STRATEGIC EVALUATION ON ENVIRONMENT AND RISK PREVENTION UNDER STRUCTURAL AND COHESION FUNDS FOR THE PERIOD 2007-2013

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SYNTHESIS REPORT

Directorate General Regional Policy

A report submitted by

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SUMMARY

1 INTRODUCTION

1.1 Purpose of the Strategic Evaluation

The study provides the strategic evaluation of the needs and priorities for environmental investment under the structural and cohesion funds for the period 2007-2013 in 15 MS.

The objectives of the study have been to:

- identify and evaluate needs in the selected fields and
- identify investment priorities for the Structural and Cohesion Funds for the 2007 - 2013 programming period.

The major outcome of the study has been the preparation of national evaluation reports for each pf the MS covered by the evaluation.

The evaluation has covered the following five fields:

- Water supply (WS)
- Wastewater treatment (WWT)
- Municipal solid waste (MSW)
- Renewable energy sources (RES)
- Natural risk management (fire, flood, drought) (NRM)

In a small number of cases the evaluation has identified other needs (such as energy efficiency measures) but the focus has been on the specified fields. The evaluation focuses on 15 countries, comprising the 10 new Member States (NMS), plus Bulgaria and Romania, plus 3 'old' cohesion Member States (Greece, Portugal and Spain).

The evaluation has taken into account:

- analysis of the situation in the selected fields in the 15 specified countries;
- analysis of the scope to reduce the cost of meeting identified needs through the use of complementary supporting measures to the use of the Funds, through the use of economic instruments and public-private partnerships; and
- analysis of the financial allocations during the current programming period (2000-2006) and lessons to-date, especially in relation to rates of absorption.

1.2 Key Policy Issues

The evaluation has also been directed to four specific key issues, to provide:

- An assessment of the potential to make significant improvements in relation to the implementation of the environmental directives, especially in the new Member States – and by implication and assessment of the progress that the achievement of identified priorities would yield
- An assessment of the economy – environment links as they occur, especially in less developed areas requiring support for convergence, and the scope for a cleaner environment to promote business development and the retention of a higher skilled workforce
- An assessment of the scope and responses required to address climate change where it impacts on economic performance, and to stimulate the use of alternative sources of energy
- An assessment of the range and scale of natural risks and the scope and responses required to improve the management of these risks.

1.3 General Research Approach – Assessing Needs and Priorities

The general approach to the identification of environmental investment priorities has taken a three stage process. The first stage has been concerned with providing an overview of current activity and policy in each MS. The second stage has been concerned to identify the gross levels of physical and hence financial needs based on full compliance (fields 1 to 3), CO2 emission targets (field 4) and specified risk management levels (field 5). The third stage has been concerned with establishing the priorities for investment that are consistent with the objectives laid down by the regulations governing the structural and cohesion funds.

2 THE NEED FOR ENVIRONEMTAL INVESTMENT

2.1 Specific Investment Drivers and Policy Objectives by Field

Investment needs for water supply (WS) and waste water treatment (WWT) – both upgrading and building new infrastructure – is largely driven by the need for compliance with EU Directives, especially the Urban Waste Water Treatment Directive (UWWTD) – these form the basis for many of the policy objectives in most MS strategies.

Investment needs of municipal solid waste management (MSW) – expansion and creation of modern sanitary landfills and close down of existing landfills – are driven largely by the Landfill Directive (compliance), particularly as most waste disposal across the MS remains landfill deposition; most National Waste Management Plans tend to be oriented towards implementation of EU requirements

Investment needs for renewable energy sources (RES) are largely driven by targets for increasing use of renewable energy especially Directive 2001/77/EC regarding targets for share of RES in total electricity consumption. However, increasing economic growth and parallel increase in CO2 emissions of energy sector also acts as a policy driver; some MS recognise the need to reduce dependency upon fossil fuels (and fossil fuel imports).

Investment needs of natural risk management (NRM) is driven largely be existing national programmes. Most MS appear to lack specific and comprehensive policy on natural risk management; but addressing risks as nationally evaluated. MS vary in their vulnerability to natural hazards, which is reflected in different needs, although the need for responses to flood risk is common.

The national evaluations have examined the needs across these fields and found that rather than being driven by expansions of population or economy that the major driver is the need for replacement investment or for new investment in locations previously without adequate infrastructure. This is especially the case in WWT and to a lesser extent in MSW and WS. The investment in RES responds to policy goals to expand these sources and investment in NRM reflects previous activity but recognising changes in the level of risk. This balance changes somewhat in the Southern MS, where demands from tourism, and for better resource management, are stronger and drive investment, especially in WS and MSW.

2.2 Overview of the Scale of Investment Needed by Field

The scale of investment needed in each MS to meet demand and / or particular legal requirements, and to allow replacement / refurbishment of non-compliant and/or worn out infrastructure in each field has been assessed. This is reported in detail in each of the national evaluation reports. The overall scale of investment needed for the period, prior to considerations of whether the market or the MS should be sourcing the investment rather than the Structural Funds is typically between 1% and 2% of GDP, based on an the average annual investment (dividing the total by seven years) and the average level of GDP over the period. The major exception is the very high level of assessed need in Bulgaria (4.5% of GDP) and Romania (4.7% of GDP). It is clear that in these two MS there is not the scope to meet all needs in the next programming period, even allowing for the transitional arrangements which reduce needs in the 2007-2013 period.

The needs in Fields 1, 2 and 3 account for a large majority of the share of investment needs. The exception to this is in the cohesion MS, where the effects of previous programmes in contributing to progress in the provision in basic infrastructure, and the need to ensure that RES capacity is increased quickly to ensure compliance with national targets, is reflected in a lower share for Fields 1-3. In the other MS the share in these three fields is much closer to the current plans, although the needs in Fields 4 and 5 are given greater recognition, especially in Poland and Malta.

2.3 Estimates of the Financial Requirements for EU Environmental Investment Programmes

The assessment of the investment needed, summarised in the previous section, takes no account of a range of factors that effectively reduce the need for EU investment programmes to be financed from the Structural and Cohesion Funds. These factors are:

- **Alternative Funding Sources:** The scope to meet investment needs through the market or through national, rather than EU, programmes in each Field (but mainly Fields 4 and 5)[1]

- **Use of Supporting Measures:** The scope to reduce investment needs through the use of supporting measures – mainly through the use of user charges in each Field (but mainly Fields 1, 2, 3)

- **Administrative Capacity:** The scope to manage and deliver the indicative investment needs identified taking into account the administrative capacity of the Member State in each Field, (but especially Fields 1, 2, 3).

Each national evaluation has examined these factors and adjusted the assessed level of investment needed to take them into account. The result of the analysis is an estimate of the requirement for SF/CF investment funding through EU programmes. This financial requirement forms the basis for the priority assessment and for the subsequent negotiation and design of the environmental programmes in the next programme period (2007-213). Table 1 presents the estimated requirements by MS and investment field.

