GHK

Evaluating the Potential for Green Jobs in the next Multi-annual Financial Framework

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BirdLife INTERNATIONAL
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Evaluating the Potential for Green Jobs in the next Multi-annual Financial Framework

A report submitted by GHK

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Executive Summary

The next Multiannual Financial Framework (MFF) (2014 – 2020) of the European Union is currently under negotiation. The spending proposed for the MFF is intended to deliver the Europe 2020 growth strategy. This strategy promotes collective action to turn the EU into a smart, sustainable and inclusive economy that delivers high levels of employment, productivity and social cohesion.

The clear and strong links between the proposals for the next MFF and the Europe 2020 strategy underline the importance of climate, energy and labour policies to the future of Europe.

The aim of this study is to underline the socio-economic value of 'greening' the MFF, specifically through its potential contribution to employment. The study assess the possible employment impacts of a reallocation of MFF funding to address important environmental challenges under 8 key policy areas. These are:

- Investment in the Natura2000 Network.
- Agri-environment (including rural development).
- Habitat restoration (including peatlands).
- Organic farming.
- Energy efficiency (housing).
- Renewable energy.
- Sustainable transport.
- Waste recycling.

This study explores the potential employment effects of investing €1 billion in each of these 8 policy areas and compares these with the employment supported by the MFF currently, with specific reference to CAP and Cohesion Policy.

The case studies are used to assess the potential direct and total employment impacts of investment that might be funded under the next MFF. The case studies are based on available literature; no primary research has been undertaken.

Results of the Case studies - employment impacts

The case studies illustrate a range in the scale of employment impacts from an investment of €1billion. The FTE jobs supported per €1billion range from 52,000 jobs in the renewable sector, to only 6,600 additional FTE jobs from investment in agri-environment schemes (Table 1).

Table 1: Summary of case study results – Annual EU employment (FTE) impacts per €1 billion of investment in 'Green' activities

Case	FTE jobs per €1 billion investment
N2K	29,900
AES / HLS	6,600
Habitat restoration	8,700
Organic farming	7,800
Energy efficiency	25,900
Renewables	52,700
Sustainable transport	21,500
Waste recycling	9,200

Source: GHK estimates

The employment impacts from the investment reflect the wide variation in the economic and sectoral context for each of the cases, and the extent to which in some cases the investment is associated with the displacement of other less sustainable forms of economic activity.

The cases also reflect variations in the selection made by different authors of employment multipliers, and the treatment of leakages of finance and jobs.

It should also be emphasised that these estimates are only first order indicative estimates, based on limited evidence and, in the case of transport, based on US rather than on EU evidence with the inherent uncertainties that are attached.

The estimated average employment impacts across the cases are shown in 0 that presents both the mean and median values from the cases. The 8 cases have been grouped into two sub-sets (land-based and infrastructure / sectors), reflecting the possible source of funds under the MFF.

This indicates that the cases that have used investment to support improvements in land-based activities have, with the marked exception of N2K investment, generated small numbers of jobs.

In the case of infrastructure and sector based projects, the employment impacts are larger; with a median value of 23,700 FTE jobs. The large number of jobs associated with renewables reflects the large indirect employment multiplier. In the case of energy efficiency the estimated impact is almost certainly an under-estimate if a longer-term view is taken, given the cumulative impact of household energy cost savings and associated employment benefits when redirected to other forms of consumer expenditure.

Table 2: Average values of employment generated by €1 billion

Cases	Average annual employment (FTE) impact per €1 billion
All cases	
Mean	20,300
Median	15,400
Land based (Cases 1-4)	
Mean	13,300
Median	8,300
Infrastructure / sectors (cases 5-8)	
Mean	27,300
Median	23,700

Comparison with 'Baseline' MFF investment

The Baseline

The purpose of the study is to compare the employment impacts that might be expected to be generated from investment following the conventional pattern, as reflected in current uses of EU funds, with the employment impacts associated with investment in 'green' activities. The employment impacts of the current use of EU funds have therefore to be estimated.

Despite the significance of employment as a policy goal, it has not been possible to identify any analysis that has provided a quantified analysis, in aggregate terms, of the overall EU employment impact of the EU funds; either by individual fund, or for all funds together.

Since a formal analysis of the employment impacts of EU funds is well beyond the scope of this study an attempt has been made using available data to examine the indicative employment impacts of a €1billion investment made by the funds under the Common Agriculture Policy (CAP) and under Cohesion Policy (CP) – the Structural Funds. These two

funds are the largest of the range of EU funds and accounts for over two thirds of total spending.

CAP

Analyses of the employment supported and safeguarded by CAP spending are not well developed. We have made reference to a DG Agri study that modelled the employment impacts of alternative scenarios (including or excluding CAP, but also with other policy choices). This indicates that the scenarios including CAP have little relative impact on safeguarding employment, compared to a liberalisation scenario without CAP spending. The report indicates that perhaps between 1% and 2% of the EU agricultural workforce might be safeguarded due to CAP. Based on annual CAP funding of €57billion, this represents approximately 1,500 to 3,000 FTE jobs supported per €1billion of CAP.

The estimated employment supported by €1billion of CAP is indicated in Table 3.

Table 3: EU FTE agricultural employment supported by EU agricultural sales

Parameter	Values
CAP commitments in 2010 (€billion) (2010 prices)	57.8
EU agricultural FTE employment (m) in 2010	8.9
Agricultural employment safeguarded by CAP (@2%)	178,400
FTE direct job per €1billion CAP	3,100
FTE total job per €1billion (CAP) – Type II multiplier of 2.0	6,200

Source: Eurostat, Scenar2020, DG Agri,20006.

No specific multiplier has been identified – a simple assumption of doubling of the direct impact has been made

Comparing this level of employment with that generated by the cases in which investment is made in land based activity (median value 8,300 FTE), CAP has a weaker employment impact. The investment in N2K, has the largest impact (29,900 FTE) reflecting the high share of investment made directly into supporting wages for new workers.

Cohesion Policy

The employment supported by cohesion policy is in principle less problematic to approximate, given that the Structural Funds effectively represent additional sales to economic sectors, as beneficiary programmes spend investment funds in support of cohesion policy objectives.

The difficulty is in relating the types of investments made by the Structural Funds to standard economic sectors. Analysis of planned spending in Operational Programmes broken down by the investment codes used by the fund, allows a crude link to be made.

This indicates that the largest recipient of investment is the construction sector. This is followed by other business services, (reflecting the investment in human resources and various forms of technical assistance), and research and development.

Based on the jobs supported by the sales in the identified sectors, and the weight of structural fund investment in these sectors, the total employment supported by the annual structural fund investment is some 448,000 FTE jobs.

Dividing the jobs supported by the programme investment, indicates that 8,400 FTE jobs are supported per €1billion of investment (0). Applying a type II multiplier with a value of 2.0 indicates a total employment impact of 16,800 per €1billion of investment.

Table 4: EU FTE employment supported by EU sector sales, benefiting from structural fund investment

Parameter	Values
Annual EU structural funds (€billion) (2011 prices)	53.1
EU employment supported (FTE, m)	0.5
FTE direct job per €1billion structural funds (sales)	8,400
FTE total job per €1billion (sales) – Type II multiplier of 2.0	16,800

Source: GHK estimates, based on DG Regio data from of approved Operational Programmes and Eurostat data on sales per job by sector.

No specific multiplier has been identified – a simple assumption of doubling of the direct impact has been made

Comparing this level of employment with that generated by the cases examining investment in infrastructure and sectors (median value 21,800 FTE), the investment in 'green' activities has a stronger employment impact than that calculated for the structural funds. The only case that has a lower employment impact is the waste recycling investment.

Concluding comments

The analysis was intended to test whether directing investment funded under the MFF, to green activities would have any significant detrimental effect on employment generation compared to investment in more conventional activities.

The evidence examined in this study suggests that there is no indication that such a redirection of investment would lead to any loss of employment. On the contrary, taking the results at face value, investment in green activities would have a slightly stronger employment benefit than investment in conventional activities. This is true for both CAP and for the Structural Funds.

The employment benefit is greater still if due account is taken of the improvement in the long-term sustainability of economic activity that would follow such a redirection of investment.

However, the results do need to be treated with some caution given the variations in the methods and assumptions used to calculate the employment impacts across the case studies. It also needs to be recognised that, in the surprising absence of evidence on the employment impacts of CAP and the Structural Funds under the current or indeed past MFF, there is only a limited analysis of the baseline impacts.

1 Introduction

1.1 Background for this study

The next Multiannual Financial Framework (MFF) (2014 – 2020) of the European Union is currently under negotiation. The European Commission has proposed the following objectives for the MFF for the period 2014 – 2020[1]:

- Smart and Inclusive Growth.
- Sustainable Growth: Natural Resources.
- Security and Citizenship.
- Global Europe.
- Administration.

The spending proposed for the MFF is intended to deliver the Europe 2020 growth strategy. This strategy promotes collective action to turn the EU into a smart, sustainable and inclusive economy that delivers high levels of employment, productivity and social cohesion. The strategy includes the following targets:

- 75 per cent of the population aged 20-64 should be employed (presently this figure is around 69 per cent).
- 3 per cent of the EU's GDP should be invested in research and development.
- The '20-20-20' climate / energy targets should be met (including an increase to 30% of emissions reduction if the conditions are right).
- The share of early school leavers should be under 10 per cent and at least 40 per cent of the younger generation should have a tertiary degree.
- 20 million fewer people should be at risk of poverty.

The clear and strong links between the proposals for the next MFF and the Europe 2020 strategy underlines the importance of climate, energy and labour policies to the future of Europe.

The aim of this study is to underline the socio-economic value of 'greening' the MFF, specifically through its potential contribution to employment. The study assess the possible employment impacts of a reallocation of MFF funding to address important environmental challenges under 8 key policy areas. These are:

- Investment in the Natura2000 Network.
- Agri-environment.
- Habitat restoration (specifically peatlands).
- Organic farming.
- Energy efficiency (housing).
- Renewable energy.
- Sustainable transport.
- Waste recycling.

This study explores the potential employment effects of investing €1 billion in each of these 8 policy areas.

1.2 Policy context for green investment

There are a number European policies and strategies intended to shift Europe towards a low carbon economy and reduce its environmental effects. One of the most significant of these, in terms of potential employment effects, is the European Energy and Climate Change

[1] European Commission, 2011. *A Budget for Europe 2020*. COM(2011)500.

Package (ECCP)[2]. The targets of the ECCP are known as the 20-20-20 and 10 per cent targets. They include:

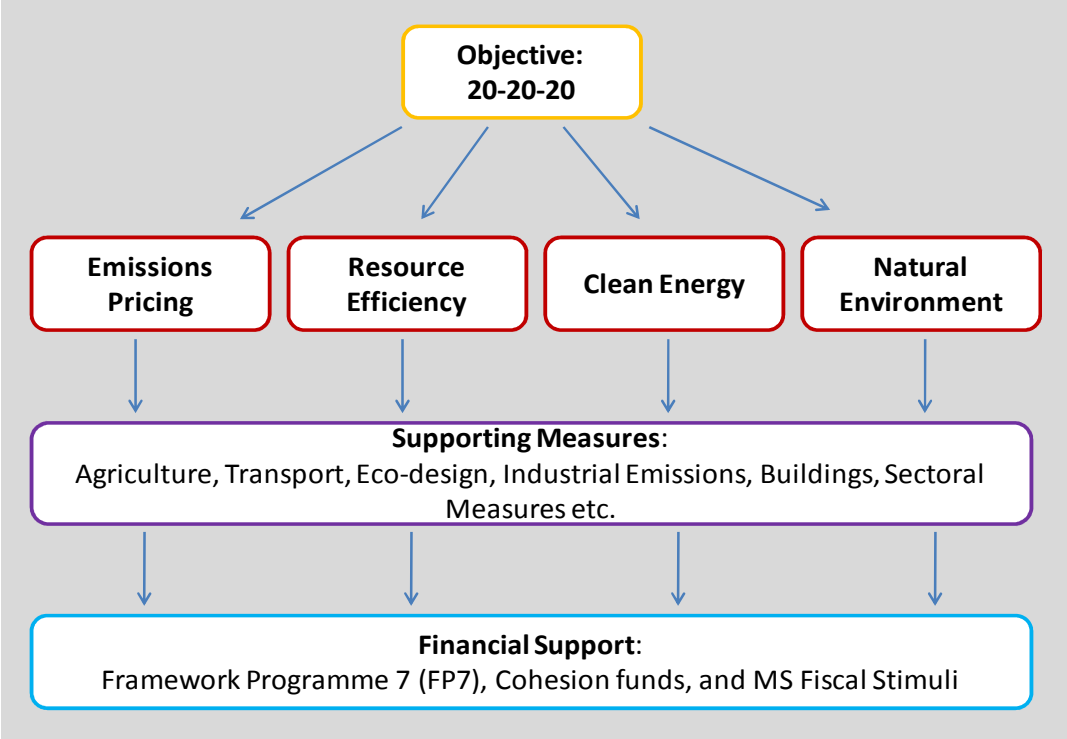
- Greenhouse gas (GHG) emissions to be cut by at least 20% from 1990 levels.
- Renewable energy sources to be increased to comprise of 20% of the EU's final energy consumption[3].
- Use of renewable energy sources to be increased by ensuring it represents at least 10% of overall EU transport final energy consumption.

The ECCP also includes the following non-legally binding objective:

- Energy consumption to be reduced by 20% of projected 2020 levels by improving energy efficiency.

Figure 1.1 demonstrates the links between these targets and supporting / implementing measures introduced by the European Commission and Member States.

Figure 1.1 20-20-20 Policy Matrix



Source: GHK

It is apparent from Figure 1.1 that achieving the 20-20-20 targets will depend on the implementation of measures across a range of sectors. These measures will affect employment in Europe.

