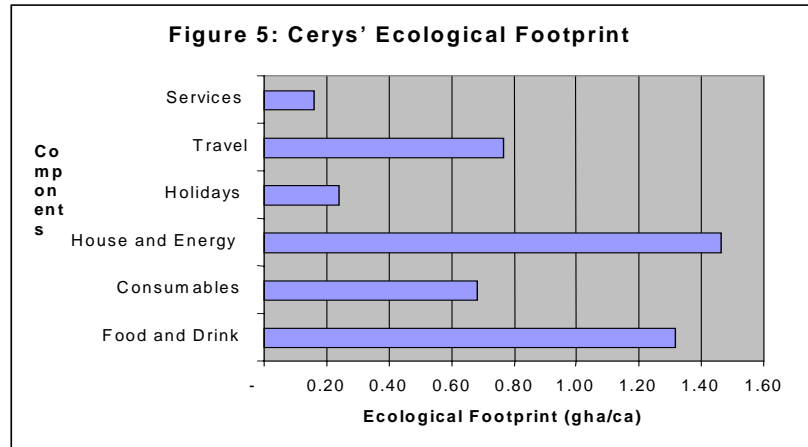
Cerys lives in one of the most rural areas of Wales and is comfortably well-off. She lives in a large farmhouse equipped with modern appliances. She’s happy to use her credit card but is not a big spender.

Cerys has access to two vehicles, a large 4x4 Land Rover and a Volvo Estate. Both are quite old and relatively inefficient. Given her location, she uses the car daily to

drop the children off at school and pick them up at the end of the day. She also drives to Newtown once a week to stock up on food she can’t get from the farm, as well as other necessary supplies. As shown in Figure 5, this reflects her high Ecological Footprint for travel – 17 per cent of her total Footprint.

A closer look (Figure 6) shows that fuel consumption contributes 50 per cent of her total Footprint for travel.

A hectic lifestyle means Cerys has little spare time. She rarely goes out socially and relies on the telephone for social and business contact. Her “House and Energy” component is the largest (32 per cent of her total Footprint), not only because she spends a lot of time at home but also because the house is quite old with little insulation and is detached.



<sup>2</sup> A Classification of Residential Neighbours (see Chapter 2 for further details)

The year-round demands of the business mean that Cerys goes on few holidays and will often just fit in trips within the UK and Ireland.

**Cerys's footprint is 5.73, which is just above the national average for Wales.**

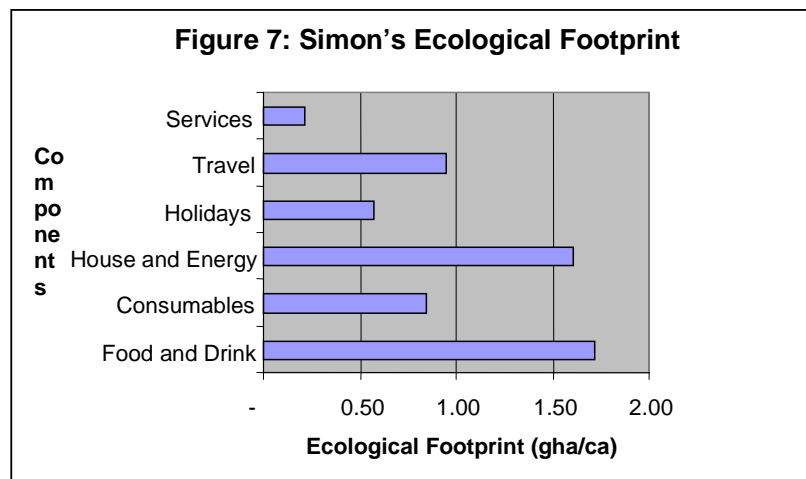
Case Study 2 – ACORN Type 21 “Prosperous enclaves, highly-qualified executives”

SIMON, 28, SALES EXECUTIVE FROM CARDIFF

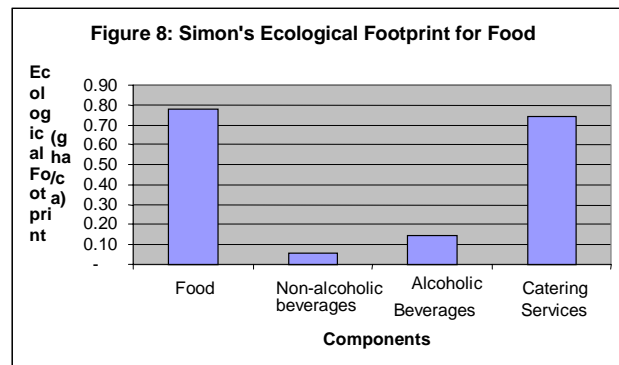
*“I live on my own in a newly renovated city centre apartment, in a former warehouse building. It’s a nice little bachelor pad, perfectly located within walking distance of great restaurants, bars and clubs. I work long hours at a large insurance company, but make time to go to the gym and often eat out. I like jetting off on weekend city breaks with friends but especially enjoy getting away from it all on longer beach holidays in the Caribbean.”*

Simon lives in an affluent part of Cardiff city centre with a buzzing nightlife. He’s a high earner and is determined to make his way up the career ladder to a senior managerial position.

Simon only recently bought his flat and has spent a lot of money decorating and furnishing it to a high standard. It is fully equipped with the latest technology. He regularly uses his credit card, has a high monthly spend and correspondingly high credit limits.