The assessed level of financial requirement by MS and by field is typically less than 1% of GDP per annum over the programme period. Only three MS have an estimated requirement in excess of 1% of GDP, Romania (1.6%), Latvia (1.6%) and Hungary (1.1%). The aggregate effect of taking into account these factors is a financial requirement of 47 billion euro, some 47% of the assessed level of need. The financial requirement per capita can also be calculated, recognising that per capita incomes vary widely between these MS. On a per capita basis the highest level of requirements are in Latvia, Slovenia and Hungary, with the lowest requirements in Spain, Romania and Poland.

The importance of the requirements in Fields 1, 2 and 3 remain, with typically 75% - 95% of the estimated requirement in these three fields across the different MS. Portugal and Greece with a requirement to support RES and Malta, with the requirement for support with storm water collectors to avoid flooding risks, are the exceptions.

[1] The main source of alternative funding is through market mechanisms introduced by MS to finance investment in RES. These include various forms of market obligation such that energy users contribute indirectly to the financing needs of RES producers.

Table 1: Summary of the Assessed Financial Requirements for EU Environmental Investment Programmes, 2007-2013, (Million Euro, current prices)

Member State	Water Supply	Waste Water Treatment	Municipal Solid Waste	Renewable Energy Sources	Natural Risk Man't	Total Req't	Total Req't per Capita (based on pop. in 2006)	Average Annual Financial Req't as % GDP in 2007-2013	Share in Fields 1-3
Greece	626	225	280	1,338	870	3,339	315	0.3%	34%
Portugal	477	881	720	2,789	250	5,118	512	0.5%	41%
Spain	2,122	1,484	2,182	681	95	6,564	162	0.1%	88%
Hungary	1,420	2,341	1,389	550	972	6,672	661	1.1%	77%
Poland	560	5,152	1,330	770	1,540	9,352	243	0.5%	75%
Slovenia	315	644	357	7	10	1,333	667	0.5%	99%
Czech	280	1,240	338	311	360	2,529	246	0.4%	73%
Slovakia	217	1,503	185	150	431	2,486	460	1.0%	77%
Bulgaria	447	354	245	121	152	1,319	169	0.8%	79%
Romania	1,520	1,920	554	200	200	4,394	202	1.6%	91%
Malta	4	60	60	20	120	264	660	0.6%	47%
Cyprus	-	120	110	5	-	235	294	0.2%	98%
Estonia	182	194	71	57	16	520	371	0.6%	86%
Latvia	616	928	378	73	5	2,000	833	1.9%	96%
Lithuania	204	518	199	104	23	1,048	299	0.6%	88%
EU15	8,991	17,564	8,398	7,176	5,044	47,173	285	0.7%	74%

Source: National Evaluation Reports. Estimates of GDP based on estimates by Cambridge Econometrics (CE) – these may differ slightly from estimates taken from MS sources and used in the national evaluations. GDP is an average of the projected annual level of GDP over the programme period (in 2000 prices), except Bulgaria and Romania where GDP is a national estimate. Investment requirements assumed to be in 2004 prices and deflated to 2000 prices for the purposes of the calculation. Population is the projected population in 2006 by CE, with estimates for Bulgaria and Romania

2.3.1 Comparison with the Current Planned Programmes

The scale of investment, compared to the current programmes, indicates that, on an annualised basis, the proposed requirements represent larger programmes than the current programmes in the majority of MS. This might be expected since the requirements represent the ceiling of investment requirements whilst the current (2000-2006) programmes reflect previous negotiations on what levels of environmental investment are affordable, given non-environmental priorities. However, in a number of MS, notably Greece, the difficulties of absorption of current funding allocations, when taken into account in the estimate of requirements for the next period, provide a more realistic picture of the levels of investment that can be achieved. As well as Greece, there are reductions in the estimated requirements compared to current planned programmes, in Spain, Lithuania, Estonia and Czech Republic.

2.3.2 Comparison with the Assessed Level of Needs

The estimated financial requirement is substantially below the estimated level of needs. The most significant differences are in Bulgaria and Romania, where due account has been taken of the practicality of achieving the levels of investment needed in a single programming period. The low figure in Greece partly reflects the present absorption difficulties, but also takes into account that whilst there is a very substantial level of investment needed in RES, the purchasing obligation in Greece is intended to finance a substantial share of this investment. At the other end of the range analysis of these factors has only a limited effect in Malta, Cyprus, Latvia and Estonia.

The effects of taking into account the different factors can be summarised by comparing the share of financial requirements by field, with the share of assessed needs by field, to understand the effects of the analysis on the balance of investment. In summary the largest influence on the balance of investment, is the effect in a small number of MS of taking into account the purchase obligations for RES, which contributes significantly to the financing of RES investment. The effect of this reduction is to increase the share in other fields.

3 THE PRIORITIES FOR INVESTMENT

3.1 Environmental Objectives of the Structural & Cohesion Funds (2007-2013)

The importance of environmental protection and improving resource efficiency as a contribution to EU, national and regional competitiveness and convergence objectives is reflected in the specified objectives of the Structural and Cohesion funds. Increasing pressure on the environment results from economic development supported by the Structural and Cohesion Funds. Without investment to decouple economic growth from the use of natural resources, these pressures put at risk the sustainable long term development of the EU economy. More efficient and less polluting methods of production and consumption need to be introduced if competitiveness and economic and social convergence is to be environmentally sustainable.

3.2 Framework Factors and the Priority Assessment

The review of current programmes indicates that the highest priority is attached to investment that contributes to ensuring compliance with the environmental directives. 90% or more of the share of environmental investment across the five fields is typically

directed to the expansion / modernisation of existing, non-compliant infrastructure. The need for compliance (Fields 1, 2, 3) responds to the legal requirements as set out in the environmental acquis. Not all investment (eg reservoirs for the storage of water) is necessary for compliance, but the bulk of the investment in these fields is required to ensure compliance.

However, there are other objectives that environmental investment programmes recognise in principle and/or in practice. At a strategic level the rationales for investment funding from the Structural and Cohesion Funds, as described in the previous section, relate to the need to secure convergence of national and regional economies, and to support improved levels of economic competitiveness.

At the level of individual fields of activity there are also specific objectives, which contribute to the strategic objectives of regional development. The case for environmental investment (defined as comprising the five fields) to be funded by the Structural Funds is driven by the need to promote regional competitiveness and convergence through:

- compliance with EU environmental law (the environmental acquis) (Fields 1 to 3); and

- conformance with other policies (eg climate change or natural hazard management) (Fields 4 and 5).

In the case of compliance, the environmental standards set out in the acquis are those which are deemed necessary for a sustainable economy; and which therefore should be met in order for long term regional development. In the case of conformance with other policies, the rationale for use of the Structural Funds derives from the economic costs and benefits associated with climate change and natural risks and their effects on regional development.

3.3 Review of the Investment Priorities

The results of the priority assessment are summarised in Table 2 which indicates the preferred balance of investment by field, for each MS for the next programme period. The first and second priorities, for each MS are summarised in Table 3.