1.3 Employment effects of green investment

The effects of European environmental policy on employment in Europe will differ depending on the sector affected. Quantitative estimates of the impacts of environmental policy on

[2] There are 6 legislative actions, all of which can be found at: http://ec.europa.eu/environment/climat/climate_action.htm.

[3] Final energy consumption means at the point of end use, as electricity, heat, and directly used fuels. This method therefore counts all forms of electricity equally, regardless of origin.

specific sectors are available in several studies; EmployRES (2009)[4], MOSUS (2005)[5] and ETUC (2008)[6]. Several other studies also provide qualitative estimates; ETUC (2007, 2009), UNEP (2008), CEDEFOP (2009) and GHK (2010, forthcoming)[7]. These studies have been reviewed in the context of an assessment of the likely impacts of green policies on employment in Europe (e.g. implementation of the EU 20-20-20 targets)[8].

The review found that most studies indicate that the initial impact of environmental policies is a cost to the European economy, followed by a modest positive outcome over the longer term. Depending on the specific policies and time periods, there is a general consensus that at the macroeconomic level, GDP and employment will increase by around 1 – 1.5 per cent compared to what might have happened in the absence of the investment.

However the review highlighted that the impacts would vary across sectors; the iron, steel, cement and petroleum sectors are likely to experience a decrease in employment, while the renewable, construction, and transport sectors are likely to experience positive job growth.

The potential positive and negative sectoral effects identified in the review are summarised below.

Positive employment effects include:

- The electricity and construction sectors are predicted to have the largest growth in net employment to 2020. The drive to improve the energy efficiency of European housing and commercial building stock is predicted to have a significant positive impact across the building supply chain. The move to de-carbonise Europe's electricity is predicted to lead to large increases in employment due to the construction, manufacturing and installation of renewable technologies. These positive employment effects are expected to be sufficient to off-set the negative employment effect of lower consumption of conventional (fossil) energy.
- By 2020, the renewable energy sector is forecast to create between 396,000 and 432,000 new jobs and generate GDP growth of 0.23 – 0.26 per cent. Within the renewable energy sector, employment growth is likely to be greatest in the biomass, waste, wind and solar energy sectors.

Negative employment effects include:

- The review found that across all of the studies surveyed, energy-intensive industries were likely to suffer the greatest job losses; employment in the cement, petroleum, iron and steel industries was predicted to decline to (and beyond) 2020. The predicted decrease in employment in these sectors was down to three factors; climate change and environmental policy; increases in labour productivity; and, lack of investment.

In addition to new green jobs, existing jobs are likely to be 'greened' in response to changing patterns of skills demand[9]. There is the potential to broaden the focus of investment in green jobs to target the re-profiling of existing jobs. A recent study suggests that sectors

[4] Fraunhofer ISI and partners, 2009. *EmployRES – The impact of renewable energy policy on economic growth and employment in the European Union: Final report*. European Commission, Directorate-General for Energy and Transport.

[5] Economic evaluation for International Institute for Applied Systems Analysis (IIASA) and partners, 2006. *Modelling Opportunities and Limits for Restructuring Europe: towards sustainability (MOSUS): Final Report*. European Commission, DG Environment.

[6] ETUC, 2008. *Climate Change and Employment: Case of the United Kingdom*.

[7] GHK Consulting, 2010, forthcoming. *Skills for Green Jobs – European Synthesis Report*. Cedefop; ETUC, 2009. *Climate disturbances, the new industrial policies and ways out of the crisis*; UNEP, 2008. *Green Jobs: Towards decent work in a sustainable, low-carbon world*; ETUC and partners, 2007. *Climate change and employment: Impact on employment in the European Union-25 of climate change and CO2 emission reduction measures by 2030*.

[8] Cambridge Economics, GHK and IER, forthcoming. *Studies on Sustainability Issues – Green jobs; trade and labour*. European Commission, DG Employment, Social Affairs and Inclusion.

[9] UNEP, 2008. *Green Jobs: Towards decent work in a sustainable, low-carbon world*.

subject to green re-profiling are generally capable of adjusting production models to respond to increased demand for green products and services[10].

1.4 The employment effects of a lack of sustainable investment

The cases examined relate to employment designed to improve the environmental sustainability of economic activity. The cases focus on the short-term employment effects flowing from the investment. They do not take account of the potential to maintain the economic activity under increased environmental constraints, and the employment that might otherwise be lost from a failure to ensure economic activity is sustainable.

The cases do not examine the consequences of unsustainable investment – i.e. investment that not only continues to harm the environment, but in so doing risks the very economic activity, in which the investment is made. Perhaps the starkest example of the risks to employment (and the environment) of continuing to invest in an unsustainable manner is in the fisheries sector. Evidence (Box 1) indicates that the continuing depletion of fish stocks beyond the natural limits of replenishment is likely to threaten existing fisheries employment in Europe.

Box 1: Fisheries and employment in Europe

Overfishing is a significant problem that continues to have a serious negative effect on the entire marine fishery sector across Europe. Although changes to management regimes (e.g. introduction of maximum sustainable yield, changes to discard policy) have brought some improvements to fish stocks, these have been limited and overfishing is still high. Approximately 80 per cent of European stocks are fished so far above their maximum sustainable yield that the yield is significantly reduced. Overfishing has resulted in approximately 30 per cent of European stocks at risk of collapse due to the reduction in reproductive capacity. Similarly, total landings from EU fisheries in the North East Atlantic and the Mediterranean have decreased by 30 per cent between 1995 and 2005 (European Commission undated). The North Sea in particular has suffered from poor fisheries management. Between 50 per cent and 98 per cent of the total biomass of major fisheries in the North Sea has been lost over the last century, and certain species have become locally extinct (WWF 2008). Existing fisheries management regimes in the North Sea have failed to prevent overfishing of most target species, and have resulted in the degradation of the habitats upon which these and other species depend (WWF 2008).

Fisheries related employment was approximately 421,000 in 2002 / 2003, of which, 405,000 were active in the coastal regions of the EU (LEI BV and Framian BV 2006). Most of these jobs are in the Atlantic and the Mediterranean areas (42% and 28 % respectively). Although the number of jobs is significant, its relative importance should not be overstated; the sector contributes less than 0.2 per cent of employment in coastal NUTS-II regions. Maintaining current levels of overfishing will result in the continuing degradation of Europe's marine fisheries and the continuing loss of fisheries jobs. Although fishing stocks are already seriously degraded, the complete collapse of fish stocks could have serious economic and social implications across Europe.

In Newfoundland, Canada, overfishing led to concerns about the possible extinction of the northern cod stock. Following the collapse in fishery stocks the fishery was closed in 1992, resulting in the largest mass employment layoff in Canada's history (Schrank 2005). The job losses resulted in predictable outcomes in areas dependent on the northern cod stocks; persistently high rates of long term unemployment (increase of 15% in 5 years, compared to 4% for Canada); depopulation (10% in a decade); and increasing reliance on social welfare payments and subsidies for remaining businesses. The depopulation of rural areas, especially by young people, reduced the amount of human capital necessary to attract and retain investment in industries capable of offering alternative employment (Hamilton and Butler 2001). While other fishing of other species (snow crab and shrimp) provided a new source of employment, the increased capital costs required to exploit these fisheries meant that the benefits did not accrue evenly throughout the local economy; unemployed fishermen were not reemployed, in general the jobs went elsewhere.

Although the economic and social situation in Europe is different (e.g. the proportion of fisheries employment is lower in Europe than it was in Canada), the collapse of commercial fish stocks could have significant negative effects on employment. If negative effects are to be avoided, novel

[10] GHK Consulting, 2010, forthcoming. *Skills for Green Jobs – European Synthesis Report*. Cedefop.

fisheries management regimes will be required.

1.5 Structure of the Report

The main focus of the study has been the development of a series of cases to understand the potential employment impacts associated with investment (to be funded under the MFF) in 'green activities' – activities that are primarily concerned to reduce the environmental impacts of economic activity, contributing to the long-term sustainability of the economic activity.

Section 2 describes the method used to assess and present the employment impacts in the case studies.

The case studies are presented in Sections 3 to 10.

Section 11 then summarises the case study results.

Section 12 provides a comparison of the results with estimates of the employment associated with spending under the current MFF. This provides an indication of the possible employment consequences of reallocating MFF investment to green activities.

2 Methodology

2.1 Establishing gross and net employment impacts from investment

The study examines the employment impacts from investments, using funds available under the EU Multi-annual Financial Framework (MFF), in environmentally beneficial economic activity ('green activity' in shorthand). The employment assessment is based on eight selected cases using analysis and data available in the published and grey literature.

2.1.1 Estimating the gross and net aggregate employment effects of the MFF

The case studies take no account of the implicit employment costs associated with funding the investment in the first place, or of the potential employment impacts that could have been secured had the investment been made in some other activity. The employment impact in each case excludes the employment impact as a result of the producing the funds in the first place. Neither do they consider the impacts of investing the funds in an alternative activity.

To calculate the net effect of the MFF investment in 'green activities', account also needs to be taken of the possibility of investing in alternative 'less green' activities that might have more or less greater employment benefits (the so called 'counterfactual analysis'). Since the potential range of alternatives is very wide and the focus has been on the green activities, the study takes an approximate estimate of the employment impact associated with the current MFF (jobs per €1 billion) as a benchmark against which to determine whether investment in green activities has a NET positive or negative employment impact.

It should also be noted that in a full social welfare analysis, the impact assessment would also seek to extend the counterfactual analysis to consider the employment effects associated with raising the finance for the investment in the first place; i.e. the consequences associated with either reallocating investment from other applications to the MFF and/or the impacts of marginally higher tax rates to generate the investment funds. However, since the focus of the study is a comparison of the alternative uses to which the MFF can be put it is not necessary to include these wider impacts.

2.1.2 Estimating the gross and net employment effects of case study investment

The main focus of the report is the development of a series of case studies of investment in green activities. At the level of the case study there are also gross and net effects. The gross effects (which will be positive) derive from the direct investment spending (e.g. jobs associated with a housing energy improvement programme, or habitat restoration / creation). These jobs last for as long as the investment lasts. If the investment leads to the establishment of self-financing activity, then at least some of the employment will be maintained.

There are also indirect effects, both on the supply side as a result of changes in producer spending on inputs (purchases) - as a result of the investment being used by recipients to make purchases of goods and services (e.g. changing farm practices and associated changes in the need for different inputs); and on the demand side, as a result of price or income effects (e.g. as a result of realising savings in energy costs; or as a result of market displacement – replacing conventional farms with organic farms if investment reduces the price of organic products). Indirect demand-side effects can also have their own supply-side impacts (e.g. as a result of changes in car purchasing following an investment in public transport that reduces the demand for private cars)

These indirect effects may be positive or negative depending on the particular sectors of the economy to which the green activities relate. It is therefore possible that the case study could have a positive gross employment impact but a negative net employment impact after taking into account the indirect effects.

Finally there are induced employment effects associated with the consumption of goods and services by those directly and indirectly employed spending their associated wages.

2.2 Standard breakdown of the employment assessment

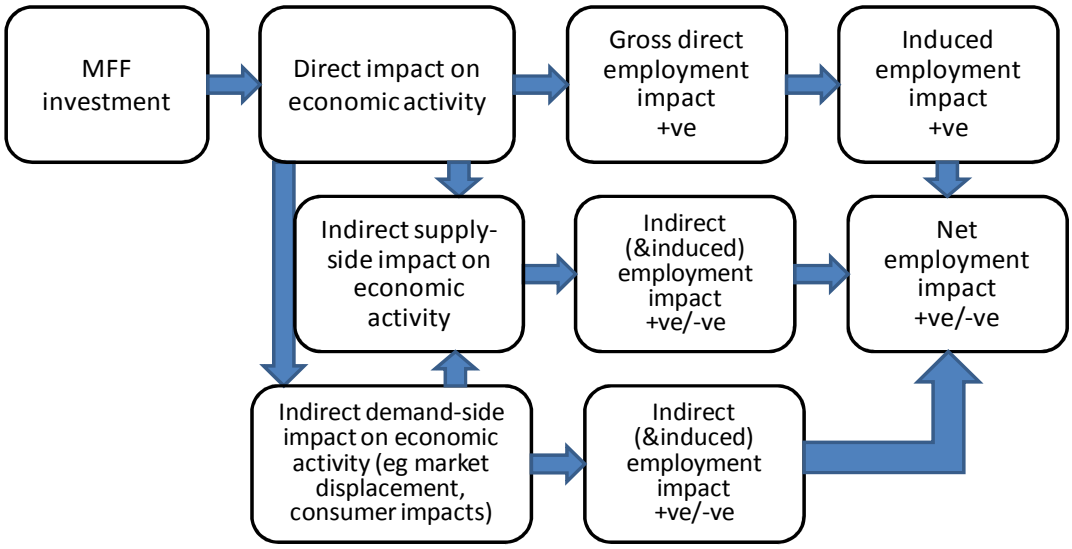
The case studies have therefore sought to estimate the gross employment impacts at the level of the EU (ignoring how the investment might otherwise have been used). A further analysis using a counterfactual estimate of MFF impacts has then been used to calculate the net employment impact. This is prepared separately from the individual case studies.

At the case study level the analysis has sought to identify both the direct and indirect employment impacts – and hence the gross and net effects at the level of the case study. However, in practice the available literature does not tend to cover all of these impacts, and tends to focus on the gross direct impacts and some supply side impacts.

In addition to these there are so called 'induced' employment effects as a result of the additional employment supported by spending of earnings by additional workers.

The range of impacts is indicated in Figure 2.1.

Figure 2.1 Outline of the employment impacts from an initial MFF investment



For each case study the employment impacts are estimated for a given level of investment. This allows the estimation of impacts per unit of investment and the aggregation of overall employment impacts across the different cases. It should also be noted that the numbers in this study have been rounded.