He owns the latest VW Golf GTI, which he drives to work every day. His office is in a business park on the outskirts of Cardiff. To avoid traffic congestion in the morning, Simon begins his journey early, giving him enough time for a workout at the gym before a hectic day at the office. He usually works until late in the evening, leaving him with little enthusiasm for cooking when he gets home. He therefore relies heavily on convenience foods such as microwave meals or takeaways, and often socialises in trendy restaurants and café/bars. As a result Simon’s Food and Drink Footprint contributes 25 per cent to his total Footprint (Figure 7), and of this, 88 per cent can be attributed to his consumption of food and catering services (Figure 8).



Whenever possible, Simon enjoys jetting off on weekend city breaks around Europe with friends. He takes at least one luxury beach holiday a year, his favourite destination being the Caribbean. Of his “Holiday” Footprint, 91 per cent is generated by consumption of aviation services and goods and services outside the UK. Noticeably, Simon’s energy footprint is still high even though he’s often not at home. As he pays for his electricity and gas by

direct debit, he doesn't really notice the money going out of his account. The heating, as well as all his gadgets, if often left on, even when he's not at home.

**Simon's Ecological Footprint is 7.03, which is well above the national average for Wales.**

Case Study 3 – ACORN Type 36 “Home-owning multi-ethnic areas, young families”

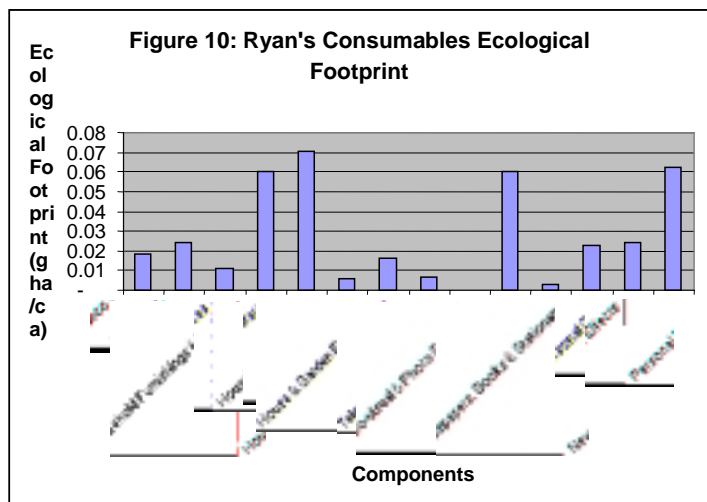
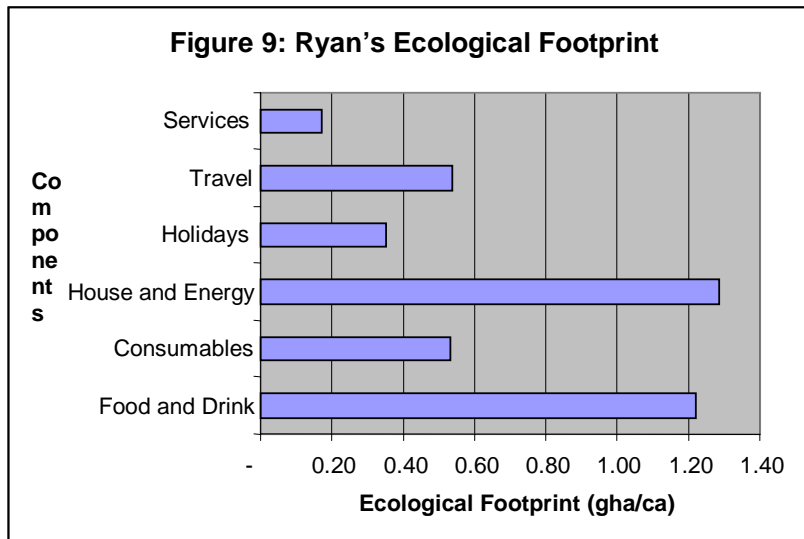
RYAN, 35, IT PROFESSIONAL FROM SWANSEA

*“I live in the outer suburbs of Swansea with my wife, a part-time social worker, and our two children. We live in a compact semi-detached house situated in a nice neighbourhood, only a 20-minute bus ride from Swansea city centre. Our children attend the local primary school, which is within walking distance of our home. My mother lives really close by and is a fantastic help with the children, especially on the days my wife works.”*

Ryan lives in a pleasant suburb of Swansea with his young family, and both he and his wife work in the city. Their income level is in line with the national average and they are gradually paying off their mortgage.

Although Ryan doesn't struggle to pay the monthly bills, once he's covered all his family's basic needs he is left with limited disposable income. Half of his Ecological Footprint is “Food and Drink” and “House and Energy” (about a quarter each, see Figure 9). He eats out only on special occasions, but treats the family to a take-away every Friday night. If his mother is available to babysit, he takes his wife to the cinema or meets friends in the local pub. He owns an old Ford Escort in which he drives himself and his wife to work, but will leave the car at home and take the bus on the days his wife doesn't work.

His “Consumables” Footprint is the lowest across the different lifestyles represented in the study (10per cent of



total Footprint), reflecting his limited disposable income. He has an old stock of modern conveniences he bought second-hand. The house is fully equipped with audiovisual appliances and pleasantly furnished. He spends a lot of time DIY and decorating.

The family usually go on an overseas holiday every other year to Spain or France.