Table 2: Environmental Investment Priorities by MS for the Period 2007-2013

Member State	Water Supply	Waste Water Treatment	Municipal Solid Waste	Renewable Energy Sources	Natural Risk Man't
Greece*	17%	22%	22%	20%	14%
Portugal*	28%	25%	17%	22%	5%
Spain*	33%	20%	31%	10%	1%
Hungary	23%	36%	22%	7%	12%
Poland	7%	56%	15%	7%	15%
Slovenia	25%	47%	26%	1%	1%
Czech	14%	48%	14%	10%	14%
Slovakia	11%	61%	7%	5%	16%
Bulgaria	40%	26%	19%	5%	10%
Romania	33%	44%	13%	5%	5%
Malta*	5%	30%	30%	10%	23%
Cyprus	0%	21%	49%	30%	0%
Estonia	40%	35%	14%	9%	2%
Latvia	34%	46%	17%	3%	0%
Lithuania	24%	47%	19%	8%	2%
EU15	22%	38%	21%	10%	8%

Source: National Evaluation Reports. Note: There are minor allocations for technical assistance in Greece, Spain, Portugal and Malta.

The highest priority overall is attached to the investment in waste water treatment. The assessed priorities mean that Slovakia and Poland should each allocate over half of total programme resources to this field. In total ten of the MS (Table 3) attach the highest priority to this field, reflecting primarily the high cost of compliance with the UWWTD. The remaining gaps in compliance, especially in smaller settlements, and the threat of legal warnings and actions means that a substantial investment programme in the field is proposed. In aggregate terms, the importance of the field in large MS (Poland, Hungary, Romania) means that almost 40% of the total financial requirement estimated for the fifteen MS should be directed to this field.

Table 3: Description of the First and Second Priorities, by MS (% share of the allocation in brackets)

Field	Highest Priority	Second Priority
Water Supply	Bulgaria (40) Estonia (40) Spain (33) Portugal (28)	Latvia (34) Romania (33) Lithuania (24) Hungary (23)
Waste Water	Slovakia (61) Poland (56) Czech (48) Lithuania (47) Slovenia (47) Latvia (46) Romania (44) Hungary (36) Malta (30) Greece (22)	Estonia (35) Bulgaria (26) Portugal (25)
MSW	Cyprus (49) Malta (30)	Spain (31) Slovenia (26) Greece (22) Poland (15)
RES		Cyprus (30)
Natural Risks		Slovakia (16)

Source: National Evaluation Reports

The second highest priority overall is attached to investment in water supply. This field represents the most important field in four of the MS (Bulgaria, Estonia, Spain and Portugal), and the second highest priority for four other MS.

The third highest priority overall is given to waste investments. Only in Cyprus (49%) does municipal solid waste represent the most important investment type; in five other countries (Spain, Slovenia, Malta, Greece and Poland) MSW forms the second highest priority. In aggregate the required level of investment in MSW (17%) is only slightly smaller than the level of required investment in water supply (20%).

By contrast investment in RES and risk management is a relatively lower priority, reflecting the importance of purchasing obligations in funding investment needs for RES and the importance of MS own programmes for risk management. However, compared to current programmes, the proposed level of priority, especially in the cohesion MS, will lead to an expansion of EU programme activity in these fields.

4 SUMMARY CONCLUSIONS

4.1 Needs and Drivers for Environmental Investment – The Case for Allocating Structural Funds

The national evaluations have assessed the need for environmental investment in five fields. The first three fields (water supply, waste water treatment and municipal solid waste) require investment to ensure compliance with the environmental acquis. This

largely requires investment in the replacement of worn-out infrastructure (e.g. non-compliant sewage plants, non-compliant landfills), rather than in new infrastructure to meet increased demands because of economic or demographic change. In some MS, population is expected to fall, whilst structural industrial change means that some resource intensive industries are closing.

The failure to secure compliance and to risk EU legal action represents a dominant influence on the scale and type of investment needed. However, even with the assistance of the Structural and Cohesion Funds, full compliance is unlikely to be achieved by the end of the next programme period. This is formally recognised in Bulgaria and Romania which has negotiated transitional arrangements. In the other MS, the failure to secure compliance is likely to mean that they will be subject to further legal proceedings.

The failure to achieve compliance is not just a legal problem. Poor environmental quality exacerbates regional disadvantage and the problems of convergence. This is formally recognised in the Structural Fund regulations for the new programme period. Economic analysis of the wider economic impact of the proposed programmes indicate that they have the potential to have overall positive effects on the GDP of the respective MS. Longer-term, failure to decouple economic growth from the use of natural resources will render development unsustainable.

In the case of the last two fields (renewable energy sources and natural risk management) the drivers of investment relate to additional levels of activity to supplement and accelerate the benefits of national programmes. This is especially important as the risks and damage costs of climate change and of flooding especially increase through time. The economic costs of failing to act quickly in response to climate change have recently been estimated at a minimum of 5% of GDP, well in excess of the investment costs associated with investment in RES and other measures to curb CO2 emissions[2].

4.2 The Case for Supporting Measures

The funding available from the Structural and Cohesion Funds in the next programme period is a scarce resource. The scope to augment the resource through additional MS policies is therefore important. Three main policies have been identified and reviewed in the national programme evaluations:

- Increased levels of user charges for the consumption of environmental services (water and waste water treatment, and municipal waste services) to increase the finance available for capital expenditure as well as operating costs
- Use of national purchasing obligations to fund the expansion of renewable energy capacity
- Use of public-private partnerships to increase access to private sector investment funds.

[2] Economic Assessment of Non-Action on Climate Change, UK Treasury, 2006

All three policies have the capacity to ensure that the maximum level of investment needed is financed from users and through national programmes. We briefly review the contribution of these sets of measures.

4.2.1 User Charges

User charges for environmental services are levied in all MS. These charges have traditionally been part of municipality finance, and have previously been only loosely based on the costs of service delivery; with tariff structures often further obscuring the nature of costs to the user, and containing various implicit or explicit cross-subsidies.

Where the underlying costs of existing tariffs can be identified, the level of the tariff or charge is often only levied at a scale capable of covering operating costs. The cost of financing new or replacement capital works is not, or only partially, covered; with no complete or full recovery of operating and capital costs.

Assuming that he maximum level of affordability of user charges for water, wastewater and MSW taken together is 5% of household income (as recorded for in the 10% of households with the lowest incomes), increased charges are still possible in 8 of the 15 MS, although national political objections for a level of charges set at this level are possible. Where there is scope for some increase in charges the additional revenue may be used to cover rising operating costs rather than contributing to capital costs. Attempts to raise additional revenue from a levy set at 5% of the lowest household incomes is therefore likely to raise political objections on grounds of affordability, with at least some of any increase achieved unavailable for capital funding.

It is possible to design tariffs to protect lower income households. No MS currently have charges approaching 5% of average household income. If the levy was set at this level (and protection was provided for lower income households) all MS could raise charges and associated revenue very significantly. If the levy was set at this benchmark, then all MS could (assuming the revenue was fully committed to capital expenditure) finance their annual investment needs in these three fields, with the exception of Bulgaria, Romania and (marginally) Latvia.