The categories of employment impact considered in the case studies comprise:

- **Direct employment impacts** – these are jobs generated in the sectors and operators that receive the investment funds. Some of the investment funds finance wages, and hence employment. In some cases the direct impacts have been estimated by converting estimated spending on wages to jobs using an average gross wage rate per FTE job. The rest of the investment finances the purchases of the goods and services required by the sector and operators;
- **Indirect (supply-side) employment impacts** – these are jobs generated in the sectors that supply the goods and services purchased using the investment funds. In some cases the employment is estimated on the basis of a knowledge of the main sectors supplying the purchased products and converting the value of sales made by the sector to jobs using the ratio of sector turnover to employment (adjusting for FTE), but assumes that the purchases are supplied by EU producers, with no leakage of investment on imports. In some cases the impact can be estimated using an available 'Type I' employment multiplier that calculates the indirect impacts based on the direct impacts, based on input-output analysis.

- Depending on the market context, the demand for purchases supported by the investment will impact on other supply chains, where the investment displaces other economic activity. For example investment in organic farming or renewables that displaces conventional production, will also impact related supply chains, reducing employment;

- **Indirect (demand-side) employment impacts** – these are jobs that might be generated or lost because the investment leads to changes in prices and incomes that affects demand. For example, the price and demand for different transport models might be expected to change as a result of changes in transport investment; or changes in spending might result because of impacts on incomes, for example as a result of investment in household energy savings;

- **Induced employment impacts** – these are jobs supported by the spending of wages by the persons gaining the additional direct and indirect employment. These can be approximated in the first instance on the basis of the level of employment supported by consumer spending, using the ratio of consumer spending required to support one FTE job. In some cases the impact can be estimated using an available 'Type II' employment multiplier that calculates the indirect and induced impacts. Where indirect effects can be calculated, the Type II multiplier can be used to calculate just the induced effect, subtracting the indirect effect.

2.3 Methodological issues arising from the review of literature

The literature review for the study has identified a range of methodological issues across the different case studies.

2.3.1 Limited coverage of the selected themes

There are some surprising gaps in the literature. For example, there was limited information available for the Waste Recycling study; and only very partial analyses of sustainable transport.

No information was identified for a suggested Sustainable Fisheries case study. The definition of sustainable fisheries generally means reducing fishing quotas and reducing the size of the European fishing fleet, or implementing a more radical reform of fisheries policy designed to conserve fish stocks and maintain yields at sustainable levels. No sources were identified that provided an estimation of the potential employment effects of investments that would improve the sustainability of European fisheries. It is likely that reducing the size of the European fishing fleet would result in net job losses in the short-term, but sustain jobs in the longer-term.

2.3.2 Spatial coverage of selected themes

It was difficult to identify EU level studies which have examined the employment impacts of investing in the chosen environmental themes. As a result, case studies have had to be selected which serve as a representation for the EU as a whole, when this may be questionable.

For example, in the case of the Natura 2000 network (N2K), most studies which quantitatively assess the socio-economic benefits of the network focus on individual sites, which can vary significantly between one another. However, it has been possible to use a survey of all Member States in the EU to calculate the EU-wide employment benefits of investing in N2K.

In the case study of agri-environment measures and peatland habitat restoration, it was not possible to identify an EU level assessment of the employment impacts of investing in these schemes. It was therefore necessary to use research undertaken in the UK as an illustration of potential EU impacts. In the case of sustainable transport no suitable case material has been found and evidence from the US has been used. This case has an especially high level of uncertainty attached to the estimates.

2.3.3 Disaggregation of employment impacts

Several of the sources identified present the employment effects in terms of net effects, without any disaggregation into direct, indirect or induced jobs. As the case studies are generally limited to country specific examples, the lack of disaggregated information means that it is difficult to accurately estimate the potential employment effects across Europe.

Only a limited number of sources make a clear distinction between direct, indirect and induced jobs. The majority of sources do not describe displacement effects of investing in particular sectors or industries, and do not tend to distinguish between one-off and continuing impacts

2.3.4 Consideration of the long-term employment effects

Investment in green activities is designed to reduce the environmental impacts of economic activity improving the sustainability of the activity. In the absence of improvements, economic activity is less sustainable and operates with a risk that the activity will be curtailed or harmed in the future as a consequence of future environmental changes. The implications of current environmental trends for future economic activity are implicit in most policy analyses, and policy rationales, but there are only limited examples of attempts to consider the economic and employment benefits as a result of reducing the risks to business by investing in environmental improvements – perhaps the most well known analysis is the Stern Review of the costs of climate change, which demonstrated the economic benefits of early investment.

The existing literature tends to focus on the short-term impacts of investment – and tends not to consider the employment safeguarded or increased in the long-term because of reduced environmental risks or improved environmental services.

2.3.5 Employment impacts of the MFF

The employment impacts estimated in the case study analysis of 'green' investment are compared with the overall employment effects of funding under the MFF. No formal analysis by the European Commission of the employment impacts of the use of MFF funding has been identified. This is somewhat surprising given the importance of employment as a policy goal, and means that the report has had to make a very approximate estimate of the employment impacts based on specific review of CAP and of the Structural Funds.

2.4 Making comparisons between employment estimates

Estimates of the employment effect of investing in green activities are assessed in the 8 case studies presented here. The estimates for each case study are based on published studies, each of which uses their own set of approaches and assumptions (some explicit, others implicit) on the employment effect of investment.

At face value the results should indicate the relative labour intensity of the investment made. However, differences in the estimated impact between cases will also arise because of different approaches to and extent of capture of:

- economic leakage (e.g. through expenditures on imported equipment);
- upstream and downstream economic linkages; and
- offsetting negative or displacement effects.

There may also be simple differences in the use of particular metrics and multipliers employed (e.g. average wage rates, turnover per FTE, selected multipliers etc.).

Due to these variations directly comparing the employment effect of investing in one area to another is problematic; and does not take full account of how these assumptions affect the estimates of employment.

The employment estimates should therefore be taken only as indicative results.

3 Investment in the Natura 2000 Network

3.1 Sustainability purpose of EU investment

The Natura 2000 Network (N2K) is the centrepiece of EU nature and biodiversity policy. It is an EU-wide network of nature protection areas established in response to the continual large scale destruction and fragmentation of wildlife habitats in Europe. It was established under the 1992 Habitats Directive, and includes areas designated under the 1979 Birds Directive, and fulfils the EU's obligation under the UN Convention on Biological Diversity. The objective of the network is to ensure the sustainability of Europe's most valuable and threatened species and habitats. It plays a key role in protecting the EU's biodiversity, and in helping to meet its commitment to halt the loss of biodiversity and ecosystem services in the EU by 2020.

Various studies have documented the benefits of investing in the N2K network, underlining the wide range of ecosystem services that are provided by the network such as tourism and recreation, water quality, flood control, and wider cultural services. The Natura 2000 network safeguards species and habitats and helps to provide essential environmental services for people and the economy. N2K sites can help to attract financing and offer an important source of direct and indirect employment by diversifying rural employment opportunities and encouraging skills retention and development. For instance, N2K sites are often an important resource for recreation and tourism.

The rationale for investment is even greater when considering the current shortfall in funding needed to deliver the full benefits of the N2K network. The total cost of implementing the network has been estimated at €5.8 billion annually for the EU-27, however, current EU funding allocated to the network only amounts to an estimated €0.5 to €1.1 billion (i.e. 9-19 per cent of the estimated cost), leaving a shortfall of between €5.3 and €4.7 billion per year (Gantioler et al. 2010). Investment is therefore required to fill this gap, in order for the network to best deliver its full range of benefits.

3.2 Types of activities associated with the investment

The types of activities associated with the management of N2K sites involve general management activities (e.g. preparation of management plans, the coordination of restoration activities, communication activities, etc.), as well as the monitoring and restoration activities themselves. These activities sustain a number of ancillary activities such as contractors supplying materials or labour in order to restore or develop the necessary infrastructure and habitat restoration works, installations for public access, the processing/distribution/marketing of natural produce, souvenir shops, tourism and so forth.

Some of these activities are on-going (e.g. site management), others are one-off (e.g. restoration works, public access works), whilst others are recurrent (e.g. monitoring / surveillance).

Investment in the Natura 2000 network creates jobs in the management of the network, among supplier businesses (particularly rural land management contractors), and in sectors that benefit from sites, such as tourism. Jobs are also created or maintained due to spending of wages in the local economy received by employees that are directly or indirectly supported by the investment.

3.3 Evidence and assumptions

The available evidence is based mainly on examining the use of employment at N2K site level. This type of information is typically based on local case studies and examples. However, the limited number of examples makes it difficult to form a comprehensive picture of the employment benefits associated with Natura 2000 as a whole. Only a few aggregate estimates are available for Natura 2000 related employment at national level (see Gantioler et al. 2010).

In order to arrive at an EU level estimate, it has been necessary to use data obtained through a survey of EU Member States which estimated the socio-economic costs and benefits of implementing the N2K network (Gantioler et al. 2010). The study found that Natura 2000 management leads on average to the creation of 3 to 5 FTE (Full Time Equivalent) jobs per site, while the spending by visitors at the site or nearby helps to create an additional job. This case study also draws on the methodology presented in Rayment et al. (2009).

For this case study, an estimate of the total number of direct jobs associated with the network has been calculated on the basis that:

- Wages comprise 50% of the costs of operating the network[11].
- The average wage rate amounts to €28,000 per full-time equivalent[12].

An estimate of the total number of indirect and induced jobs associated with the network has been calculated on the basis of the following employment multipliers[13]:

- A Type II multiplier of 2.24 (direct + indirect + induced).

These assumptions have been used to calculate the employment impacts of investing in the Natura 2000 network.

3.4 Employment impact of investment

3.4.1 Direct Jobs

On the basis that wages comprise 50% of the investment costs, and that average wage costs per full-time equivalent are €28,000, an investment of €1 billion would therefore result in 17,900 FTE direct jobs per year. These jobs will be sustained as long as investment is maintained.

3.4.2 Indirect Jobs (supply-side)

The investment in the N2K network not only supports jobs directly. The network uses 50% of the investment to purchase goods and services to enable the creation and restoration of the infrastructure.

From the information gathered by Gantioler et al. (2010) on MS experience, it was found that, on average, 33% of the investment is made in one-off investments (e.g. land purchase and investment in infrastructure such as equipment acquisition, signage, trails, and observation platforms) and 67% are recurrent and on-going annual costs (e.g. habitat management and planning). Of recurrent costs 75% are wages (included as the direct impact) and other purchases.

The expenditure associated with land purchase is assumed not to generate employment, and is taken as profit by the landowner. It is likely that the profit will subsequently be invested and therefore will generate employment, but no details are available on the use of receipts by landowners.

The employment impact associated with the remainder of the purchases generates employment depending on the economic sectors supplying the purchases. In the main the type of purchases will tend to be supplied by the construction sector and a range of other sectors.

Assuming that land purchase accounts for half of the one-off costs, and excluding wages, some 34% of the investment cost (€335m) is spent on purchases. Assuming that the employment impacts are best represented by taking the construction sector as the principal

[11] From Rayment et al. (2009)

[12] From MS responses to EU questionnaire on the costs of managing N2K sites, in Gantioler et al. 2010.

[13] Based on the EU-27 multipliers for core natural resource based activities from modelling work in the GHK et al (2007) study on the links between the environment, economy and jobs (Table 4.8)

supplier, then the purchases will support some 2,900 jobs (2,800 FTE), given that €118,000 of construction sales supports 1 job.

3.4.3 Indirect Jobs (demand-side)

The investment will also generate jobs in activities supported by the attraction of visitors and from the branding of products linked to the name or other attributes of the site. It is also possible, that the investment could encourage EU citizens that would otherwise holiday outside the EU to remain in the EU and reduce leakage expenditure.

Natura 2000 sites can be a significant source of tourist attraction. For instance, one site in Germany, the national park Wattenmeer, is responsible for 23% of total tourist visits in the region (Gantioler et al., 2010). However, 78% of tourists in the EU originate from the EU itself (only 22% originate from outside the EU) (Eurostat, 2010). Any employment supported by tourism spending attracted by the investment, is likely to be mainly at the expense of tourism spending elsewhere in the EU. In other words for every 10 jobs supported by tourism attracted by the investment, 8 jobs are displaced elsewhere – and that assumes that the international tourists were attracted as a result of the investment in N2K.

In the case where there is real growth in the spending on tourism, the displacement effect would be reduced. However, recent evidence indicates that spending on tourism is decreasing. The number of trips taken within Europe by EU residents declined between 2009 – 2010 by 1.0 per cent and the length of trips has decreased by 1.6 per cent (Eurostat 2010a, Eurostat 2010b). While the spend per trip has increased (1.2%) (Eurostat 2010c), the majority of this is due to fixed costs (such as transport to the destination) being spread over fewer nights.

There is therefore likely to be a slight positive effect at the EU level due to N2K investment based on increased attraction of international (non-EU) tourists and growth in EU tourism expenditure. There would also be a positive employment effect if the investment reduced tourism related leakage. Food branding might attract a price premium and generate revenue and support employment at the site, but the payment for this would be at the expense of reduced spending on other products, given fixed consumer expenditure budgets. Quantifying these impacts is however not possible due to a lack of information.

At the level of the immediate locations of N2K sites it is expected that some significant additional employment would be generated, depending on the scale of investment and the characteristics of the location of a particular site.

3.4.4 Induced Jobs

Additional jobs will also be created as a result of the household spending of wages received, on local goods and services (e.g. food, rent, etc.).

This employment effect can be approximated by applying an employment multiplier to the direct and indirect jobs generated.

Taking a multiplier of 1.65 (calculated from the Type II multiplier of 2.24), but excluding the indirect impacts since these have already been examined, and applying it to the 20,700 direct and indirect FTE jobs, indicates a further 9,300 FTE jobs.

3.5 Overall employment effect

Table 3.1 summarises the figures calculated above for direct, indirect and induced employment resulting from an investment of €1 billion in the Natura 2000 network.

These are gross estimates and do not take account of alternative uses of the funds expended, or of the economic effects of financing this expenditure. Nonetheless, the impacts are likely to be strong compared to other uses of these funds, in light of the relative labour intensity of much of the work involved and the multiplier effects.