**Ryan’s Footprint is 5.21 gha/cap, the national average in Wales.**

Case Study 4 – ACORN Type 50 “Council areas, high unemployment, lone parents”  
ROWENA, 21, A SINGLE MOTHER FROM ABERYSTWYTH

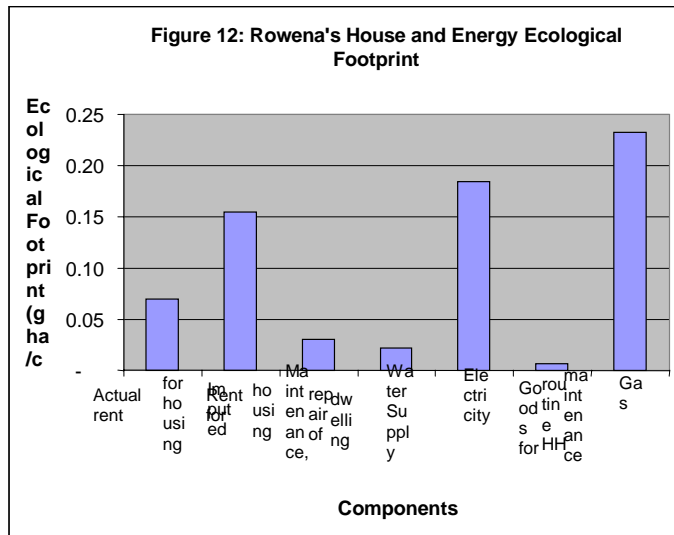
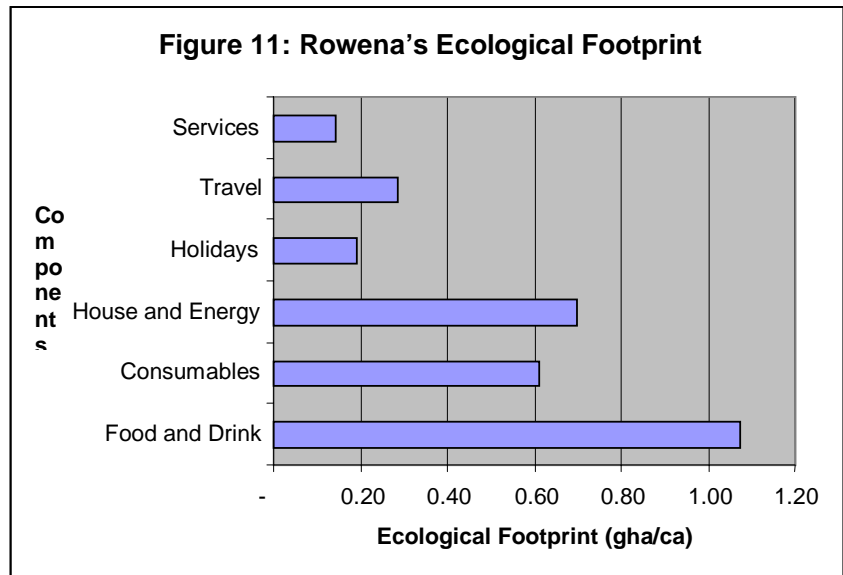
*“I live in a flat provided by the local housing authority with my two-year-old daughter, Amara. I work two mornings a week in the local supermarket while my mum takes care of Amara. I would like to work more, as I desperately need the money, but then who would look after my baby? My mum also has a job and I simply can’t afford childcare. As soon as Amara starts school I hope to sort something out jobwise. In the meantime I just about get by on support, but paying my bills each month is a stress, and hard as I try the money never goes far enough.”*

Rowena lives in a small flat on a council estate in Aberystwyth. Although she has a job she still relies on social benefit, and survives on one of the lowest levels of income in the country.

With very little disposable income, Rowena has to walk to get to most places, but sometimes uses public transport. She does, however, put money aside to get away

and visit her grandmother on the Pembrokeshire coast. Socialising for Rowena involves a night in watching videos with her friends, and occasionally going to her local pub when her mum can babysit.

Rowena just about manages to pay the monthly bills and rarely has any disposable income to buy luxury goods and services. In fact 59 per cent of her total Ecological Footprint is made up of the “Food and Drink” (36 per cent) and “House and Energy” (23 per cent) components (Figure 11). A closer look at her “House and Energy” component (Figure 12) shows that 22 per cent is spent on rent, 26 per cent on electricity and 33 per cent on gas. Such high proportionate consumption of basic goods



reflects Rowena’s low economic standing.

Although Rowena’s consumption of consumable goods is relatively low when compared with other socio-economic groups, proportionately it is high (20 per cent of total EF). Again, this reflects her need of consumable goods in her daily life. Personal effects, household appliances, tobacco and other recreational items (in Rowena’s case likely to be games and toys for Amara) comprise 68 per cent of her total consumption for consumable goods.

**Rowena’s Ecological Footprint is 4.12, which is below the national average for Wales.**

Case Study 5 – “Environmentally aware”

SARA, 25, PRIMARY SCHOOL TEACHER FROM MACHYNLLETH, MID-WALES

*“I share a small cottage, with a friend, in the scenic town of Machynlleth in Mid-Wales. I teach full-time in the local primary school and take part in a lot of village activities. I am head of the local Fair Trade Forum and a member of Worldwide Opportunities on Organic Farms. I am in the process of setting up an allotment and enjoy being outdoors.”*