4.2.2 Renewable Energy Purchasing Obligations

The evaluation has considered the extent to which the market (with any additional market obligations) is capable of meeting identified investment needs, and thus avoiding or reducing the need for SF support. In a number of MS (Slovenia, Spain, Greece, Czech Republic, Malta and Bulgaria) the market funds the majority of investment needed, between 67% and 98%. In Portugal and Poland, the market contributes a minority of the investment needed. All these MS use some form of market obligation to increase the finance that is raised through the market.

In the remaining MS, the national evaluations have excluded the investment requirements for RES that are commercially funded by the market (if any) and identified the investment that would need to be funded through some market intervention. In some MS (Cyprus, Hungary, Estonia and Latvia) there are existing market obligations but which are considered ineffective or inapplicable to the investments identified. In the remaining MS (Lithuania, Romania, Slovakia) no form of existing market obligation has been identified.

4.2.3 Public-Private Partnerships

The national evaluations have reviewed the scope to expand the use of public-private partnerships (PPP) as an aid to encouraging private sector contributions to investment especially in the water / sewerage and waste sectors. The review suggests that at the present time there is little scope for any substantial expansion of PPP in the environmental sector, and that the opportunity for any significant expansion of PPP is limited to a small number of activities, most notably in the area of waste disposal and recycling.

In the case of water supply inadequate cash generation through operation and the state ownership of infrastructure is seen as a constraint on private sector participation. In the case of waste water treatment the general assessment is that the high investment costs and limited returns make the sector unsuited to PPPs; with additional difficulties and costs for private investors posed by the decentralised operation through municipalities, and a focus of investment in collection systems, increasingly in rural areas. In the case of municipal solid waste, opportunities for a more substantial role for PPP is recognised, especially in the provision of contracted services for landfill and other disposal capacity. It is here where the greatest contribution from PPP is to be expected; although the estimated SF requirements have (with the exception of Greece and Portugal) not included an allowance for increased private sector funding.

4.3 Priorities

The investment priorities in the suggested national programmes have been assessed based on the type and scale of investment needed, taking into account a range of criteria related to the achievement of the acquis, regional convergence, and avoiding the economic losses associated with climate change and natural risks.

The assessed priorities would result in the majority of investment taking place in the first three fields; driven by the acquis and indirectly by the associated improvements in regional convergence resulting from environmental improvement. The need to complete projects and sub-programmes already started within the current programme period is an important influence in these three fields. The balance of priorities also reflects the desire and scope to maximise financial contributions from users of environmental services (including energy) within the MS. The national assessments, especially in the cohesion MS, also stress the importance of resource management through higher user charges (providing an incentive to lower demand), resource planning and waste minimisation.

The suggested investment programmes will contribute to regional development as a result of:

- Direct economic impacts including net additional improvements in Gross Value Added (GVA) and accelerated regional convergence
- Improved environmental quality delivering direct economic benefits, cost savings and new technological and market opportunities
- Long-term mitigation and adaptation to climate change, with a significant contribution to savings in CO2 emissions

- Enhanced EU scale management and strategic planning especially linked to the cross-border management of water resources, avoiding major impacts from natural risks.

5 RECOMMENDATIONS

The review of national evaluations has identified a number of generic issues where recommendations appropriate to all or most of the fifteen MS and the associated MS negotiations on the Structural Fund allocations would enhance the efficiency and effectiveness of the resulting investment programmes.

1. **Link Environmental Strategies to Wider Development Strategies** – use of the Structural and Cohesion Funds to achieve compliance with the environmental acquis should be made on the understanding that improved environmental quality is vital for improved economic competitiveness. Consequently, environmental strategies should recognise that environmental improvement is an important contributor to wider economic and sustainable development objectives, and more fully articulate the links to the broader development strategies so that priorities reflect the linkage. This is especially important in the context of regional Operation Programmes.

2. **Apply Spatial Planning Perspectives** – the preparation of the environmental strategies should make explicit reference to national and regional spatial development perspectives, especially where influenced by and contributing to the implementation of the Water Framework Directive. The scope for more efficient use of investment for water supply and risk management through well researched and developed perspectives is acknowledged in a number of MS.

3. **Emphasise Prevention and Demand Management** – the scope to manage investment needs through effective preventative measures (such as waste minimisation) and demand management (especially of water) should receive strong recognition in the national and regional environmental strategies. This is argument is increasingly evident in the cohesion MS.

4. **Acknowledge Full Cost Recovery Principles** – the national evaluations all recognise the importance of user charges, but also that at the present time, the current level of tariffs do not cover the full costs of environmental services. Charges may cover operating costs but do not contribute to the costs of investment. There are important political constraints to the application of the principle of full cost recovery because of the implications for affordability of higher charges. However, acknowledgement of the principle in environmental strategies (with reference to the polluter pays principle) would ensure that the negotiation and the implementation of the programme maximised the funding from the application of user charges.

5. **Encourage Programmes to Provide Clear Data on the Extent of Current User Charges and Levels of Full Cost Recovery** – the scope to secure additional funding for the required capital investment is difficult to define without specific information on the level of charges (which can be hard to disentangle from general municipal taxes, and which vary by area, type of user

and scale of use) and the extent to which current levels of operating costs allow revenues to be allocated for capital spend. Such data will also help in the analysis of affordability issues as they arise during the programme period.

6. **Enhance Current Project Pipeline Capacity through Specific Field Strategies** – the national evaluations acknowledge the scope to build on current project activity is considerable. However, the national evaluations have also emphasised the problems of absorption, and reflected this in the proposed scale of investment programmes, although the proposed programmes are generally larger than in the previous period. Careful development and management of the project pipeline will as always be central to efficient programme delivery. The design and use of field specific strategies will allow the necessary focus but also allow the MS to place the specific field investment programme in the context of existing national provision including delivery capacities.

7. **Create Markets for a Broader Range of Renewable Energies** - most countries are focusing on financial or market measures that benefit the most commercial technologies. More significant from the perspective of the need for funding support in the 2007-2013 period is the need to develop the less commercial sources through demonstration and capital support so they can gain a stronger foothold in the market and unlock their potential sooner rather than later.

8. **Ensure MS Provide Suitable Hazards Monitoring and Related Emergency Response Plans –** practice has shown that early warning and a co-ordinated well resourced response can be a very effective tool to avoid damages. The resource needs are often greater than local capacity and efficiency requires a multi-regional co-ordinated response, reflected in the need for greater national and regional spatial planning for risk management (Recommendation 2).

MAIN SYNTHESIS REPORT

1 INTRODUCTION

1.1 Purpose of the Strategic Evaluation

The study provides the strategic evaluation of the needs and priorities for environmental investment under the structural and cohesion funds for the period 2007-2013. The study examines the evolution of environmental investment with respect to EU and national priorities and the need for Structural and Cohesion Fund support in the current programme period (2000-2006); and identifies the needs and priorities for the 2007-2013 programme, informing European Commission (EC) discussions with Member States (MS) on the preparation of National Strategic Reference Frameworks and Operational Programmes. Section 5 summarises the relevant Structural and Cohesion Fund environmental objectives relating to the evaluation and which inform the basis of criteria for the priority assessment.