Table 3.1 Annual EU employment (FTE) impact of investing €1 billion per annum in the Natura 2000 network

Effect		Addition / loss of jobs (FTE)
Direct effect	Half of the investment is spent on wages. These jobs can include low skilled labour (e.g. for capital works) and higher skilled labour (e.g. research, surveys, consultations)	17,900
Indirect (supply)	Jobs created from the supply of goods and services related to the management of the Natura 2000 network, purchased with the other half of the investment, excluding land purchase	2,800
Indirect (demand)	There is likely to be a slight increase in EU employment from impacts on tourism, encouraging additional expenditure from international (non-EU) tourists, attracting a share of any real growth in tourism spending by EU citizens and by reducing leakage associated with tourism expenditure by EU citizens outside the EU	Slightly positive
Induced effect	Jobs created from the consumption activity generated by spending of the wages received by those directly and indirectly employed	9,300
Total jobs	**Gross figure**	**29,900**

3.6 Sources

This Case Study draws on several studies which estimate the costs and benefits of implementing the Natura 2000 network, mainly using information from the following reports:

- Assessment of the Natura 2000 co-financing arrangements
- Costs and Socio-Economic Benefits associated with the Natura 2000 Network.
- Assessing Socio-economic Benefits of Natura 2000 – a Toolkit for Practitioners
- The economic benefits of environmental policy.

A full reference list is given below:

Eurostat, 2010. Arrivals of non-residents in tourist accommodation establishments – world geographical breakdown – annual data (tour_occ_arnraw)

Eurostat, 2010a. Number of trips - by month of departure - annual and quarterly data (tour_dem_ttmd)

Eurostat, 2010b. Nights spent - national - annual data (tour_occ_ninat)

Eurostat, 2010c. Tourist expenditure - total - annual and quarterly data (tour_dem_extot)

Gantioler, S., Rayment, M., Bassi, S., Kettunen, M., McConville, A., Landgrebe, R., Gerdes, H. and ten Brink, P. (2010) Costs and Socio-Economic Benefits associated with the Natura 2000 Network. Available from: http://ec.europa.eu/environment/nature/natura2000/financing/docs/natura2000_costs_benefits.pdf

Kettunen, M., Bassi, S., Gantioler, S. & ten Brink, P. (2009). Assessing Socio-economic Benefits of Natura 2000 – a Toolkit for Practitioners (September 2009 Edition).

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4 Agri-environment (including High Nature Value farming)

4.1 Sustainability purpose of EU investment

Intensive agriculture has had, and continues to have, a significant impact on European biodiversity; a significant amount of biodiversity is found in or around agricultural landscapes. Moreover, continued agricultural production is reliant on biodiversity and the ecosystem services it delivers. It is therefore important to balance agricultural productivity with the needs of ecosystems and biodiversity.

High Nature Value agriculture is typically low intensity agriculture, using traditional practices that support high levels of biodiversity. HNV farms conserve a significant part of the EU's biodiversity, covering 74 million hectares and accounting for approximately 30% of the total Utilised Agricultural Area in the EU[14]. Moreover, HNV farming systems, such as HNV grasslands, are also important for climate change mitigation and adaption. Ecosystem services provided by HNV areas include, for instance, carbon storage, resistance to floods, fire resistance in dry areas, and landscapes allowing species and habitat adaptation to climate change.[15]

Agri-environment schemes (AES) more broadly are also important tools for improving and supporting biodiversity in the wider countryside. They play a role in maintaining and enhancing landscapes, protecting the historic environment and natural resources, and promoting public access to the countryside. They have already made substantial contributions to the achievement of UK BAP targets for certain habitats and species (LUPG, 2008).

In the absence of EU-level information on the employment impacts of investment in farming systems with high nature value, it has been necessary to use as a proxy a study which assesses the employment impacts of a relatively high nature value agri-environment scheme in the UK ("Higher Level Stewardship").

4.2 Types of activities associated with the investment

Investment in agri-environment supports the actual farming and agricultural work. It is likely that the greatest employment impact in this case is job retention rather than job creation, especially in the case of the more extensive HNV farming systems, that tend to be more marginal producers.

However, there is potential for job creation in terms of the share of activities associated with agri-environment schemes and HNV farming which relate to the restoration and maintenance of features (hedges, woodlands, walls etc) on the farm in a 'high-nature value' state. This restoration work is particularly relevant in the case of farms implementing advanced agri-environment measures (such as under the "Higher Level Stewardship" scheme in the UK), where numerous measures are eligible for farm payments (e.g. hedgerow restoration, stone walling and bank restoration, fencing, the blocking of grip drainage channels, etc.). There are more limited opportunities in the case of HNV farms, where sites are most likely already being extensively managed, and therefore the activities will most likely involve maintaining (rather than creating) the presence of natural and semi-natural farmland features such as mature trees, shrubs, uncultivated patches, ponds and rocky outcrops, or linear habitats.

In the case of farms implementing advanced agri-environment measures therefore, there is considerably more scope for expenditure on supplies and on off-farm contract labour (e.g. contractors and advisors) to support the infrastructure or restoration works. The greatest increase in jobs associated with agri-environment is therefore likely to be related to these types of capital works, such as dry-stone walling, fencing, etc.

[14] IEEP: Agriculture and Land management. High Nature Value Farming. http://www.ieep.eu/topics/agriculture-and-land-management/high-nature-value-farming/

[15] High Nature Value grasslands: Conference conclusions. http://www.fundatia-adept.org/bin/file/conference2010/Conference%20conclusions_final.pdf

4.3 Evidence and assumptions

Evidence on the employment impacts of investment in nature friendly agri-environment measures is limited. In the absence of any quantitative analysis it has been necessary to examine studies related to the employment impacts of broader agri-environment schemes. This section therefore draws on a recent study which estimates the incidental socio-economic benefits of environmental stewardship schemes in England (CCRI, 2010).

Environmental Stewardship (ES) is an agri-environment scheme which offers payments to farmers and land managers in England for effective land management to protect and enhance the environment and wildlife. The scheme is delivered for Defra by Natural England and forms part of the Rural Development Programme for England (2007-2013). The ES scheme in the UK is composed of two levels - the Entry Level Stewardship (ELS) (with entry levels also provided for organic farms and upland farms) and the Higher Level Stewardship (HLS). ELS is open to any farmland, whereby a farmer is given options which the farmer can choose to apply on their land (e.g. hedgerow maintenance, etc.). HLS, on the other hand, is much more targeted and encompasses more important habitats and active and environmentally beneficial management practices.

In the UK, High Nature Value (HNV) farming is almost entirely associated with extensive livestock systems based on semi-natural grazing and low intensity grassland systems, usually in the uplands (RSPB, 2011). Although HLS can capture some of these elements, agriculture in the UK is relatively developed and intensive and therefore HNV farming systems are not as abundant in the UK as in some other countries in the EU, as extensive farming systems are more scarce.

The CCRI (2010) study assesses the direct, indirect and induced employment effects from investment in agri-environment schemes at the local level. As the HLS scheme is the closest approximation to HNV farming for which evidence on employment impacts is available, this case study will only draw on those results. It is not entirely clear from the study how the HLS investment is used and the balance between its use for capital works (and the generation of new jobs), or for supporting farm incomes and the retention of jobs. We have assumed that the HLS is used entirely for capital works based on the apparent employment and multiplier effects estimated.

The study assessed the direct, indirect and induced employment effects for HLS schemes at the local level as comprising;

- An investment of €75 million, resulting in 186 gross[16] direct FTE jobs (estimated from survey data) or 2.48 jobs per € million;
- For indirect FTE jobs, it was assumed that 1 FTE job will be created for every €250,000 expenditure on second and third round supplies (throughout the duration of the schemes); and,
- For induced jobs, an induced employment coefficient of 0.1 was assumed (i.e. an additional induced job will arise with every 10 jobs supported either directly or indirectly at the local level).

These assumptions and calculations have been used in this case study to estimate the employment impacts of a €1 billion investment.

There are however two caveats to consider;

- The CCRI (2010) data only considers local level impacts, and therefore is likely to be an underestimate of the employment impacts at the national level (with larger multipliers, although some displacement effects may also be larger); and,

[16] The study assumes that 50% of this employment would be taken by local workers and applied a 50% displacement assumption. We have removed the assumption on the basis that vacancies created would subsequently be taken up – given the nature of skills and availability of unemployed or under-employed workers

- HLS farms are only being used in this case study as an approximation of HNV farms, and so the employment impacts of the latter might differ from the former.

In comparison, using an econometric model rather than direct surveys, Petrik and Ziar (2010) estimated the regional employment impacts of CAP measures. This concluded that agri-environmental measures in Eastern Germany, generated some 14,500 direct FTE jobs per €1billion (14.5 jobs per €1m), approximately 10 times the impact found in the UK study. The study did not estimate indirect or induced effects.

4.4 Employment impact of investment

4.4.1 Direct jobs created

The CCRI (2010) study finds that an investment of €1m directly supports 2.48 FTE jobs. On this basis, increasing this investment to €1 billion would therefore create 2,500 direct FTE jobs. It is likely that the direct employment effects in the case of HNV systems are likely to be even greater than those found in the case of HLS schemes, as HNV farms tend to be more labour intensive than other types of farms, including HLS farms.

The CCRI (2010) analysis suggests that, although the additional job creation is not particularly significant, agri-environment schemes do appear to play an important role for job retention, if not necessarily job creation. This is evident from the fact that farms were able to absorb much of the additional workload generated by the scheme without recruiting additional staff, implying that farm staff were underemployed.

4.4.2 Direct jobs safeguarded (not included in the aggregate estimate)

The number of jobs safeguarded by investing in HNV farms can be estimated using the existing investment in Less Favoured Areas across the EU as a proxy measure, as the great majority of HNV farms fall within LFAs (IEEP, 2006). The contribution of LFA payments to farm income can be significant, being as high as 50% (IEEP, 2006). One example in the UK has shown that LFA payments can constitute as much as 68-85% of net income on some farms (ADAS, 2003). However, in other cases the figure is much smaller, potentially as low as only 1% of farm income. Overall, LFA support contributes about 20-30% of agricultural income on the basis of eight Member States, where the LFA support is applied relatively intensively (IEEP, 2006).

LFA compensation payments amount to just over €3 billion per year (IEEP, 2006), allocated to roughly 1.4 million farms in the EU in 2005[17]. Based on the FTE per LFA farm being 1.28 (Morison et al., 2005), the number of jobs supported by LFA farms in the EU amounts to 1.8 million FTE. €1 billion would be allocated to farms employing 0.6m FTE.

Assuming that 20% of farm income would be lost in the absence of LFA payments, and 20% of employment would be lost , the €1 billion investment would safeguard some 0.12m FTE jobs. Arguably the potential for jobs to be lost in the absence of investment is greater in the case of HNV farms than those farms that receive agri-environment payments such as under HLS in the UK, as the contribution to farm income is potentially higher.

In terms of the impact of the HLS scheme, it is possible to obtain a basic estimate of the level of job retention provided by HLS payments. Roughly 820,000 hectares of land is under HLS stewardship[18], the average agricultural employment per 100 hectares in the UK is 2.19 FTE[19], total employment of 18,000 jobs. Investment in HLS schemes is some €95 million in

[17] DG AGRI (2009) Rural Development Policy 2007-2013. Available from: http://ec.europa.eu/agriculture/rurdev/lfa/index_en.htm

[18] Natural England (2011) Agri-Environment Performance Report for Agri-Environment Stakeholders' Group 8 February. Available from: http://www.naturalengland.org.uk/Images/stakeholder-feb-2011_tcm6-24924.pdf

[19] Morison et al. (2005) Survey and Analysis of Labour on Organic Farms in the UK and Republic of Ireland. International Journal of Agricultural Sustainbility Volume 3(1). Available from: http://www.essex.ac.uk/bs/bs_staff/pretty/Organic%20Jobs%20IJAS%20(Morison%20et%20al%20%202005).pdf

2010/2011[20]) and represents approximately some 20%[21] of farm incomes. On the basis that the loss of HLS would lead to a loss of 20% of employment this represents 36.2 FTE per €1m of investment, or 36,200 FTE jobs per €1 billion.

As noted it is not clear in the study how the HLS is used and the balance between use for capital works (and the generation of new jobs), and farm income support and the retention of jobs. We have assumed that the HLS is used entirely for capital works, and that the job retention impact is excluded.

4.4.3 Indirect jobs (supply-side)

The CCRI (2010) study finds that for an injection of €1 million on purchases, 4 additional indirect FTE jobs are created. On that basis, an investment of €1 billion would support 4,000 indirect FTE jobs. Subtracting the investment from the €1billion that supports the direct jobs (say €69m at €28,000 per job), the remaining investment is spent by farms and supports some 3,500 indirect FTE jobs. These jobs are associated with the supply of contract farm labour, materials and farm advisory services to implement HLS measures.

It is also worth noting that, as with the direct employment impacts, whilst the gains from investing in HLS capital works may not be particularly significant, the schemes do play an important role in helping to reduce employment fall-offs in rural areas. A study by Scottish Natural Heritage (SNH, 2002) found that, for instance, of total employment impacts across the survey case studies, close to 80% of positive employment benefits accrue to the off-farm contract labour sector (e.g. dykeing, hedge laying and stock fencing).

It is likely that the indirect employment effects in the case of HNV systems will be smaller than those found in the case of HLS schemes, as HNV farms would be unlikely to require similar levels of contractors and supplies as HLS farms, given that they are typically based on low input, extensive and traditional systems of farming where little investment or infrastructure work is required to restore the site. Instead, activities are more likely to be related to the maintenance of a site in its 'high-nature value' state.

4.4.4 Indirect jobs (demand-side)

No indirect (demand-side) employment effects have been identified.