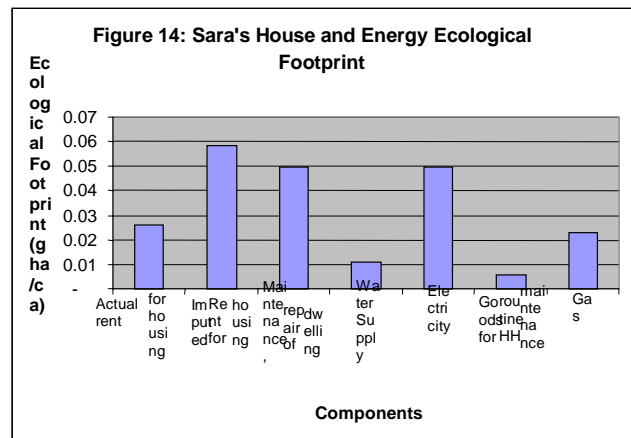
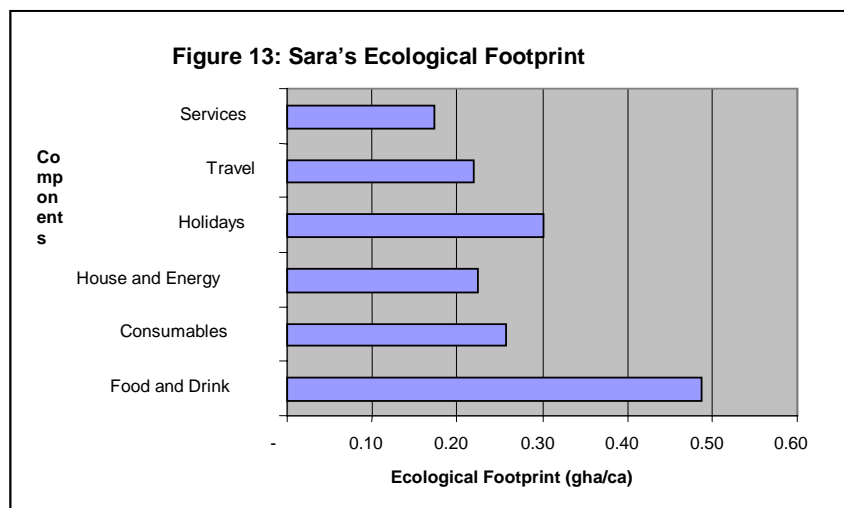
Sara recently bought a small cottage, which she shares with a friend. This helps keep the cost of living at a minimum.

The cottage has undergone serious modernisation, including draught-proofing, double glazing and cavity wall/roof insulation. This was one of the reasons Sara bought it.

She has installed energy-saving appliances throughout the house, and she consumes 100 per cent renewable electricity.

In total, the “House and Energy” component makes up only 13 per cent of her total Ecological Footprint (Figure 13). Her efforts have reduced gas consumption by approximately 80 per cent compared with the national average, and her spend is greater on the mortgage and maintenance of the house (26 per cent and 22 per cent of the “House and Energy” EF total respectively – see Figure 14).

Sara endeavours to purchase 60 per cent organic fresh food at all times. She is careful when buying consumable products, always re-uses them where possible and attempts to repair them before recycling or eventually throwing them out.



Sara leads a very “local” lifestyle and walks or cycles to most places. However, her rural location means she occasionally needs to venture long distances. Sometimes public transport isn’t suitable for her journeys so she has part ownership of a car through a car club scheme. She prefers to holiday in the UK, always opting for outdoor activities such as camping and hiking, but every other year will travel to Europe.

**Sara’s Ecological Footprint is 2.78, considerably smaller than the national average for Wales.**

## Conclusions

These five lifestyle examples show how strongly our way of living determines our individual Ecological Footprints. They also highlight the inequalities in disposable income and subsequent expenditure potential across the Welsh population. However, one’s quality of life doesn’t have to be reduced in order to achieve a greater level of sustainability, as can be depicted by comparing case studies 4 and 5. Although case study 5 is the most environmentally aware and has achieved the lowest Ecological Footprint, there is still a long way to go before we reach 1.8 gha per person, which represents the average available biocapacity of the Earth. While behavioural change is key to achieving greater levels of sustainability, there is also a need for more stringent policies and legal frameworks to prompt this change (social and environmental). This is the topic explored in the following section.

# Changing policies

Setting the right legal and fiscal framework can have a significant impact on the Ecological Footprint, as can other policy decisions. The following examples show which policies can make a difference – and which won't.

## Food

With food consumption creating a significant flow of materials and waste, and contributing most to the Ecological Footprint, there is strong requirement for change.

### Relevant Targets & Policy Recommendations

- *Second Organic Action Plan for Wales 2005-2010 (2004):*  
“10-15% of agricultural land in Wales to be organic or in-conversion by the end of 2010”
- *Food and Well Being – Reducing inequalities through a nutrition strategy for Wales (2003):*  
“Knowledge of recommended number of portions of fruit and vegetables, and correct estimation of a portion size will increase by 10% from 31% by 2005”

“A healthy diet will usually have a low Ecological Footprint, meaning benefits to the individual and to the environment.”

Building on the current policies and infrastructure put in place by the Welsh Assembly Government (WAG), the following policy suggestions involve linking organic production and consumption systems, as well as changing diets.

## SCENARIO 1: LINKING SUPPLY CHAINS

The advantages of organic farming, the level of demand and the current policy opportunities mean that organic production should now be taken up as a mainstream policy option for Welsh agriculture. WAG has acknowledged this by establishing a target (see text box above). The scenarios explore what would happen if the target were reached and if the organic food produced were consumed in Wales.

The area of organically managed farmland in Wales has increased significantly from under 1 per cent in 1998 to 4 per cent – but growth has stagnated, creating a major challenge to achieving the objective. If the ambitious target of 15 per cent organic production by 2010 were achieved and if further growth in organic production could be maintained until 2020, there would be a reduction in the Ecological Footprint of 11 per cent.

## SCENARIO 2: CHANGING DIETS

An increase in organic food production and consumption is not enough. This is an indication that it's not merely about the quality of the food we eat, but also what types of food our diet comprises. This is where the nutrition strategy complements the organic strategy, highlighting the need for complementary approaches.