1.2 Objectives of the Strategic Evaluation

The objectives of the study are to:

- identify and evaluate needs in the selected fields (see section 1.5), and
- identify investment priorities for the Structural and Cohesion Funds for the 2007 - 2013 programming period.

The major outcome of the study has been the preparation of national evaluation reports for each pf the MS covered by the evaluation.

The evaluation takes into account:

- analysis of the situation in the selected fields in the 15 specified countries (see section 1.5 and separate country reports that form the core of the study);
- analysis of the scope to reduce the cost of meeting identified needs through the use of complementary 'flanking' measures to the use of the Funds, through the use of economic instruments and public-private partnerships; and
- analysis of the financial allocations during the current programming period (2000-2006) and lessons to-date.

1.3 Key Policy Issues

The evaluation is also directed to four specific key issues, to provide:

- An assessment of the potential to make significant improvements in relation to the implementation of the environmental directives, especially in the new Member States – and by implication and assessment of the progress that the achievement of identified priorities would yield

- An assessment of the economy – environment links as they occur, especially in less developed areas requiring support for convergence, and the scope for a cleaner environment to promote business development and the retention of a higher skilled workforce
- An assessment of the scope and responses required to address climate change where it impacts on economic performance, and to stimulate the use of alternative sources of energy
- An assessment of the range and scale of natural risks and the scope and responses required to improve the management of these risks.

1.4 Application of the Evaluation

The primary application of the evaluation is to support DG Regio desk officers in their negotiation over Operational Programmes (OPs) with MS. These OPs are in the process of being drafted by the MS. These OPs are framed by National Reference Frameworks, which need to conform to the Community Strategic Guidelines. These OPs may vary between MS in their approach. For example MS may choose to have a single OP at national level for the environment. Alternatively MS may choose to include the environment as one theme in individual regional (Objective 1 / 2) OPs. The MS choice of OP design will influence the level of detail that the negotiation will cover. Note that compared to current programmes, the new OPs are not required to specify measure level activity. Note also that in the case of risk management that there has also been cross-border working through Objective 3 Interreg programmes.

The national evaluation reports are therefore the primary and priority outputs of the evaluation. This synthesis report is based on the findings of these national reports.

1.5 Scope of the Evaluation

The evaluation covers the following five fields:

- Water supply (WS)
- Wastewater treatment (WWT)
- Municipal solid waste (MSW)
- Renewable energy sources (RES)
- Natural risk management (fire, flood, drought) (NRM)

In a small number of cases the evaluation has identified other needs (such as energy efficiency measures) but the focus has been on the specified fields.[3]

The specified fields respond to the recognised needs of ensuring that the infrastructure of water supply, waste water treatment plant and municipal waste collection, disposal and treatment are financed. These are key areas where the requirements of the EU directives are such that continued investment is required over the coming decade. The urban waste water treatment (UWWT) directive is arguably the most costly of the investment heavy directives, with the landfill directive another key investment challenge.

[3] Technological risks were excluded from the evaluation, as were needs that might reasonably be expected to be financed by polluters under the polluter pays principle (e.g. industrial pollution).

Renewable energy has gained in importance given the Kyoto commitments and the increased concerns over climate change and the understanding that more than meeting the Kyoto targets is required to be able to deal with the climate change challenge and to avoid adverse economic effects.

Risks are increasingly seen as important given the spate of flooding and storms seen across Europe in the last 5 years which have led to very significant damage. Natural disasters can only be expected to increase with global warming and hence efforts are needed to avoid impacts rising in the future. There are therefore clear and strong arguments for the focus in these fields.

The evaluation focuses on 15 countries, comprising the 10 new Member States (NMS), plus Bulgaria and Romania, plus 3 'old' cohesion Member States (Greece, Portugal and Spain). Countries have different needs (for example, natural environmental risks are very different across countries, and the state of environmental infrastructure is different) and capacities (for example, the potential for wind turbines varies widely across the countries). Note that for purposes of exposition we use the term Member State to cover all 15 countries, although Bulgaria and Romania have still to formally accede to the EU, planned for January 2007.

1.6 Structure of the Report

The report continues in the following sections:

- Section 2 – summarises the methodology used for the evaluation
- Section 3 – provides an analysis of the activity within the current programme period and identifies lessons for future programmes
- Section 4 – presents an analysis of future needs and financial requirements, by field and MS
- Section 5 – reviews the criteria for determining priorities for structural and cohesion fund objectives, based on agreed environmental objectives
- Section 6 – identifies the recommended priorities for structural and cohesion fund interventions, by field and MS
- Section 7 – summarises the main conclusions and recommendations.

Annexes provide supporting information. In addition, we have prepared a Guidance Report, which presents the guidance provided to national evaluators and presents the agreed approaches to the different stages of the evaluation. This synthesis report is based on, and complemented by, the 15 country reports, which provide considerable detail for existing policies and practices, investment needs and priorities for all five environmental fields.

2 METHODOLOGY

2.1 General Research Approach – Assessing Needs and Priorities

The general approach to the identification of environmental investment priorities has taken a three stage process. The first stage is concerned with providing an overview of current activity and policy in each MS. The second stage is concerned to identify the gross levels of physical and hence financial needs based on full compliance (fields 1 to 3), CO2 emission targets (field 4) and specified risk management levels (field 5). The third stage is concerned with establishing the priorities for investment that are consistent with the objectives laid down by the regulations governing the structural and cohesion funds.

The first stage work reviewed the range of activity in each field, the policy context and the extent to which complementary measures such as user charges are currently applied. The specific use of cohesion and structural funds has been identified.

The second stage work applied a qualitative and quantitative assessment based on existing data and assessments, supported by available unit cost data. This approach has taken into account projected economic and population change as well as the requirement to comply with EU environmental directives and the need to replace worn out infrastructure.

The third stage work applied a set of standard criteria to the identified needs to identify and rank investment priorities. These standards criteria are described below. The focus has been on establishing priorities within and between fields within a MS. The work has not attempted to define priorities between MS.

The work has therefore focused on preparing the required national evaluation reports, as the primary output of the evaluation. The national evaluations have been developed in discussion with EC national desk officers to maximise the use of the evaluation to the continuing negotiations between the EC and individual MS.

Each national evaluation has been based upon a combination of desk research and document review supported by stakeholder interviews. The qualitative and quantitative analysis of needs and priorities has made use of available national plans and proposals as well as physical and financial data. In doing so, the evaluators have sought to provide an independent appraisal of needs and priorities as identified by MS.

The work has been supported by the provision of independent population and economic projections for each of the MS (except Bulgaria and Romania) for the programme period to support the needs assessment and to compare with available national projections or to fill gaps where none exist. Some limited economic modelling of the implications of recommended investment for convergence has been undertaken for the larger MS.