4.4.5 Induced jobs

Applying a Type II multiplier of 2.24 taken from the GHK multiplier estimates (GHK, 2007) in the absence of a case study estimate, indicates that an additional 600 FTE jobs are generated.

4.5 Overall employment effects

The direct, indirect and induced employment effects of an investment of €1 billion into high nature value agriculture (on the basis of results from HLS schemes) is shown in Table 4.1.

Table 4.1 Annual EU employment (FTE) impact of investing €1 billion per annum in Higher Level Stewardship Schemes

Effect		Addition / loss of jobs (FTE)
Net direct effect	Direct employment effects in the case of HNV systems are likely to be even greater than those found in the case of HLS schemes, as HNV farms tend to be more labour intensive than other types of farms, including HLS farms.	2,500

[20] DEFRA (2010) Defra confirms Higher Level Stewardship funding and new Environmental Stewardship payment schedule. Available from: http://www.defra.gov.uk/news/2010/11/16/hls-scheme/

[21] GHK own estimate assuming average size of 57 Ha and average farm income of €34,500

	The positive impact on direct employment if the investment s used for income support and job retention rather than capital works	*36,200 (not included in total)*
Net indirect (supply) effect	It is possible that the indirect employment effects in the case of HNV systems are likely to be smaller than those found in the case of HLS schemes, as HNV farms are typically based on low input, extensive and traditional systems of farming where little investment or infrastructure work is required. The need for suppliers, contractors, etc. is therefore significantly reduced.	3,500
Net indirect (demand) effect	No indirect (supply) employment effects were identified.	-
Net induced effect	The spending of wages by employees, contractors and advisors results in a small positive impact	600
Total jobs	*(not including job retention)*	**6,600**

Source: GHK estimates

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5 Peatland restoration

5.1 Sustainability purpose of EU investment

The importance of habitat restoration has been recognised in the new and expanded biodiversity target for the EU, which aims to "halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, *and restoring them in so far as feasible*, while stepping up the EU contribution to averting global biodiversity loss" (italics own).

This official validation of the role of restoration in supporting biodiversity means there is now an increased imperative to consider not just the protection of existing habitats, but also the restoration of degraded ones. Restoration is often the only option in case of habitats where losses or damage has already occurred.

Habitat restoration can have a multitude of environmental, social and economic benefits. For instance, restoring habitats can facilitate the return of wildlife to disturbed areas for its own sake or for the sake of recreational activities such as hiking, hunting, fishing, and bird-watching. Returning degraded habitats to health can expand existing habitats, making them larger and thereby helping to protect species against the vulnerabilities of small population sizes.

There are also habitat specific benefits depending on the habitat being restored. For instance, economically, healthy riparian zones help control erosion and maintain good water quality in streams and lakes reducing the need for 'grey' infrastructure such as water filtration systems. Restoring damaged wetland zones helps ensure clean drinking water and can contribute to flood control. In terms of forests, restoration can particularly enhance carbon stocks and mitigate greenhouse gas emissions, given that forests are the largest terrestrial reservoir for atmospheric carbon.

Similarly in the case of wetlands, and specifically peatlands, these habitats can play an important role in the management of carbon stocks. Peatlands, for instance, are the single largest terrestrial store of carbon (equivalent to 75% of all atmospheric carbon) and act as one of the best long-term stores. Peatland degradation therefore poses a particularly severe challenge and threat both in terms of biodiversity loss and climate change; the EU is the world's second largest source of carbon dioxide emissions from peatlands drainage, after Indonesia, due mainly to agriculture and forestry[22]. Western Europe has already lost over 90% of its original functioning peatlands and central Europe over 50%. Their continued degradation not only accelerates climate change, but also results in the loss of rare and vulnerable biodiversity.

5.2 Types of activities associated with the investment in peatland restoration

Forest and wetland restoration includes a diverse set of activities, such as thinning, removing noxious weeds, and modifying culverts, bridges, and dams to improving fish passage and stream habitat.

Specifically in terms of peatland restoration, activities can be as simple as blocking drains and gullies to stem carbon losses and to allow channels to re-vegetate. Other activities can include reseeding or planting of wetland species, modifying forestry practice to employ low impact logging / extraction techniques and modifying livestock management (e.g. having the peatland areas lightly grazed, or not grazed at all).[23] Grazing control, scrub clearance, hydrological control and visitor access are also important.[24]

[22] Wetlands International and Greifswald University (2010). The Global Peatland CO2 Picture: peatland status and drainage related emissions in all countries of the world

[23] Peat Portal: Modification of peatland management strategies. http://www.peat-portal.net/index.cfm?&menuid=171&parentid=46.

[24] Peak District National Park Authority (2008). A compendium of UK peat restoration and management projects. Available from: http://randd.defra.gov.uk/Document.aspx?Document=SP0556_7584_FRP.pdf.

Some of these restoration activities require skills in, for instance, project design, data collection, surveying, and engineering. Generally, restoration projects are planned and managed by one (usually public) entity, and then implemented by contractors. The funds spent in-house on planning and coordination will vary depending on the type of project. Labour-intensive contracting usually creates more jobs and less overall economic activity, whereas equipment-intensive contracting creates fewer jobs and more overall economic activity (ISE, 2010). A large share of the jobs created by restoration projects are considered to be temporary (lasting only as long as the funded restoration activity) and to require relatively little specialization (Wagner and Shropshire, 2009).

5.3 Evidence and assumptions

The case study draws on information related to the restoration of habitat types. Specifically, this section uses the analysis of the direct employment impacts of peatland restoration projects, from a study by the Peak District National Park Authority (PDNAP) (2008). They calculated that the average project, worth £241,000, resulted in 1.4 FTE jobs. The PDNAP study did not consider indirect or induced employment effects.

Estimates given below for the employment impacts resulting from a €1 billion investment [25] in habitat restoration are calculated on the basis of the above information and the application of multipliers from the DG Environment study on economy and environment linkages.

A study by the University of Oregon's Institute for Sustainable Environment (ISE 2010) on the employment impacts of forest and watershed restoration has also been identified. This study examined data collected from contractors and grant recipients to develop an input-output model which estimated the employment and economic output effects of public investments in forest and watershed restoration in Oregon. There has been no specific information identified in relation to the employment impacts of peatland restoration.

Although several types of restoration projects were assessed by ISE (2010), the results have not been used in this case study given the uncertainties associated with the application of the specific input-output model to the EU.

5.4 Employment impact of investment

5.4.1 Direct jobs

Direct employment is created by the planning and implementation of restoration projects. Applying the results from the PDNAP (2008) study indicates that 3,900 direct FTE jobs is created by investment of €1 billion in peatland restoration (undertaking the types of activities described above).

5.4.2 Indirect jobs (supply-side)

Indirect employment effects result from the demand for goods and services necessary to implement the restoration project, such as materials, supplies, equipment, and other services needed to implement projects.

ISE (2010) find that the most significant purchases relate to fuel, raw materials (wood, minerals, metals), and other building and landscaping products. Other sectors which are less affected but which also benefit from purchasing activity are employment services, commercial and industrial machinery rental, commercial and industrial machinery repair and maintenance, and professional services.

Based on the GHK (2007) Type I multiplier for resource management of 1.79 the indirect employment impacts 3,100 FTE jobs will be created.

[25] The €1 billion investment figure used here is not a reflection of whether this level of investment in peatland restoration is either necessary or feasible, but was chosen instead in order to determine the relative employment effects of investing in peatland habitat restoration compared to investing in other environmental areas.

These results are potentially a good approximation of the indirect (supply-side) employment impacts that would occur from investment in peatland restoration projects, given the need for equipment and machinery to develop practical works on peatland sites. For instance, the PDNAP (2008) study finds that the purchase of equipment for bunding peat or baling heather and the removal of vegetation such as trees or scrub were all expensive investments for a number of projects. Several activities associated with peatland restoration, such as peat reprofiling, require the use of machinery and capital investment. Nonetheless, it is possible that the labour requirements for peatland restoration projects are slightly higher than those evidenced from wetland and upland projects in the ISE(2010) study, given that many activities can also be done using more labour-intensive methods. For instance, peat reprofiling can also be done by hand-cutting methods rather than using machinery. Moreover, other activities, such as monitoring and archaeological surveys (which were also a significant proportion of project costs), would require greater labour inputs.

Overall, it is likely that the indirect (supply-side) employment effects are likely to be slightly higher than those found in the case of wetland and upland restoration projects assessed in the ISE (2010) study.

5.4.3 Indirect jobs (demand-side)

There is the risk that jobs may be lost as a result of changing, reducing or removing economic activity to enable restoration. For instance, one particular study (RSPB, 2002) looked at the impact of restoring areas of afforested peatland to blanket bog, and found that premature felling of the area could potentially deprive the local community of future jobs associated with timber harvesting, haulage and processing, and second rotation forestry. However, the study highlights that the growing of trees on deep peat soils is experimental and there is little certainty that a harvestable crop would result, potentially limiting the job opportunities that would have existed without the restoration of the peatland. Any displacement impact will clearly depend on the specific circumstances of the restoration projects.

Therefore, whilst a number of job opportunities will be generated because of the funding of restoration work, including on-going jobs to ensure land is appropriately managed into the future, the opportunities for long-term jobs may be less than if activities such as forestry or agriculture were to continue in the absence of the restoration.

Displacement effects might be compensated by the provision of ecosystem services including the provision of recreation and tourism related services, thereby generating additional employment.

5.4.4 Induced jobs

The induced employment effect from those people directly and indirectly employed spending their related incomes on goods and services, based on the GHK (2007) Type II multiplier of 2.24 indicates the induced employment impacts from a €1 billion investment are 1,700 FTE jobs.

5.5 Overall employment effect

The results of the above analysis are summarised in the table below, showing the likely overall employment effect of investing €1billion in peatland habitat restoration projects (Table 5.1).

Table 5.1 Annual EU employment (FTE) impact of investing €1 billion per annum in habitat restoration

Effect		Addition / loss of jobs (FTE)
Direct effect	Employment created by the planning and implementation of the project. Includes figure for the direct employment impact of the average peatland restoration project. Peatland restoration	3,900

	projects appear to be more labour intensive than wetland or upland restoration projects assessed by the ISE (2010).	
Indirect (supply) effect	Jobs created from the supply of goods and services related to the project. No data is available on the indirect employment impact of peatland restoration projects, however it is likely that these impacts will be slightly greater than in the case of wetland / upland restoration projects given the potentially greater scope for labour inputs.	3,100
Indirect (demand) effect	Possibly some negative employment impacts associated with any displacement of existing economic activities on site. This might be compensated by the provision of ecosystem services including the provision of recreation and tourism related services	-
Induced effect	Jobs created from the consumption generated by spending of the habitat restoration project employees, suppliers, contractors, etc. No data is available on the induced employment impact of peatland restoration projects.	1,700
Total jobs (FTE)		**8,700**

Source: GHK estimates

5.6 Sources

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Wetlands International and Greifswald University, 2010. *The Global Peatland CO2 Picture: peatland status and drainage related emissions in all countries of the world*. Available from: http://www.wetlands.org/LinkClick.aspx?fileticket=o%2bd%2bTaPldLI%3d&tabid=56

6 Organic farming

6.1 Sustainability purpose of EU investment

Organic agriculture can be defined as an overall system of farm management and food production. It combines the best environmental practices, a high level of biodiversity, the preservation of natural resources, the application of high animal welfare standards and production methods, which are in line with the preference of certain consumers for products produced using natural substances and processes[26].

The total organic area in Europe has increased from about 100,000 hectares in 1985 to 7.6 million hectares in 2008. Although there is significant variability across Member States, certified organic agriculture represented 4.3 per cent of the overall European utilised agricultural area (UAA) in 2008.

There is considerable evidence that organic agricultural performs better in environmental terms than conventional agriculture (Pimentel et al. 2005, Dabbert et al. 2000) or FAO 2002). Organic production generates multiple positive externalities, including;

- Wildlife conservation;
- Landscape, floral and faunal diversity;
- Improved animal health and welfare;
- Ground and surface water quality;
- Conservation of soil fertility; and,
- Improved erosion control.

Organic farming also avoids many of the negative externalities associated with conventional farming, including for example; run-off, spills, depletion of natural resources, reliance on energy-intensive inputs and practices (including their induced greenhouse gas emissions), and the potential health effects to farmers of being exposed to pesticides.

6.2 Types of activities associated with the investment

The costs of converting to organic farms are a major constraint on the farmers; and at least for a time following conversion, lower farm incomes can be expected. Investment in the conversion process would accelerate the use of organic farming practices.

Investment in organic agriculture would generate jobs at the farm level, many of which would be almost identical to jobs in conventional agriculture. However, organic agriculture is generally more labour intensive than conventional farming, as many of the labour saving technologies (e.g. pesticides and insecticides) are not used. It also tends to use more machinery.

Investing in organic farming would increase demand for inputs to organic farms. This would include, for example, organically approved fertilizers and agro-chemicals, veterinary services, farm machinery and fuel for vehicles. In contrast it tends to use less chemicals. There would however be reduced demand for inputs from conventional farms, with employment consequences. There would also potentially be reductions in output volume but increases in farm processing and marketing activity, given that organic farming tends to have much stronger local downstream linkages.

6.3 Evidence and assumptions

This section draws on two studies onthe impacts of converting from conventional to organic farming. One study focuses on the costs and benefits of a transition to organic agriculture in France, whilst the other is a limited case study exploring the employment impacts of

[26] Council Regulation (EC) No 834/2007

switching from conventional to organic farming. Both cases make use of input-output analysis to assess the indirect effects[27].

A significant shift from conventional to organic farming would have direct and indirect impacts on employment.

Positive effects would be observed due to;

- Higher average labour intensity in the organic farm sector, in order to compensate for the absence of chemical inputs and nitrogen fertilisers;
- Increased marketing, on-farm processing activities and information requirements; and,
- Labour gains in upstream and downstream industries due, for example, to the increase in demand for machinery related equipment.