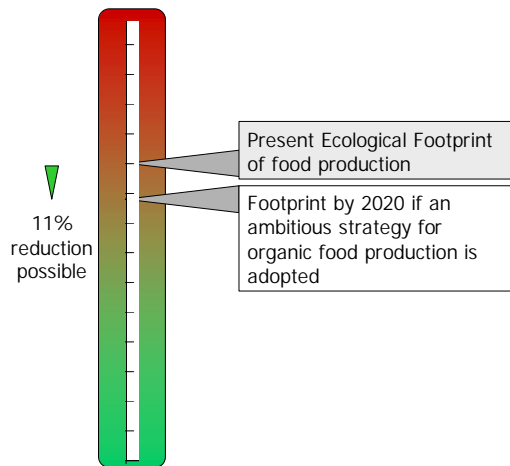


Figure 15: EF reduction for Organic Food Target

The scenario exploring the potential reduction due to eating fresh seasonal organic food with a low meat diet reduced the Ecological Footprint by 30 per cent, from 1.24 to 0.89gha/cap. *Health and Well Being* in connection with the *Health Challenge Wales* has the potential not only to achieve direct health benefits, but also to contribute indirectly to ecological sustainability. The results suggest that a healthy diet will usually have a low Ecological Footprint, meaning benefits to the individual and to the environment.

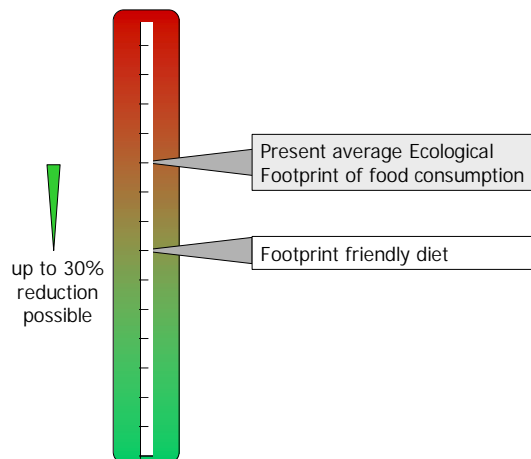


Figure 16: EF reduction for Changing Diets Scenario

### Suggestions to WAG

- Explore how the Ecological Footprint can link with *Health Challenge Wales*. It is essential that the scheme reaches the majority of the population, otherwise any reduction will be insignificant.
- Continue to set targets for increasing organic production, ensuring that supply chains are established so that Welsh products are consumed in Wales.

### Energy

Two options are available to reduce the impact of energy, reduce consumption and produce it more efficiently (i.e. lower CO<sub>2</sub> emissions per kWh). WAG has adopted both of these approaches. With renewable energy and

energy efficiency programmes, the signs are that WAG is taking climate change and CO<sub>2</sub> reductions seriously. This is of extreme importance, as the UK government has just admitted that it will not meet its carbon dioxide reduction target by 2010.

**Relevant Targets & Policy Recommendations**

- Energy Policy Action Areas: “Supply 4TWh of renewable energy by 2010 and 7TWh by 2020”
- Warm Homes and Energy Conservation Act 2000 “Assisting a total of 95,000 homes, through the Home Energy Efficiency Scheme by March 2007”

“It is possible to reduce the Ecological Footprint of domestic energy consumption by an absolute total of 47 per cent if all potential sources of renewable energy were implemented.”

SCENARIO 1: RENEWABLE ENERGY

Calculations have been made to determine the potential reduction in the Ecological Footprint if the target of 4 TWh being supplied by renewables by 2010 were to be achieved as well as the reduction if the total “achievable potential”, as estimated by Sustainable Energy Limited, were to be met (9 TWh from renewable resources).

It is possible to reduce the Ecological Footprint of domestic energy consumption by an absolute total of 47 per cent if all potential sources of renewable energy were implemented to their maximum levels. If the WAG target of 4TWh of energy from renewables is achieved by 2010, it is possible to make a 25 per cent reduction. Of all the policies in place in Wales, this target would bring about the most substantial reduction in the Ecological Footprint.

At present, domestic energy consumption is increasing year on year, so this reduction would be achieved only if energy consumption remained stable. The second scenario addresses this challenge.

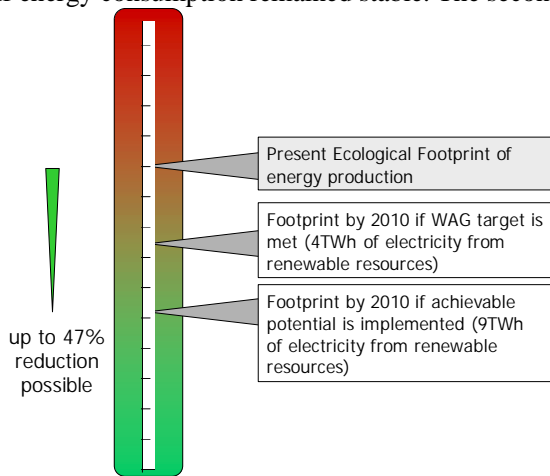


Figure 17: EF reduction for Renewables

SCENARIO 2: ENERGY EFFICIENCY

Wales is committed to the UK Fuel Poverty Strategy target of eradicating fuel poverty among vulnerable households as far as possible by 2010 (some 14,500 homes have already benefited from the project).

Activities include cavity wall filling, draught-proofing, adding jackets to hot water tanks, loft insulation and the installation of compact fluorescent lighting. These not only help eradicate fuel poverty but also help reduce CO<sub>2</sub> emissions.

The scheme so far represents just a 0.1 per cent reduction in the Ecological Footprint of domestic energy use, because only 1.1 per cent of the total housing stock in Wales is included in the scheme. If the 95,000-home target is achieved by 2007, the result would be a 1.1% reduction in the Ecological Footprint. To make an energy efficiency scheme truly effective, the scale of the programme needs to be magnitudes higher and address the total housing stock.