2.2 Methodology for Reviewing Current Activity

The purpose of the work has been to provide geographic units in DG Regio with an initial snapshot of the current position in each MS, in each of five fields to support the negotiating process. In particular the report provided:

1. summary of the current state of provision of environmental infrastructure
2. summary of the operation of current programmes (2000-2006) in each of the five fields,
3. summary of emerging plans in each of the five fields, and
4. summary of any lessons from experience in relation to the operation of the programmes

For each field the work has provided an indication of the current state of provision using a combination of physical and financial indicators. It also provided an indication of current plans (if any) for 2007-2013 and any particular lessons or descriptions of good practice.

The work has used available policy and planning documents supported by discussion with relevant stakeholders.

The specific guidance provided to evaluators to undertake the overview is Part 1 of the Guidance Report.

2.3 Methodology for Assessing Needs

The purpose of the work has been to provide geographic units in DG Regio with an assessment of the needs for environmental investment over the period 2007-2013 in each MS, in each of five fields. The work has built on the review of current activity in Stage 1.

The needs assessment has been undertaken in physical terms (e.g. the number and type of investments necessary to achieve a given level of compliance or (if specifically linked), to environmental quality standards, using a series of indicators. These physically specified needs have been expressed in financial terms i.e. the direct investment costs of each specified type of investment by using a unit cost approach; combining the specified needs in physical terms (e.g. waste water treatment capacity) with the unit cost of providing a given level of treatment capacity.

Two ways of approaching the assessment of future needs have been used – capacities and drivers. *Capacities* - In some fields (such as WWT or RES) the needs have been defined by reference to physically defined targets (some mandatory such as the need for certain treatment levels and plant capacity per population unit (PE), others discretionary such as the share of electricity demand to be met from RES). Here the need is set by the targets and less by reference to certain drivers such as the growth of the economy, and requires explicit assessment of future and current capacity to calculate the needs. The need is essentially to provide missing or non-compliant infrastructure. *Drivers* – in other fields such as water supply, needs are more directly related to demographic or economic changes. Here the need is set by the rates of

change in demands of the population or of the economy; but still requires consideration of the existing levels of supply / capacity.

Future needs have also been defined by reference to policy goals. This is most easily understood in the context of targets where these are set by reference to formal EU or MS policies. Policy goals also provide the basis for assessing the significance of different needs, by allowing an understanding of the purpose and benefits associated with a given investment field. Description of these policy goals provides the context for assessing needs. Note that some targets relate to intermediate years within the programme period (eg renewables targets for 2010). Some extrapolation to 2013 has been necessary – supported by discussion with the MS.

Estimating future needs is somewhat speculative (although less so when defined by reference to set targets). This uncertainty has been addressed where relevant by the use of two or three scenarios (e.g. low growth, high growth) illustrating the effects of different assumptions, when combined in estimating future needs. Individual scenarios therefore seek to capture the composite effects when combining different parameters (eg population change with population intensity of use of a resource). For individual parameters (e.g. future rates of population growth), uncertainties have been reflected by using ranges around average values.

Technical barriers can prevent supply of services and capacities expanding to meet future needs. In the traditional fields (1, 2, 3) and in to some extent in relation to risk management, the technologies are largely tried and tested. However, one exception is in relation to the supply of services in rural areas and smaller communities. In the case of RE the technologies are still developing, and expansion of supply to meet future needs may require significant technical barriers to be overcome. These barriers have been highlighted where it assists programme negotiations.

The specific guidance which presents the detailed approach to the needs assessment for each of the fields is separately presented in the Guidance Report.

2.4 Methodology for Assessing Priorities

The priority assessment is intended to support national desk officers of DG Regio responsible for negotiating individual MS programmes. Specifically, the assessment is intended to provide an independent assessment of the priority needs from the overall level of identified needs, assuming that these will in total exceed the indicative financial allocations available for environmental investment.

The priority assessment derives, in the first instance, form the case for environmental investment (defined as comprising the five fields) to promote regional competitiveness and convergence through:

- compliance with EU environmental law (the environmental acquis) (Fields 1 to 3); and
- conformance with other policies (eg climate change or natural hazard management) (Fields 4 and 5).

In the case of compliance, the environmental standards set out in the acquis are those which are deemed necessary for a sustainable economy; and which therefore should

be met in order for long term regional development. In the case of conformance with other policies, the rationale for use of the Structural Funds derives from the economic costs and benefits associated with climate change and natural risks and their effects on regional development.

The approach has three parts to it:

- **Summarising the Needs Assessment** – this Part highlights, using a combination of qualitative and quantitative information from the detailed needs assessment, the needs which are important to meet the policy objectives for each Field. These maybe the large costly investments but also important low cost measures (such as strategic plans or capacity building). The summary provides the context for the priority assessment.

- **Establishing Priorities within Fields** – to produce a simple ranking – most important to least important – of the types of investment in each Field. This ranking is based directly on the needs assessment and the specific policy objectives of each field. This Part also includes an assessment of the scope to use flanking measures and of the administrative capacity to deliver investment programmes to identify the specific financial requirement in each field.

- **Establishing Priorities Across Fields** – using a range of criteria to compare investment across fields. This is based on a Point Scoring system and a Multi-Criteria Analysis (MCA) to establish the priorities. We provide explanation and guidance below.

The two most significant methodological challenges that have been addressed has been the estimate of financial requirement in each field and the MCA.

The estimate of the financial requirement has attempted to take account of the scope to avoid direct financial support from the structural and cohesion funds by using MS own resources (as a national rather then EU responsibility) or through complementary 'flanking' measures. The latter is based on a review of the scale of potential income from user charges taking into account the affordability for households. The estimate also takes into account the likely scope to deliver investment programmes based on previous performance in the absorption of funds and progress in programme planning in the current programme period.

The MCA has sought to identify priorities across the fields based on the application of a set of 10 criteria, which are based on the objectives stated in the structural and cohesion fund regulations. The contribution of specific investments have been assessed against these criteria using a simple scoring system, based on a qualitative judgement ranging from very strong contribution (score 10), through strong contribution (score 7), or limited contribution (score 3), to negligible contribution (score 0). The MCA has used the scoring together with different weightings attached to the criteria to identify priorities. Section 5 provides further details.

The specific guidance on the application of the approach to the priority assessment is Part 3 of the Guidance Report.

2.5 Methodology for the Macro-economic Assessment

As noted in the general description the specific national evaluations have been supported and complemented by a 'top-down' analysis that has informed and allowed some cross-check for the needs assessment through population and economic projections, and assisted in examining possible effects of investment on regional convergence in selected MS.

The work has been based on the national and regional economic forecasting model of Cambridge Econometrics. The model provides the scope to assess, for given future changes in population and the economy, the gross level of environmental infrastructure required (in physical capacity) using per capita or per GDP ratios of environmental capacity. The results are sensitive to the assumed unit ratios (such as the demand for water or MSW arisings per capita). The effect of these ratios (and by implication of resource efficiency measures) on the estimated need have been considered.