Negative effects would be observed due to;

- Labour losses in upstream and downstream industries due to a decrease in demand for inputs and energy. However, the employment impact is moderated by the high capital-intensity of these industries; and,
- Reallocation of consumer demand within food products and between food and non-food products, due to higher spending on organic products reflecting, in part, higher prices for organic farm products.

A study by GHK (2007) analysed the EU-wide effects of a shifting 10 per cent by value (€) (worth approximately €20 billion) from conventional agriculture to organic agriculture in the EU. The study applied Input-Output tables, and attempted to take account of the indirect effects in terms of the shift in inputs required. The study found that shifting 10 per cent (by value) from conventional to organic farming would generate a net positive impact of approximately 66,000 direct jobs, but a net loss of indirect jobs of 22,000 jobs.

The French case study assessed a programme of conversion to 2020, to reach a national organic farming target of 20% of UAA (from 2%), representing some 5m hectares. The study found that although there was a net increase in direct jobs, and a net decrease in indirect jobs, the indirect effect was greater than the direct effect, and indicated an overall loss of employment.

Establishing the impact from these two studies is difficult since neither explored the costs of the conversion process explicitly. In the former case, conversion costs were not considered; and in the latter case, the costs were assumed to be covered by price increases capitalising on the premiums that organic food can deliver.

The approach has been to use a very approximate estimate of the costs per hectare of conversion, applied to the EU case to establish the scale of conversion afforded by the investment and the share of the results that might be attributable to the investment. The employment impacts are therefore the consequences of the investment, rather than from the specific activities associated with the conversion process itself. It assumes that following the conversion process, organic farms can compete on an equal basis with conventional farms.

For the purposes of the case study, the analysis is based on an approximate average cost of conversion of €300 per hectare, taken from Schwarz et al. (2010). This should be recognised as only an indicative guide with a very wide variation between MS dependent on the agricultural/rural conditions, economics etc. At farm level, costs will vary enormously within any one country, depending on starting position, infrastructure, current system, direct costs, enterprises (and expectations).

Relating this to the EU case noted above and the analysis based on a 10% switch in EU agricultural output from conventional to organic production, suggests the investment of €1billion could lead to a 2% switch. The impacts of this are therefore represented by taking 20% of the results calculated in the EU study

[27] The costs and benefits of a transition to organic agriculture: Illustration in the case of France. Unpublished report prepared by BIOS; and GHK, et al (2007) Links between the environment, economy and jobs.

6.4 Employment impact of investment

6.4.1 Direct jobs

Direct jobs from an investment in organic agriculture would include on-farm jobs which are sustained by the investment. For example, conversion to organic farming could require changes to the irrigation system used, or the addition of soil improvers. These jobs would be one off jobs that would only occur during the investment period.

The direct employment associated with the level of organic farming enabled by the investment, based on a 20% share of the EU study results (GHK et al., 2007), indicates that an investment of €1 billion could lead to an additional 12,000 FTE jobs due to the higher on-farm labour intensity of organic farms (representing an increase of 7% on the on-farm labour employed in the convention farms (of approximately 164,000)).

6.4.2 Indirect jobs (supply-side)

Organic farms would require inputs approved for organic agriculture, which would increase employment along the supply-chain for these products. Conversely the purchase of inputs by the conventional farm will be reduced. Both the EU and the French cases indicate that because organic farms spend less on inputs, there is a loss of employment in the supply chain, notwithstanding the supply chain to conventional farms is capital intensive (especially the supply of chemicals, energy).

The EU case indicates that the whilst the expansion of organic farming would lead to an additional 2,800 FTE jobs in the supply chain, this is more than offset by a loss of some 7,200 FTE jobs in the supply chain to conventional farms.

6.4.3 Indirect jobs (demand-side)

The EU case did not consider demand side effects. In the French case there was an analysis of the price premiums that might be attracted (and which finance the higher operating costs of the organic compared to conventional farm). This indicated that, because of the diversion of consumer spending to organic food products, there was a negative impact on employment.

This impact is not included because the MFF investment funds are assumed to replace the income that the price premiums would otherwise finance, with no price premiums being charged.

6.4.4 Induced jobs

Induced jobs were not estimated by the GHK (2007) study. They would include the employment effects due to spending in the economy by people directly and indirectly employed in organic agriculture. Given the small number of net direct and indirect jobs and uncertainty associated with estimating induced effects, this impact has not been calculated.

6.5 Overall employment effect

Table 6.1 below summarises the employment impact of an investment of €1 billion.

Table 6.1 Annual EU employment (FTE) impact of investing €1 billion per annum in organic agriculture

Effect		Addition / loss of jobs (FTE)
Direct effect	Increase in output from organic agriculture and therefore a gain in employment	176,000
	Loss of output from conventional agriculture and therefore loss of employment	(164,000)
Indirect (supply-side) effect	Increase in demand for inputs to organic sector, and subsequent increases in demand from various sectors	2,800

	Fall in demand for inputs to conventional agriculture with subsequent fall in output from chemicals sector	(7,200)
Indirect (demand-side) effect	No demand-side impacts assessed	-
Induced effect	No induced effect assessed	-
Total jobs		**7,800**

Source: GHK estimates

6.6 Sources

BIOS, unpublished. *The Costs and Benefits of a Transition to Organic Agriculture: Illustration in the case of France*.

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7 Energy efficiency (housing)

7.1 Sustainability purpose of EU investment

Europe's building stock is responsible for 40 per cent of total energy use in the EU, and for 36 per cent of EU CO_2 emissions[28]; the largest source of greenhouse gas emissions in Europe. Improving the energy efficiency of Europe's building stock is central to meeting the objectives of the Europe Climate and Energy package (the Europe2020 strategy)[29], and also making the move to a resource efficient economy. Initiatives such as retrofitting walls and roofs with insulation, and improving energy management systems, have been identified as having potential for both residential and commercial buildings.[30,31] Investing in improving the energy efficiency of Europe's housing stock would reduce energy consumption and generate employment.

7.2 Types of activities associated with the investment

Investment in improving the energy efficiency of the housing stock funds, for example, improvements to wall and roof insulation, the fitting of double glazed windows and installing thermostats and more efficient heating systems, are the main activities associated with investment. There are also jobs associated with the manufacture and supply of the materials to be incorporated into a house, such as the manufacture and supply of insulation materials or double-glazed windows.

Changes in household income, due to reduced energy bills for householders, will affect employment in the wider economy; with increases in sectors providing consumer goods and services as a result if the spending of energy savings. But the reduced energy demand will reduce the level of employment in the energy supply industry.

7.3 Evidence and assumptions

This section draws on a case study prepared by the Institute for European Environmental Policy (IEEP 2010). The case study examines the costs and benefits of an expanded housing renovation programme designed to improve the energy efficiency of the housing stock.

The IEEP case study developed a model to examine the renovation requirements and associated costs, and the level of energy efficiency savings that could be achieved. The model is based on a description of the existing EU housing stock and current levels of energy efficiency, and examines the effect of a 10 year 'deep renovation' programme (against a 'do nothing' no renovation case) using retro-fit measures to achieve low-energy building standards.

The current renovation rate of the housing stock across the EU is around 1.2% per year. The basic assumption of the model is that the renovation rate increases gradually from 2011 to 2021 achieving a rate of renovation approximately double the current rate.

The case study described a cost scenario that includes the full refurbishment of the facade, roof, floor insulation and the replacement of all existing windows in all the EU-27 Member States, without considering the cost optimality of the measures. The annual cost of the

[28] http://ec.europa.eu/energy/efficiency/buildings/buildings_en.htm

[29] European Commission, 2010. *EUROPE 2020 A strategy for smart, sustainable and inclusive growth*. COM(2010)2020, Brussels 3.3.2010.

[30] The Fundamental Importance of Buildings in Future EU Energy Saving Policies. A Paper Prepared by a Taskforce of Actors and Stakeholders from the European Construction Sector. Final – 12th July 2010

[31] European Commission, 2006. *Action Plan for Energy Efficiency: Realising the Potential*. COM(2006)545.

scenario for the EU-27 starts at €3.9 billion in 2011 rising to €54 billion by 2021. Assuming a discount rate of 4 per cent, the present value (NPV) of the cost of the programme is approximately €250 billion.

The energy savings from the programme (and reduction in the related greenhouse gas emissions) are very substantial. The model estimates that the programme will lead, by 2022, to an annual saving of some 34,000 ktoe, equivalent to around 12% of the EU-27 final energy consumption in 2007 or up to 50% of the final electricity consumption of the EU-27 in the same year.

In terms of energy generation, the energy saving potential is the equivalent of the energy produced by around 70 standard power plants. By 2022, the renovation programme contributes to the avoidance of up to 276 Mt CO_2 emissions. These savings continue on an annual basis thereafter.

The case study estimates the number of direct jobs that would arise from investment in improving the efficiency of Europe's housing stock. It calculates the potential employment effect based on a review of several European studies. The figures for indirect demand effects were calculated for this review, and are based on the employment effects of increased household expenditure due to decreased energy demand (i.e. households energy bills decrease).

7.4 Employment impact of investment

7.4.1 Direct jobs

The case study reviewed a range of studies to identify the number of jobs directly supported by a housing renovation programme. This review identified a range of between 10 and 20 jobs supported per €m of investment. Taking the mid-point this represents 15,000 jobs, at a cost of some €375m based on an average wage of €25,000. The remainder of the investment is spent on purchases of materials.

The types of jobs generated are largely in the construction sector, and includes;

- Basic and skilled workers;
- Auditors and certifiers of buildings;
- Auxiliary staff and customer support;
- Promotional and marketing jobs; and,
- Training, accreditation and quality control jobs.

7.4.2 Indirect jobs (supply-side)

Investment in improving housing energy efficiency generates indirect jobs in the industries supplying building insulation, construction materials, windows and window components. Based on the number of jobs supported in the construction sector of €115,000 per job, the remaining investment of €625m would support approximately 5,000 FTE jobs.

7.4.3 Indirect jobs (demand-side)

The model estimates the additional energy cost savings of the deep renovation programme to be approximately equal to the additional investment cost. However, the costs savings accumulate over the length of the programme. For example, whilst €1billion investment cost in the first year is matched by the energy savings; in the second year a further €1billion generates a further saving, but the housing refurbished in year 1 repeat their savings, with savings in year 2 worth €2billion in total. Assuming an investment of €1billion for 7 years, the cumulative savings are worth €28billion.

Household spending on consumer goods of some €310,000 is required to support 1 FTE job. Assuming that all savings are spent (and not saved), the household expenditure in year 7 would support some 90,000 FTE. At the same time the energy supply sector loses income of €28 billion. The energy supply sector requires approximately some €575,000 to support 1 FTE, implying a loss of some 49,000 jobs. The net effect is a positive job impact of 41,000

FTE jobs in year 7. To allow comparison on an annual basis, the average annual indirect demand side employment impact is therefore 5,900 FTE jobs.

7.4.4 Induced jobs

The case study does not describe the induced jobs which would arise due to investments in improving housing energy efficiency. However, although there are positive employment impacts, it should be recognised that the staff employed in the retail and consumer services sector have substantially lower wages than those employed by the energy supply sector.

As a result is likely that the induced effect is likely to be close to zero.

7.5 Overall employment effect

The employment effect of an investment of €1 billion in housing renovation is summarised in Table 7.1.

Table 7.1 Annual EU employment (FTE) impact of investing €1 billion in improving energy efficiency in the housing stock

Effect		Addition / loss of jobs (FTE)
Direct effect	Construction jobs related to improving the energy efficiency of Europe's housing stock	15,000
Indirect (supply-side) effect	Employment associated with the supply of materials for improving housing energy efficiency.	5,000
Indirect (demand-side) effect	Increase in household spending due to improved energy efficiency and reduced energy bills, offset by job losses due to decreased demand for energy. Calculated as the average annual impact over a 7 year programme, of €1billion investment a year	5,900
Induced effect	Additional jobs due to increased incomes of those employed directly and indirectly due to the housing energy efficiency investment offset by the loss of wages due to the loss of jobs and relatively higher wages in the energy supply sector	-
Total jobs		**25,900**

Source: GHK estimates

7.6 Sources

IEEP, 2010. *Improving the energy performances of the EU-27 residential buildings – a case study on accelerating deep renovation programmes for the EU-27 housing stock*. European Commission, Directorate-General for Environment.

European Commission, 2010. *EUROPE 2020 A strategy for smart, sustainable and inclusive growth*. COM(2010)2020, Brussels 3.3.2010.

8 Renewable energy

8.1 Sustainability purpose of EU investment

The European Commission's response to climate change and future energy-needs led to the European Energy and Climate Change Package (ECCP)[32], agreed by the European Parliament and Council in December 2008 and binding from June 2009. The Package contains targets that seek GHG emissions to be cut by at least 20% from 1990 levels, and for renewable energy sources to be increased to 20% of the EU's final energy consumption by 2020. To meet these targets Europe will have to increase the proportion of energy produced by a range of renewable technologies. Solar, wind and biomass will all play an important role in delivering the 2020 targets.

8.2 Types of activities associated with the investment

Investing to increase the amount of renewable energy used in Europe will increase jobs in the planning, design and implementation of renewable energy technologies. There would also be jobs associated with the operation and maintenance of this infrastructure. In addition to infrastructure, renewable energy policies are likely to increase the demand for bioenergy crops. This could increase the number of agriculture jobs, and employment associated with refining and producing biofuels.

There would also be positive employment effects related to the supply of equipment for the renewable energy sector, such as tractors to grow bioenergy crops or fabrication of machines to manufacture wind-turbines.

8.3 Evidence and assumptions

This case is based on a study by Fraunhofer ISI and Partners from 2009. The study estimated the likely employment effects of European renewable energy policy. The study provides figures for renewable energy investment and employment impacts in 2005. The study used several macro-economic models to estimate the effects of renewable energy policy on energy generation capacity, GDP and employment to 2020 and 2030. The study found that the 'policy-on' scenarios would result in an additional 115,000 - 417,000 jobs in 2020, and between 128,000 - 656,000 in 2030[33], compared to the no-policy scenario. That is, renewable energy policy in Europe is likely to have a positive effect on employment over the medium to long term.