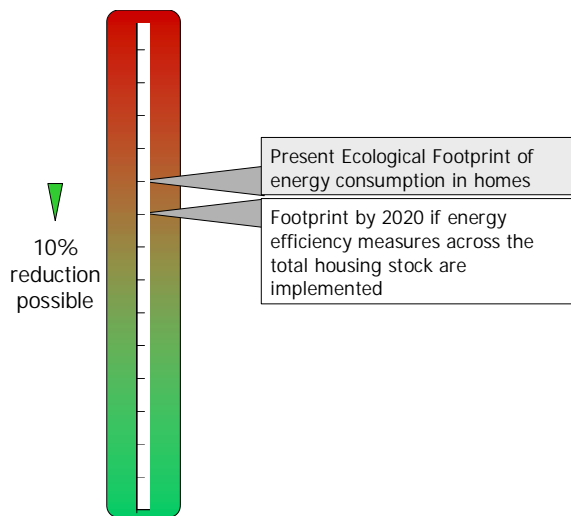


Figure 18: EF reduction from energy efficiency

### Suggestions to WAG

- The challenge for Wales is to ensure that the benefits of an ambitious renewable energy target are not lost through an increasing demand for energy. At present, the scale of the energy efficiency scheme will not bring about this required reduction. A more holistic approach is required that considers the energy efficiency of new-build as well as increasing the scale of an energy efficiency programme.
- Even though the UK may not reach the carbon dioxide reduction target by 2010, WAG should lead by example and ensure that Wales has achieved its proportionate reduction.

### Transport

Of all the components considered, the Ecological Footprint of transport is growing at the most significant rate. Between 1996 and 2016, the high growth rate is forecast at 51 per cent, the low growth rate at 23 per cent and the medium growth rate at 38 per cent.

The first scenario identifies some reasons for this increase. The second explores the Intra-Wales air service, and the third explores the options for “Demand Side Management”.

#### Relevant Targets & Policy Recommendations

- *Trunk Road Forward Programme (2002):*  
“To maintain and improve the trunk road network in Wales in a sustainable manner, taking into account the social, economic and environmental needs and obligations of the nation.”

“WAG is not only encouraging the use of the car, but is increasing car traffic.”

#### SCENARIO 1: INCREASING TRAVEL USE

A good indication of where priorities lie is to examine the financial backing given to the various modes of transport. More than 75 per cent of total funding was budgeted for improving, widening or building roads. Since the Standard Advisory Committee on Trunk Road Assessment report in 1994, the concept of “induced traffic” has been widely accepted: this states that increasing urban road capacity tends to generate additional peak-period trips that would otherwise not occur. This consists of a combination of *diverted vehicle trips* (trips shifted in time, route and destination), and *induced vehicle travel* (shifts from other modes, longer trips and new vehicle trips). Over time, “induced traffic” often fills a significant portion (50-90 per cent) of added urban road capacity, meaning that in as little as three years, we could be back where we started – having spent £0.7 billion in the process.

Therefore, freeing up “suppressed traffic” through building and improving new roads is partly responsible for a 38 per cent increase in the Ecological Footprint.

WAG is not only encouraging the use of the car, but is increasing car traffic. The implementation of highway schemes alone, without demand restraint or other measures to influence behaviour, will result in relatively short-term relief from congestion.

#### SCENARIO 2: INTRA-WALES AIR SERVICE

In March 2004, WAG published a consultation document on the proposed Intra-Wales Scheduled Air Service which stated: “The services were not considered likely to give rise to any significant environmental or land use planning impacts.”

This conclusion is at variance with a large number of studies of aviation and its environmental impacts, all of which identify severe noise, pollution and climate change impacts from the growth of aviation.

The consultation provides information on options for a round-Wales air service focused on Cardiff. The scheme would produce between 2,680 and 5,116 tonnes of CO<sub>2</sub> and lose between £2.5 and £5.9 million over four years. It would also increase the annual Ecological Footprint of domestic flights by 7 per cent.

#### SCENARIO 3: DEMAND SIDE MANAGEMENT

*Transportation Demand Management* (TDM) is a general term for strategies that result in more efficient use of transport resources. Policies that can affect motorists include car sharing, parking management, and parking and congestion charges. TDM would require a full policy menu, graduated parking charges, mileage allowances, employer subsidies and tax breaks, purchasing and contracting conditions, and subsidised clean car clubs just to name a few options. The full report explored a number of these for business, individuals and schools, and demonstrated that an 18 per cent reduction in the Ecological Footprint would be achievable, based on the evidence of past studies.

Most journeys made by Welsh citizens are less than 10 miles. Generally, these could be made reliable, safe, attractive, sustainable and rewarding through investment in walking, cycling and public transport. This would in turn bring significant gains to the poor, the elderly, women, children and other groups not well served by high-cost investments in highway infrastructure and aviation.

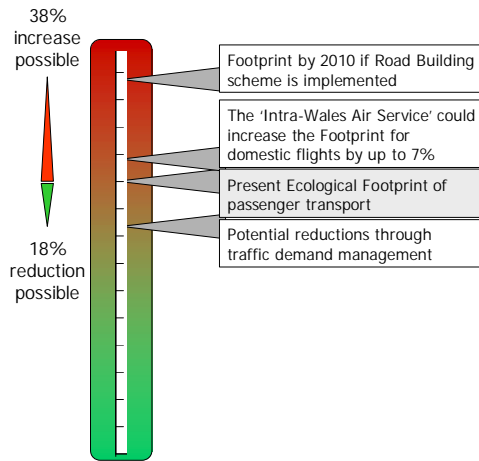


Figure 19: EF reduction for various transport measures

### Suggestions to WAG

- Wales is at a watershed: It can either adopt (implicitly or explicitly) a “business as usual” outlook based on the expansion of environmentally damaging modes of transport (car, lorry and air) supported by new highway and aviation infrastructure, or it can move towards sustainability in transport policy based on re-balancing modes and reallocating budgets in favour of sustainable transport options. Transport demand management should play a significant role in this process.