It was the original intention to provide a 'top-down' needs assessment using the economic model as a check against the more detailed 'bottom-up' analysis. However, because of the significance of investment not directly related to demographic or economic change or where a top-down analysis was in any case employed using nationally available forecasts it has not been possible to forecast physical investment needs to compare with the bottom-up analysis. However, where possible and appropriate, certain demand related investments have been checked.

3 ANALYSIS OF THE CURRENT SITUATION

3.1 Regional Development Rationales for Environmental Investment

There is a general appreciation that environmental improvement and protection is an important element in regional development. Three broad rationales can be identified from current programmes and related strategic advice.

3.1.1 Quality of Life

A high-quality environment is core to maintaining a high quality of life. The effect of pollution on human health is highly significant. World Health Organisation research indicates that air pollution with particulate matter claims an average of 8.6 months from the life of every person in the EU. Reducing negative health impacts are therefore likely to lead over time to a more productive workforce. Social well-being is also impacted by environmental protection – a pleasant natural environment has been shown to support stronger communities and 'social capital'.

Improving quality of life provides one strong argument for investing in environmental infrastructure. For example, increasing treatment of urban wastewater allows Europe's rivers, lakes and estuaries to recover from pollution and designating territory as protected natural areas helps to maintain ecosystems and preserve biological diversity, all of which translate into benefits for human health and quality of life. This has particular significance for regional development through the impact on retaining and attracting mobile, higher skilled workers.

3.1.2 Resource Efficiency and Risk Prevention

Resulting gains in eco-efficiency from responding to environmental protection and improvement measures can also help improve the competitiveness of the European economy by reducing the social costs of production. As environmental costs become internalised in business costs through markets (fuel costs and taxes/charges) and global measures (carbon reduction) so resource efficiency improvements have direct benefits on economic competitiveness.

Risk prevention investments, for example, in reducing flood damage, and preventing forest fire damage also have direct economic development benefits because the occurrence of such hazards has major damage and disruption costs and reduces economic growth.

3.1.3 Innovation and Eco-Industries

Eco-innovation and environmental projects also contribute to economic development through the creation of new eco-industries and employment. Environmental services such as clean water, waste management, improved energy efficiency and resource use, are all prerequisites to attracting innovative businesses, and promoting employment and investment, and the emergence of regional centres of environmental excellence. Harnessing new environmental technology can not only make a contribution to resource efficiency, but has positive benefits for security of supply, emissions reductions and local development.

This stimulus is of major importance given the expanding world market for environmental goods and services, estimated at over €500 billion in 2003[4]. The eco-industries sector employs over 2 million people in Europe and is growing at 5% per year, illustrating the promising market opportunities for eco-efficient products. Box 3.1 summarises the example of renewable energy.

Box 3.1: Economic Benefits from Investment in Renewable Energy Sources

Renewable energy offers important benefits through ensuring a diverse supply of energy and by reducing adverse environmental impacts. Many renewable energy technologies can be cost-competitive and even less expensive than other forms of energy; others require support for some years to come before commercial competitiveness is guaranteed without support. Other economic benefits include employment creation and increased trade of technologies and services. Employment creation can occur at different levels, from research and manufacturing to services, such as installers and distributors. An estimate by the Canadian Association for Renewable Energies suggests renewable energy could create more than 14 million jobs worldwide.

An EU study (EUFORES) shows that more than 900,000 new jobs will be created across Europe by 2020 as a result of increased use of renewable energy – of these, 385,000 will come from developing renewable electricity and a further 515,000 from biomass fuel production. Renewable energy technologies are also found to be more labour-intensive than conventional technologies for the same energy output. A 1999 European study assumes 17 job-years of employment are created for every megawatt of wind energy capacity manufactured. Using this assumption for the expansion of the wind turbine industry, worldwide wind power employment is projected to rise from 67,000 jobs in 1999 to approximately 1.7 million by 2020.

Many of these jobs are created locally and renewable energy investments use local energy resources, thus contributing to the local economy and regional economic development. European analyses show that this is particularly true for biomass industries, which are expected to be the biggest job creator in the coming years.

An EBRD case study showed that harnessing renewable energy has resulted in significant economic benefits for certain sectors of industry. In the Bulgarian ski region, using renewable energy sources (e.g. through below-ground man-made reservoirs that collect warm water from underground sources and changes in water pressure that generate heat) has had a large impact on heating bills for tourism-dependent hotels. Heating bills cost 75% less than the estimated cost of heating using oil.

3.2 Review of Environmental Strategies

The national evaluations allow an appreciation of how far current environmental investment and related policy is framed by broader strategic development approaches and frameworks, and the extent to which investment is driven by more specific legislative requirements to comply with the environmental acquis. Annex 1 provides a more detailed description of national environmental strategies.

[4] Eco-industries in the EU, Ecotec, DG Environment, 2002

3.2.1 Relationship between Environmental Investment and Sustainable Development Strategies

Almost all MS make reference to the Lisbon Strategy, the EU Sustainable Development or both in preambles to investment strategies. Sustainable development and the Lisbon Agenda (and thus National Reform Programmes for each MS) provide key strategic directions in most national policy.

Examples include Greece (where the National Reform Programme (NRP) has sustainable development as a 'priority axis', with special emphasis on aspects such as basic environmental infrastructure on solid waste, wastewater management, civil protection and risk prevention, protection and promotion of natural environment); Estonia (where the National Environmental Strategy (NES) is based on the Lisbon Agenda, the EU Sustainable Development Strategy and state strategies); Slovenia (where the development strategy declares five development priorities and action plans and serves as the Sustainable Development Strategy for Slovenia, including goals for the national environment); and Malta (where the NRP (2005-08) sets out key environmental issues e.g. internalisation of externalities, halting biodiversity loss and fighting climate change).

Other MS make reference to sustainable development as a concept to which environmental policy contributes rather than as a strategic policy framework. For example, one of the main goals of environmental policy in Latvia is the integration of environmental policy into all branches and fields of life in order to establish the basis for sustainable development. Similarly in Hungary, the National Environmental Programme (NEP II) – policy framework for environmental policy – ensures the integration of environmental considerations into sectoral policies, which is seen to promote the achievement of sustainable development.

Sustainable development is also seen as the conceptual basis for implementing proposed measures of environmental policy in Slovakia – implementation of the National Environmental Action Programme (NEAP II) is seen as conditional upon application of the fundamental principles of sustainable development. Environmental policy in Poland is also argued to have been based on sustainable development principles since 1990. In the Czech Republic, the State of the Environment Policy forms the environmental pillar of the national Sustainable Development Strategy.