However, the employment estimates for 2020 and 2030 were not explicitly linked to investment figures. Thus rather than use estimates for future employment effects, the estimates presented below are based on an estimate for employment related to renewable energy investment in 2005.

8.4 Employment impact of investment

8.4.1 Direct jobs

The Fraunhofer ISI and Partners study estimated that renewable energy investment in Europe in 2005 was approximately €30 billion, which generated 1.4 million jobs. Of these 1.4 million jobs, the study estimates that approximately 0.8 million were direct jobs. On the basis of an investment of €1billion, assuming the same levels of employment intensity as the current industry, would support 26,600 jobs (25,900 FTE).

Renewable energy investments generate direct jobs such as:

[32] http://ec.europa.eu/clima/policies/package/index_en.htm

[33] The large difference between the two estimations is the result of the two different models used, and the way the impact of the energy cost increase on the overall economy is modelled (particularly related to sectoral shift).

- The installation of PV systems.
- The construction and installation of wind turbines.
- Upgrading electricity grids to accommodate renewable energy.
- Operation and maintenance in renewable energy sectors.

Other studies have shown that many of the direct jobs associated with renewable energy investment often employ people who had previously lost their jobs in other industries such as manufacturers of steel products, shipbuilding, slaughterhouses and other agriculture-related businesses[34].

Investment in the renewable energy sector could also have negative effects in the conventional (fossil) energy sector. It would decrease demand for conventional fuel, reducing direct jobs associated with the production of conventional energy, and reducing direct jobs related to the operation and maintenance of conventional energy infrastructure.

8.4.2 Indirect jobs (supply-side)

Of the 1.4 million jobs the study estimates relate to renewable energy investment in 2005, approximately 0.6 million were estimated to be indirect jobs, assumed to relate to the supply of goods and services to the renewables sector.

Constructing and operating new renewable energy infrastructure requires the supply of construction materials, machinery and components and business services.

On the basis of the €1 billion investment the indirect (supply-side) impact is 19,400 FTE jobs. This indicates a substantial employment multiplier effect of 2.33. This compares with a Type I employment multiplier for core activities based on natural resources (including renewable) of 1.66 in the GHK (2007) study.

8.4.3 Indirect jobs (demand-side)

Given the marginal nature of investment and the growth in energy demand, it is unlikely that the expansion in renewables is not at the expense of the conventional energy sector. However, the policy aspiration is to constrain the overall demand for energy. In this context the investment in renewables capacity would replace conventional capacity.

Based on the current EU market shares of different renewables provided by the study (excluding large hydro where there is little new investment), the €1billion investment would produce approximately 550 MW capacity. Assuming this led to the retirement of a similar level of conventional energy supply capacity, there would be a small number of jobs lost – in the order of 100 jobs.

8.4.4 Induced jobs

Induced employment effects were not estimated by the study. Using a Type II multiplier of 2.04[35], applied to the direct impact, indicates an induced effect of some 7,500 FTE jobs after subtraction of the indirect impact.

8.5 Overall employment effect

The employment impact of an investment of €1 billion in renewable energy is summarised in Table 8.1 below.

[34] EWEA, 2009. Wind at work: Wind energy and job creation in the EU. European Wind Energy Association.

[35] Based on employment multipliers estimated in DG Environment (2007): Linkages between Environment, Economy, Jobs

Table 8.1 Annual EU employment (FTE) impact of investing €1 billion per annum in renewable energy

Effect		Addition / loss of jobs (FTE)
Direct effect	Positive effects associated in the production and installation of renewable energy	25,900
Indirect (supply-side) effect	Positive employment effects in the sectors supplying goods and services to the renewable sector	19,400
Indirect (demand-side) effect	Slight negative impacts associated with investment, from displaced activity in the conventional energy sector	-100
Induced effect	Additional incomes of people employed in direct and indirect jobs leading to increased spending and related jobs.	7,500
Total jobs		**52,700**

Source: GHK estimates

8.6 Sources

EWEA, 2009. *Wind at work: Wind energy and job creation in the EU*. European Wind Energy Association.

Fraunhofer ISI and partners, 2009. *EmployRES – The impact of renewable energy policy on economic growth and employment in the European Union*, final report. European Commission, Directorate-General for Energy and Transport.

9 Sustainable transport

9.1 Sustainability purpose of EU investment

The transport sector is crucial to maintain well functioning and efficient economies. Road transport and aviation are the principal components of Europe's transport system, and this reliance on road and aviation transport contributes to the relatively significant contribution of the sector to Europe's greenhouse gas (GHG) emissions. The sector generates approximately 21 per cent of Europe's GHG emissions. Emissions from the sector have increased by 20 per cent between 1990 and 2008; road and aviation transport were the fastest growing contributors to this increase. Road transport is the largest contributor to these sector emissions (93 per cent) (EEA 2011).

To improve the sustainability of the sector a significant decrease in GHG emissions is required. Significant improvements have been made in improving vehicle efficiency, but to achieve radical improvements a significant modal shift away from road and aviation is necessary, requiring investment in 'sustainable transport' (rail, bus, urban public transport systems, and waterways). At the same time investment in demand management, through improved traffic management, using new ICT systems, is also required.

9.2 Types of activities associated with the investment

An investment to increase sustainable transport would increase employment associated with the design, manufacture and installation of transport infrastructure. This includes, for example, jobs associated with the construction of railroads, building cycle paths and the manufacture of rail rolling stock and buses.

Increasing the amount of sustainable transport infrastructure would increase demand for raw materials (metals, minerals), energy and distribution services. Supplying these materials would also generate employment.

The design, manufacture and supply of transport infrastructure has a long and complicated supply chain. The proportion of the supply chain that exists in Europe determines the employment effect of an investment. For example, if the majority of parts for rail rolling stock are manufactured outside of Europe then the majority of employment associated with an investment may also occur outside Europe. In this case, the employment effect in Europe could be mostly associated with the assembly of the parts, rather than their manufacture.

Following the initial investment, there would also be employment associated with the operation and maintenance of the transport infrastructure; train and bus drivers to operate the vehicles, crew, ticket agents, mechanics to keep the vehicles running, and administrative staff[36]. If the jobs are supported by the initial investment they would be classified as direct jobs. If they are supported by subsequent use of revenue raised by fares they would be included as indirect jobs.

9.3 Evidence and assumptions

This case study is based on a study by the Alliance for American Manufacturing (AAM) and the Political Economy Research Institute[37], which examined investment in rail, mass transit and inland waterways. Although a European study estimating the employment effects in the

[36] American Public Transportation Association, 2009. *Job Impacts of Spending on Public Transportation: An Update*, A white paper prepared by Economic Development Research Group, Inc. for the American Public Transportation Association.

[37] AAM, 2009. *How infrastructure investments supports the U.S. Economy: Employment, Productivity and Growth*. Alliance for American Manufacturing and the Political Economy Research Institute.

transport sector was identified (relating changes in policy to employment effects)[38], it could not be used as it did not relate investment to employment. Given similar specifications for transport systems and production methods, the direct impacts are unlikely to be very different in the EU. The indirect effects will however vary because of differences in the multiplier effects reflecting differences in industrial structure and trade patterns.

However an FP5 project (2003)[39] estimated, on the basis of a series of urban case studies that investment in public transport supported some 30 jobs per €1m. Adjusting for inflation and FTE numbers this is approximately 25,000 FTE per €1billion investment, substantially greater than that estimated in the US case. However, many of the cases studies were based on investment in the 1980s, and substantial efficiencies might be expected. This does, though suggest, that the mass transit investment may be more representative than rail.

The AAM study uses an input-output model to calculate the employment effects of investing $1billion in each of three different transport models (rail, mass transit and inland waterways). The input-output models are used to explore the interconnections between consumers of goods and services, including households and governments, and various producing industries. This enables the study to estimate the effects on employment of an increase in final demand for the products of a given industry. However, its application in this study needs to recognise that the difference between the EU and the US in trade, industrial structure and transport systems. The results should only be used as an indicative analysis of potential EU impacts.

The AAM study presents the direct and indirect jobs as a combined total. Induced effects are presented separately (Table 9.1).

Table 9.1 Estimated employment effects of $1billion infrastructure spending in different transport models

Category of infrastructure	Jobs per $1 billion infrastructure investment		
	Direct / indirect	Induced	Total
Rail	9,900	4,800	**14,700**
Mass transit	17,800	5,100	**22,800**
Inland waterways	17,400	6,400	**23,800**

Source: (AAM 2009)

The study identified that leakage, or the proportion of an investment that can be expected to leave an economy (to other countries), has a significant impact on the employment creation potential of investment. The proportion of imported goods and services in the production of infrastructure is the most significant source of leakage considered in the US study, and the employment impacts would be larger if the share of domestic production were to increase. The relative difference between spending on imports between Europe and US could have a significant effect on the employment impacts identified.

The study includes only the jobs created by an increase in infrastructure investment. They do not attempt to estimate ancillary jobs associated with the operation and maintenance of the infrastructure once it is in place (e.g. bus drivers, mechanics, ticket sellers). Neither does it estimate the potential indirect demand side effects of changes in travel behaviour. To the extent that these changes lead to a reduced demand for travel, especially using private transport, then some negative employment impacts are likely.

For the purposes of the case study below, we have assumed that €1billion is invested in mass transit.

[38] ETCU, 2007. *Climate change and employment; Impact on employment in the EU-25 of climate change and CO2 emission reduction measures by 2030*.

[39] ITS-BOKU, 2003. *Urban Transport and Local Socio-economic Development (Transecon)*. Fifth Framework Programme, 2003.

9.4 Employment impact of investment

9.4.1 Direct jobs and Indirect jobs (supply-side)

The AAM study defines direct jobs as those directly involved in construction of new infrastructure, or the manufacture of new vehicles or associated equipment. The study does not attempt to quantify the jobs involved in the maintenance or operation of the infrastructure once established, such as street cleaners, bus drivers etc. Investing €1 billion is estimated to create 16,700 direct and indirect FTE jobs. Separate figures for direct employment are not provided. Neither does it include the possible impacts of investment in demand management and related ICT systems.

The AAM study defines indirect jobs as those generated when supplies are purchased for the construction of new infrastructure, or the manufacture of new vehicles or equipment. Separate figures for indirect employment are not provided.

9.4.2 Indirect jobs (demand-side)

The AAM study does not consider the indirect demand side employment effects.

An investment in sustainable transport that encourages people to switch from other forms of transport to more sustainable modes would support employment in these modes at the expense of employment in the less sustainable modes.

9.4.3 Induced jobs

The study estimates that the numbers of induced jobs from an investment of €1 billion would be approximately 4,800.

9.5 Overall employment effect

The potential employment effect of investing €1 billion in sustainable transport in Europe is provided in Table 9.2 below. These figures are based on the estimates for rail and mass transit (public transport) in the AAM study.

Table 9.2 Annual EU employment (FTE) impact of investing €1 billion per annum in sustainable transport (rail, public transport)

Effect		Addition / loss of jobs (FTE)
Direct effect	Employment associated with constructing new infrastructure, and manufacturing new transport vehicles / equipment.	16,700
Indirect (supply-side) effect	Employment associated with the supply of materials for the construction of sustainable transport infrastructure, and the manufacture of transport vehicles / equipment.	
Indirect (demand-side effect)	Not estimated – will depend on detailed analysis of the subsequent impacts on travel behaviour	
Induced effect	Jobs created by increases in household spending by those employed in direct and indirect jobs.	4,800
Total jobs		**21,500**

Based on exchange rate of $1= €1.42 27/06/2011

Source: GHK estimates

9.6 Sources

AAM, 2009. *How infrastructure investments supports the U.S. Economy: Employment, Productivity and Growth*. Alliance for American Manufacturing and the Political Economy Research Institute.

American Public Transportation Association, 2009. *Job Impacts of Spending on Public Transportation: An Update*, A white paper prepared by Economic Development Research Group, Inc. for the American Public Transportation Association.

EEA, 2011. *Transport emissions of greenhouse gases (TERM 002) – Assessment published January 2011*. European Environment Agency

ITS-BOKU, 2003. *Urban Transport and Local Socio-economic Development (Transecon).* Fifth Framework Programme, 2003.

10 Waste recycling

10.1 Sustainability purpose of EU investment

Recycling rates are relatively low in Europe; over 260 million tonnes of municipal waste was generated in the EU27 in 2008, of which only 41 per cent was recycled (Eurostat 2010, in FOE 2010). Commercial and industrial (C&I) waste streams may account for an additional 150 million tonnes of waste (Prognos et al 2008 in FOE 2010). However, waste is increasingly considered a valuable resource, the disposal of which should be avoided to ensure that its value is realised.

Investment in recycling capacity to increase the proportion of waste diverted from landfill and incineration has been shown to offer economic and employment benefits. A Friends of the Earth study (FOE 2009) estimated that if all of the key recyclables disposed in 2004 (in the municipal and commercial and industrial (C&I) waste streams) were recycled, it would have saved 148 million tonnes CO_2e, and would have had a minimum monetary value of €5.25 billion. In addition to greenhouse gas (GHG) emission reductions and resource efficiencies, increasing recycling in Europe could also have positive employment effects[40].

10.2 Types of activities associated with the investment

Investment in recycling capacity is investment in the land purchase, and plant and machinery required for waste recycling (sorting, processing and packaging). Whilst there will be some employment on site during construction, most of the investment will be associated with the purchase of the goods and services required to construct the recycling plant.

Once the plant is running, labour costs compose a significant proportion of total costs. Collecting and sorting waste are labour intensive and account for many of the jobs associated with recycling. As well as unskilled work manually sorting waste, there may also be skilled professional work operating recycling plant and equipment. In addition, there are also administration and support jobs.