#### Built environment

The construction sector – buildings, infrastructure and the built environment generally – is the largest single material user, waste generator and energy user. It also has a massive inertia, as only 1-2 per cent of the total built stock is renewed in any one year. As one of the most critical infrastructures determining people’s quality of life is their home and the surrounding environment, this infrastructure is central to the scenarios.

#### Relevant Targets & Policy Recommendations

- *Starting to Construct Differently (2004) Consultation on the Construction Industry in Wales:*  
“Education and partnership to bring about sustainable construction”.

“In BedZED units, a total Energy Footprint reduction of 84 per cent is achieved, compared with the ‘Wales average’.”

### SCENARIO 1: ECO-HOME DEVELOPMENTS IN WALES

This scenario includes a comparison, in Ecological Footprinting terms, between a home built to 2002 Building Regulations, a home achieving a BRE<sup>3</sup> EcoHomes “excellent” rating, and a home at the pioneering BedZED eco-village development<sup>4</sup> that has been designed to consume no fossil fuel energy<sup>5</sup>.

<sup>3</sup> Building Research Establishment Ltd

<sup>4</sup> [www.bioregional.com](http://www.bioregional.com), follow the link to ‘BedZED & Eco-Village Development’

The greatest Ecological Footprint reductions can be achieved in the energy component. Less energy is used in homes built to the 2002 building regulations and in EcoHomes. The building regulations from 2002 already have a considerable effect and reduce the energy Footprint by 44 per cent. BRE EcoHomes achieve a further reduction of 62 per cent. In BedZED units, a total energy Footprint reduction of 84 per cent is achieved, compared with the “Wales average”.

The scenarios show that the Ecological Footprint of new homes can be reduced substantially through the gradual yet compulsory introduction of EcoHomes standards (-25 per cent by 2020) or BedZED standards (-60 per cent by 2020). However, it has to be borne in mind that this only affects *newly* built homes. Without any additional measures on the existing housing stock, the respective reductions for the *total* housing stock Footprint would be only -0.9 per cent (EcoHomes) and -1.7 per cent (BedZED homes).

HOUSING

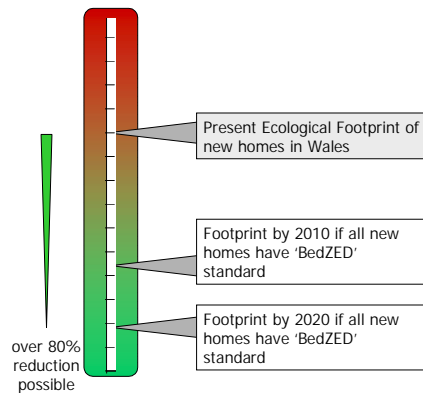


Figure 20: EF reduction for various transport measures

### Suggestions to WAG

- The reduction in the Energy Ecological Footprint of new homes can be substantial (up to 84 per cent if achieving the BedZED standard). Design details should be highlighted as well as facilities provided – for example, space for recycling bins, energy-efficient equipment, and other programmes to encourage sustainable lifestyles such as car share schemes and provision of allotments. To demonstrate a real commitment to this process, WAG should establish a target for developing BedZED-type communities for Wales. However, these policies must be accompanied by measures to improve the energy efficiency of the existing housing stock in order to make a substantial difference.

<sup>5</sup> For further details on input data, assumptions and the calculation methodology for this scenario, refer to the report ‘Sustainability Rating for Homes – The Ecological Footprint Component’ that can be downloaded from [www.regionalsustainability.org](http://www.regionalsustainability.org)

## Waste

Waste can be seen as a “satellite account” in the Ecological Footprint calculations, providing an analysis of the environmental burden of different waste options.

### Relevant Targets & Policy Recommendations

*Wise About Waste: The National Waste Strategy for Wales (2002):*

- By 2010, achieve a reduction in waste produced equivalent to at least 10% of the 1998 arisings figure
- By 2020 waste arisings per person should be less than 300 kg per annum
- By 2009/10 achieve at least 40% recycling/composting of municipal waste with a minimum of 15% recycling

“If the growth rate in domestic waste is not reduced, any benefits gained through recycling, composting and the removal of bio-degradable waste from landfill will be lost.”

A detailed policy assessment demonstrated that, if current targets established by WAG were achieved, the Ecological Footprint of waste would be reduced by 37 per cent. Essential to the success of this reduction is the ability to stabilise, then reduce, the total tonnage of waste produced. It is important to acknowledge that many factors controlling the amount of waste discarded by people is largely beyond the control of individual local authorities or WAG. Even so, achieving this target will contribute more significantly to Ecological Footprint reduction than any other target.

Both the bio-degradable and recycling targets will also bring about a significant reduction in the Ecological Footprint – perhaps as much as 20 per cent. If the growth rate in domestic waste is not reduced, any benefits gained through recycling, composting and the removal of bio-degradable waste from landfill will be lost – something that will need concerted effort at an EU/UK level. But if WAG does manage to see a decrease in household waste, the benefits of more efficient waste disposal will be experienced. WAG is confident that the recycling/composting target has been met for 2003.