10.3 Evidence and assumptions

The literature generally describes the employment associated with policy scenarios rather than as a result of investment costs; or jobs per tonne of waste recycled, but with no distinction between the jobs supported by the investment and by on-going revenue streams. Neither are there published analyses of the employment impacts on the waste disposal sector as a result of the waste diversion.

The case study therefore takes two approaches. The first is to use (rather dated) data on the employment supported by capital investment and apply available multipliers. The second is to use data on the current costs of constructing recycling capacity, and to then calculate employment impacts associated with the use of this capacity. This latter approach is likely to overstate employment impacts, because much of it will be supported by revenues rather than the investment.

For the first approach we have used employment data related to capital expenditure on waste management from Ecotec (2002) and multiplier values from GHK et al (2007). For the second approach we have used publicly available data on costs of new capacity and employment per tonne (FOE, 2010).

[40] It has been demonstrated that, per tonne, recycling provides approximately ten times more jobs than land-filling or incineration (FoE, 2010).

10.4 Employment impact of investment

10.4.1 Direct jobs

Capital expenditure approach

Investment (Capex) jobs are those associated with the construction of recycling plants, and the manufacturing of associated machinery. Based on Ecotec (2002), there were some 10,000 jobs associated with a capital expenditure of €1billion (1999 prices), but in the breakdown provided, these were all located in the supply chain, i.e. were indirect jobs. The number of on-site jobs are estimated to be negligible during the investment phase. There would of course be site based employment when operational.

Capacity approach

Based on a recently competed recycling plant, an investment of €1 billion would purchase a number of separate plants. In total the investment is estimated to provide from less than 2m tonnes to as much as 10m tonnes of recycling capacity, depending on the location, size and the materials processed by the plant. For the purposes of the analysis we have taken a capacity of 5m tonnes.

The analysis provided in the FOE (2010) of the direct employment per 1000 tonnes associated with a 70% recycling rate (Table 12 in FOE 2010) has been adjusted for the capacity provided by the €1billion investment (approximately 4% of that required by the scenario). This suggests the capacity would directly support some 12,200 FTE jobs[41].

10.4.2 Indirect jobs (supply-side)

Capital expenditure approach

Based on the Ecotec figures and allowing for say 30% inflation from 1999, €1billion invested now would generate some 7,400 indirect FTE jobs. According to the Ecotec breakdown, some two thirds are in the capital goods industry and a third in the construction sector. However, one might expect the investment requirements and hence the pattern of purchases to have changed over the past decade as new recycling technology has evolved.

Capacity approach

The FoE analysis has applied a Type I multiplier of 1.5. Applying this to the estimate of direct jobs indicates 6,100 indirect FTE jobs.

10.4.3 Indirect jobs (demand-side)

Neither approach seeks to estimate the employment impact from the diversion of waste from disposal and the loss of activity amongst sites providing disposal services.

10.4.4 Induced jobs

Capital expenditure approach

Induced impacts can be calculated by applying a multiplier of 1.25, adapted from the Type II multiplier of 2.14 in GHK et al. (2007) for resource management. This estimates the induced impact as 1,800 FTE jobs.

Capacity approach

The FOE study applies a Type II multiplier of 1.75. The estimated induced impact is 3,000 FTE jobs.

[41] Actual calculations: 5,000 k tonne capacity / 114,628 k tonnes = 4.4%. 321,725 jobs (adjusted because of minor error in table to 291,322 jobs) x 96% = 279,669 FTE jobs x 4.4% = 12,199 FTE. Note there appears to be a small arithmetic error in the table in relation to the biowaste employment estimate.

10.5 Overall employment effect

The results of the two approaches are summarised below (Table 10.1 and Table 10.2).

Table 10.1 Annual EU employment (FTE) impact of investing €1 billion per annum in recycling – capital expenditure approach

Effect		Addition / loss of jobs (FTE)
Direct jobs	No direct jobs with the exception of a small number of on-site construction workers	Negligible
Indirect (supply-side) jobs	Jobs estimated to be supported in the supply chain providing plant and machinery and construction services	7,400
Indirect jobs	No impact assessed	-
Induced jobs	Jobs supported by spending in the economy by people indirectly employed	1,800
Total jobs		**9,200**

GHK estimates

Table 10.2 Annual EU employment (FTE) impact of investing €1 billion per annum in recycling – capacity approach

Effect		Addition / loss of jobs (FTE)
Direct jobs	Jobs on site associated with the operation of the plant	12,200
Indirect (supply-side) jobs	Jobs estimated to be supported in the supply chain providing goods and services to the plant	6,100
Indirect jobs	No impact assessed	-
Induced jobs	Jobs supported by spending in the economy by people indirectly employed	3,000
Total jobs		**21,300**

GHK estimates

10.6 Sources

Ecotec, 2002. *Analysis of the EU Eco-industries, their Employment and Export Potential*. A Final Report to DG Environment.

European Commission, 2008, Directive 2008/98/EC on waste (Waste Framework Directive).

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FOE, 2009. *Gone to Waste: The valuable resources that European countries bury and burn*. Friends of the Earth.

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GHK et al, 2007. *Linkages between the Environment, Economy and Jobs.* A Final Report to DG Environment.

11 Overall effects of green job investment

11.1 FTE jobs supported in the EU by investment in 'green' activities

The case studies suggest a range in the scale of employment impacts from an investment of €1billion. The FTE jobs supported per €1billion range from 52,700 jobs in the renewable sector, to only 6,600 FTE jobs from investment in agri-environment schemes with high nature value (Table 11.1). However, the variation in employment impacts reflects to some considerable degree differences in the assumptions and methodologies applied in the literature. The range should therefore be used as only a broad indication of the variation in labour intensity of the different activities receiving investment.

Table 11.1 Summary of case study results – Annual EU employment (FTE) impacts per €1 billion of investment in 'Green' activities

Case		FTE jobs per €1 billion investment
1	N2K	29,900
2	AES / HLS	6,600
3	Habitat restoration	8,700
4	Organic farming	7,800
5	Energy efficiency	25,900
6	Renewables	52,700
7	Sustainable transport	21,500
8	Waste recycling	9,200

Source: GHK estimates

The employment impacts from the investment reflect the wide variation in the economic and sectoral context for each of the cases, and the extent to which in some cases the investment is associated with the displacement of other less sustainable forms of economic activity.

The cases also reflect variations in the selection made by different authors of employment multipliers, the treatment of leakages of finance and jobs, and the extent to which net rather than gross effects are assessed.

It should also be emphasised that these estimates are only first order indicative estimates, based on limited evidence and, in the case of habitat restoration and transport, based on US rather than on EU evidence with the inherent uncertainties that are attached.

The estimated employment impacts across the cases are shown in the following table (Table 11.2) that presents both the mean and median values from the cases. The 8 cases have been grouped into two sub-sets (land-based; and infrastructure / sectors), reflecting the possible source of funds under the MFF.

This indicates that the cases that have used investment to support improvements in land-based activities have, with the marked exception of N2K investment, generated small numbers of jobs; with a median value of 8,300 FTE jobs.

In the case of infrastructure and sector based projects, the employment impacts are significant; with a median value of 23,700 FTE jobs. The large number of jobs associated with renewables reflects the assumption that the investment is not associated with the displacement of conventional energy sources, given the increasing demand for energy. In the case of energy efficiency the estimated impact is almost certainly an under-estimate if a longer-term view is taken, given the cumulative impact of household energy cost savings and associated employment benefits when redirected to other forms of consumer expenditure.

Table 11.2 Average values of employment generated by €1 billion

Cases	Average annual employment (FTE) impact per €1 billion
All cases	
Mean	20,300
Median	15,400
Land-based (Cases 1-4)	
Mean	13,300
Median	8,300
Infrastructure / sectors (Cases 5-8)	
Mean	27,300
Median	23,700

11.2 Longer-term impacts

The cases have focused on the immediate, annual impacts of the investment on the labour market. It should also be recognised that the environmental and resource efficiency savings promoted, will over time feed back into reduced costs and enhanced services, which will in turn benefit the economy.

For example the investment in ecosystem services may have limited immediate impacts but the potential for long-term benefits from the enhanced services is likely to be significant; and the easing of congestion from investment in sustainable transport systems is likely to be reflected in long-term improvements in urban form and the achievements of further agglomeration economies.

12 Comparison with 'Baseline' MFF investment

12.1 The Baseline

The purpose of the study is to compare the employment impacts that might be expected to be generated from investment following the conventional pattern, as reflected in current uses of EU funds, with the employment impacts associated with investment in 'green' activities. The employment impacts of the current use of EU funds has therefore to be estimated.

Despite the significance of employment as a policy goal, it has not been possible to identify any analysis that has provided a quantified analysis, in aggregate terms, of the overall EU employment impact of the EU funds; either by individual fund, or for all funds together.

Since a formal analysis of the employment impacts of EU funds is well beyond the scope of this study an attempt has been made using available data to examine the indicative employment impacts of a €1billion investment made by the funds under the Common Agriculture Policy (CAP) and under Cohesion Policy (CP) – the Structural Funds. These two funds are the largest of the range of EU funds and account for over two thirds of total spending.

12.2 CAP

Analyses of the employment supported and safeguarded by CAP spending are not well developed. We have made reference to a DG Agri study that modelled the employment impacts of alternative scenarios (including or excluding CAP, but also with other policy choices). This indicates that the scenarios including CAP have little relative impact on safeguarding employment, compared to a liberalisation scenario without CAP spending. The report indicates that perhaps between 1% and 2% of the EU agricultural workforce might be safeguarded due to CAP. Based on annual CAP funding of €57 billion, this represents approximately 1,500 to 3,000 FTE jobs supported per €1billion of CAP.

The estimated employment supported by €1billion of CAP is indicated in Table 12.1.

Table 12.1 EU FTE agricultural employment supported by EU agricultural sales

Parameter	Values
CAP commitments in 2010 (€billion) (2010 prices)	57.8
EU agricultural FTE employment (m) in 2010	8.9
Agricultural employment safeguarded by CAP (@2%)	178,400
FTE direct job per €1billion CAP	3,100
FTE total job per €1billion (CAP) – Type II multiplier of 2.0	6,200

Source: Eurostat, Scenar2020, DG Agri,2006.

No specific multiplier has been identified – a simple assumption of doubling of the direct impact has been made

Comparing this level of employment with that generated by the cases in which investment is made in agricultural processes and ecosystems (median value 8,300 FTE jobs), CAP (and the agricultural sector more generally) has a significantly weaker employment impact. The investment in N2K, which has a relatively high employment impact (29,900 FTE), reflecting the high share of investment directly into supporting wages for new workers.

12.3 Cohesion Policy

The employment supported by cohesion policy is in principle less problematic to approximate, given that the Structural Funds effectively represent additional sales to economic sectors, as beneficiary programmes spend investment funds in support of cohesion policy objectives.

The difficulty is in relating the types of investments made by the Structural Funds to standard economic sectors. Analysis of planned spending in Operational Programmes broken down by the investment codes used by the fund, allows a crude link to be made.

Table 12.2 summarises the investment funded by the structural funds grouped by economic sector. This indicates that the largest recipient of investment is the construction sector, followed by other business services, approximating to the investment in human resources and various forms of technical assistance, and research and development.

Based on the jobs supported by the sales in the identified sectors, and the weight of structural fund investment in these sectors, the total employment supported by the annual structural fund investment is some 448,000 FTE jobs.

Table 12.2 Planned annual investment by Operational Programmes (2007-2013), grouped by economic sector and the employment (FTE) supported

Economic Sector	Annual programme investment (€billion)	Sales per (FTE) job (€)	Jobs supported by programme investment (FTE)
Construction	17.2	118,500	145,500
Other Business Activities	13.8	86,400	159,400
Research and Development	9.9	133,700	74,000
Electricity, Gas and Water Supply	6.0	575,400	10,500
Computer and Related Activities	3.6	155,500	23,300
Hotels and Restaurants	1.1	59,800	17,600
Transport, Storage and Communication	0.9	164,600	5,700
Agriculture and Rural Development	0.4	35,400	11,700
Manufacturing	0.2	212,100	800
Total	53.1		448,400

Sources: DG Regio, approved operational programmes; Eurostat, sales and employment data.

Based on the analysis above, dividing the jobs supported by the programme investment, indicates that 8,400 FTE jobs are supported per €1billion of investment (Table 12.3). Applying a type II multiplier with a value of 2.0 indicates a total employment impact of 16,800 per €1billion of investment.

Table 12.3 EU FTE employment supported by EU sector sales, benefiting from structural fund investment

Parameter	Values
Annual EU structural funds (€billion) (2011 prices)	53.1
EU employment supported (FTE, m)	0.5
FTE direct job per €1billion structural funds (sales)	8,400
FTE total job per €1billion (sales) – Type II multiplier of 2.0	16,800

Source: Table 12.2.

No specific multiplier has been identified – a simple assumption of doubling of the direct impact has been made

Comparing this level of employment with that generated by the cases examining investment in infrastructure and sectors (median value 23,700 FTE jobs), the investment in 'green' activities has a stronger employment impact than that calculated for the structural funds. The only case that has a lower employment impact is the waste recycling investment.

12.4 Concluding comments

The analysis was intended to test whether directing investment funded under the MFF, to green activities would have any significant detrimental effect on employment generation compared to investment in more conventional activities.

The evidence examined in this study suggests that there is no indication that such a redirection of investment would lead to any loss of employment. On the contrary, taking the results at face value, investment in green activities would have a slightly stronger employment benefit than investment in conventional activities. This is true for both CAP and for the Structural Funds.

The employment benefit is greater still if due account is taken of the improvement in the long-term sustainability of economic activity that would follow such a redirection of investment.

However, the results do need to be treated with some caution given the variations in the methods and assumptions used to calculate the employment impacts across the case studies. It also needs to be recognised that, in the surprising absence of evidence on the employment impacts of CAP and the Structural Funds under the current or indeed past MFF, there is only a limited analysis of the baseline impacts.

ANNEXES

Annex 1 References

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