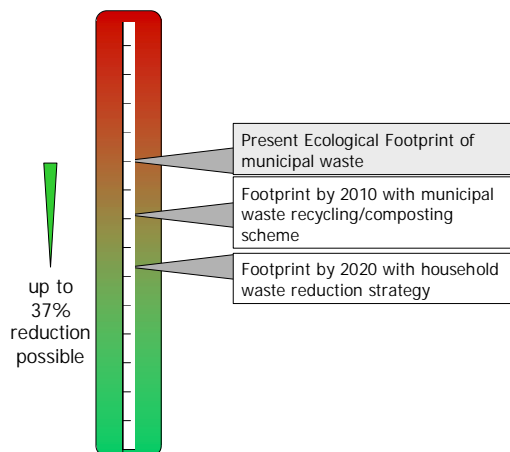


Figure 21: EF reduction for various waste measures

## Suggestions to WAG

Assess the potential benefits of adopting schemes that will help achieve the waste minimisation target, including:

- direct consultation and individualised campaigns on household waste reduction
- pay-by-weight schemes; and
- non-disposable nappy schemes

All these require serious financial backing.

#### Sustainable consumption

Ultimately, all material flows – waste generated by industry and services, as well as household waste – is produced because we consume. “Consumption is the sole end and purpose of all production”, said Adam Smith in 1776. Therefore, any adjustments that can be made to final demand will affect all the industrial sectors.

#### Relevant Targets & Policy Recommendations

- *A Winning Wales, the Economic Development Strategy for Wales (2002):* “Household income in Wales will increase to 95 per cent of the UK average, currently being 87.5 per cent”.

“For the price of one mile of motorway, every person in Wales could be contacted as part of an individualised marketing scheme for transport.”

The analysis in the main report established the Ecological Footprint of 17 ACORN<sup>6</sup> groups across Wales. The variation in their overall Footprint is huge: the greatest extreme is 7.03 gha/cap compared with 4.10 gha/cap, which means that some groups’ negative impact on the environment is almost twice as high as that of others.

Why is there such a difference? The project’s research shows a strong correlation between expenditure and the Ecological Footprint. Different ACORN groups consume in vastly different ways and have extremely diverse impacts on the environment. Basically, the more money you spend, the more you consume and the higher your Footprint becomes. But not all spending is bad: flying a few times a year to exotic destinations is surely more detrimental to the environment than a cycling holiday, and the latter one saves money that could be spent on (for example) insulating the home. However, research suggests efficiency of consumption may not be enough to achieve the required reduction in the Ecological Footprint. It’s more than likely that a reduction in the throughput of materials is required, meaning a fundamental readjustment of how we achieve our goals and aspirations.

Jackson and Michaelis (2003<sup>7</sup>) suggest reasons why we consume the way we do, and suggest we are “locked in to current consumption patterns” by a combination of market incentives, psychology and conditioning, social structures and norms, institutional frameworks, cultural values and narratives. At the same time it is noted that these are not fixed entities changing over time. Growing evidence suggests that targeted information provided in a useful and appropriate format can be very successful at bringing about a positive change in behaviour.

<sup>6</sup> ACORN = A Classification of Residential Neighbours

<sup>7 7</sup> Jackson T. and Michaelis (2003) Policies for Sustainable Consumption, Sustainable Development Commission (available at [www.sd-commission.org.uk/news/index.php?page=get\\_page&article\\_id=PXXSKPK-DULDB81-NJKPWJT-9BJLZPJ](http://www.sd-commission.org.uk/news/index.php?page=get_page&article_id=PXXSKPK-DULDB81-NJKPWJT-9BJLZPJ))

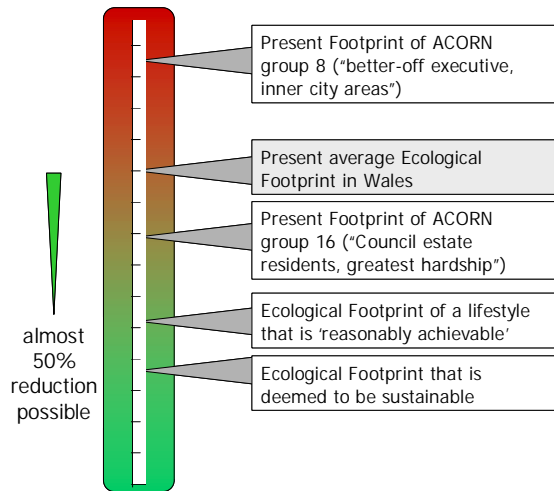


Figure 22: EF reduction for various waste measures

One approach to address behavioural change is the tool of “individualised marketing”, which is mainly used to influence transport behaviour. People are given personalised travel plans tailored to their individual needs to bring about a move away from the car and towards more sustainable alternatives. There is no reason why such a method could not be used for other issues.

Any approach that ensures a greater sense of community and social responsibility is likely to bring about a positive change to society. Eco-teams are seen as another option where groups of concerned people are able to share experiences and an understanding of sustainability issues.

It is estimated that for the price of one mile of motorway, every person in Wales could be contacted as part of an individualised marketing scheme for transport. If initial results are to be trusted, this could bring about a 16 per cent reduction in car use. It is fairly safe to suggest that one mile of motorway would not be this effective.

### Suggestion to WAG

- Commission a pilot study into the potential effects of a robust behavioural change programme for Wales.

# Conclusion

While some good work has been done in Wales to bring about a more sustainable society, present policies will not be sufficient to reduce the consumption of materials, the production of waste and the Ecological Footprint to a level that could be regarded as sustainable.

The established targets for renewable energy and waste will contribute to Ecological Footprint reduction. However, a number of policies ensure that any advances made are lost through increased levels of consumption, most noticeably private travel. It is also important to remember that the efficiency gains through recycling can only be achieved once and that unless fundamental questions are considered about the way we consume, these reductions will be short lived.

In conclusion, a more radical agenda is required that helps to prepare Wales for a more sustainable future. Moreover, the most dramatic changes are likely to be experienced with a holistic approach to reducing consumption, which integrates effective 'sustainable' policies while at the same time addressing the need for behavioural change.