3.2.2 Role of Environmental Investment in Wider National Development Policies

Evidence that current environmental investment strategies and plans are integrated with wider development objectives, beyond the general acknowledgement of principles, is more difficult to find. In Greece, for example, there is an acknowledgement of past environmental investment contributing significantly to improvements in the quality of life of inhabitants, but no explicit mention of the role of environmental investment in wider development objectives. In Portugal, the potential contribution of environmental policy to regional convergence and competitiveness goals is acknowledged but not quantified in several publications. Exceptions include Estonia and Slovenia. In Estonia, one of the four priorities of the National Development Plan is infrastructure and local development, under which lies the measure 'development of environmental infrastructure', aimed at supporting specific activities and reaching specific objectives – indicating an understanding that investment in environmental infrastructure contributes to wider development objectives. In Slovenia, the importance of providing 'healthy drinking water' for the promotion of sustainable and regional development, is

expressed in policy documents on water supply and need for environmental investment.

In sum, the specific and explicit identification of the economic development rationales for environmental investment tends to be absent from the national strategies. Improvements in basic services (water supply, waste water treatment and solid waste collection) are assumed to be essential in attracting people to poorer areas, and renewable energy investment is expected to create new economic opportunities.

3.2.3 Broad Objectives of the Environmental Strategies or Investment Plans

The broad objectives across most of the MS include: ensuring quality and quantity of drinking water, minimising the creation of waste, use, recycling and correct disposal of waste, promoting sustainable use of natural resources, protecting existing biodiversity and nature, reducing industrial sources of pollution to water, land and air, promoting clean technology, cleaning up past pollution, promoting environmental awareness and developing renewable energy sources.

The Kyoto Protocol also has an impact on national environmental strategies – for example it is one of the key drivers of renewable energy policy in Greece, which is showing a particularly accelerated rate of increase in CO2 emissions. Kyoto also influences the National Energy Plan of Slovenia, which has obligations to reduce greenhouse gas emissions by 8% by 2010.

3.3 Review of Current Activities and Financial Support by Field

The national evaluations have examined the plans and current activity on the current programme period (2000-06). This review allows a profile of the current scale of activity by MS and by field. Note that whilst the cohesion MS had planned expenditure for the full programme period, the other MS received funding as transitional programmes for less than the full period. The review also provides a comparison of planned and executed investment to inform considerations of the capacity of individual MS to absorb planned programmes for the next (2007-2013) programme period.

3.3.1 Scale of Planned Activity

The scale of the planned investment by field and MS is summarised in Table 3.1. This represents the investment planned over the current period. Not all programmes started in 2000, the majority of programmes in the accession MS started in 2004.

The analysis indicates that the scale of the planned programmes is typically between 0.5% and 1.5% of GDP, based on the estimated average annual investment (see table notes). The planned programmes in the Baltic States represent the highest shares of GDP, between 1.5% and 1.8% of GDP. Because of the inclusion of certain non-field items (see table notes), the scale of the plans are slightly overstated in some MS in terms of the five fields.

3.3.2 Fields of Planned Activity

The planned allocation by field (Table 3.1) indicates that the plans are almost exclusively concerned with basic environmental infrastructure (Fields 1, 2, 3). Outside of the cohesion MS, which have a slightly broader programme focus, only Cyprus has less than 90% of planned investment in these three fields. This confirms the conclusion of the qualitative review, that the primary driver for the investment programmes is

compliance with the environmental acquis. The high level of planned investment in waste water treatment, driven by the need for compliance with the UWWTD, which accounts for over 40% of planned investment in all MS except, Greece, Spain, Cyprus and Malta, is particularly evident.

Table 3.1: Overview of Planned Investment Programmes 2000-2006 (Million Euro, 2000 prices)

Member State	Water Supply	Waste Water Treatment	Municipal Solid Waste	Renewable Energy Sources[5]	Natural Risk Man'nt	Total for Period	Average Annual Planned as % GDP in 2000	Share in Fields 1-3
Greece	1,866	1,134	870	632	347	4,849	0.6%	80%
Portugal	779	1,595	511	909	76	3,870	0.5%	75%
Spain	5,538	3,378	1,579	376	1,706	12,577	0.3%	83%
Hungary	17	545	194	9	26	791	0.6%	96%
Poland	302	2,716	484	20	203	3,725	0.8%	94%
Slovenia	24	85	47	0	0	156	0.3%	100%
Czech	188	719	165	33	80	1,185	0.7%	90%
Slovakia	205	522	32	3	6	768	1.3%	99%
Bulgaria	102	178	75	0	13	368	1.0%	96%
Romania	381	805	147	0	0	1,333	1.2%	100%
Malta	5	9	32	0	2	47	0.4%	97%
Cyprus	1	12	12	3	12	39	0.1%	62%
Estonia	80	137	63	5	1	286	1.7%	98%
Latvia	76	219	44	0	2	341	1.5%	99%
Lithuania	175	267	142	16	2	602	1.8%	97%

Sources: Investment figures – national evaluation reports – based on published plans

Notes: In many cases the investment plans include activity outside the fields – such as rural development and landscape protection, non-RES environmental technologies and industrial waste. The estimates for water supply and waste water treatment are only indicative since they include rough allocations of investment in joint projects. Plans include both EU and MS sources of funding.

Estimates of GDP are based on Eurostat data for 2000 – these may differ slightly from estimates taken from MS sources and used in the national evaluations. The average

[5] [5] These values do not include household investment. This is very significant for passive solar (for heating) and, while far less significant, growing for photovoltaics. In the latter case there are market support schemes in place that are discussed elsewhere in this report.

annual investment is based on a programme of 7 years in the cohesion MS, and 3 years in the accession MS.

Even with the focus on the traditional environmental infrastructure, most MS have planned allocations in the other two fields of RES and natural risks (although the activity in these fields tends to include non-field specific activity). Only Slovenia and Romania have focused exclusively on Fields 1, 2 and 3.

3.3.3 Comparisons with Actual Investment

The national evaluations have found that the available data on current implementation is not always up to date, and makes any systematic comparison difficult. The information tends to refer only to investments executed up to 2004, and so does not provide a full picture of the scale of implementation of the plans. However, there are a number of broad conclusions that the comparison suggests, and which have informed the needs assessment for the next programme.

Firstly, the current levels of implementation indicate a substantial delay and lack of progress in most MS, in most fields, compared with the implied investment profile of the plan. The delays are partly accounted for by delays in transposing EU Directives into national law, and hence the basis for determining compliance requirements. For example Portugal, even in 2004 had still to transpose 7% of EU environmental directives into law (currently estimated at 3.5%). Delay was also partly accounted for by problems in project design and planning. These delays have in turn has impacted on the time taken to evaluate and to secure funding approval.

Secondly, the delays are expected, at least in part, to be made up through the implementation of projects in the next two years (2006-08), as funding approvals continue to feed through. This will be partly driven by the pressure from the Commission in the form of written warnings concerning the continuing lack of compliance. For example, in Portugal, approximately 7% of STPs still failed to comply with the UWWTD, at the end of 2005, some seven years after the legal deadline.

Thirdly, the difficulties of progressing implementation in some MS has been a significant consideration in the appraisal of 'absorptive capacity'[6] for the next programming period. We summarise some of these conclusions in more detail in the next section, but, for example, appraisal in Greece indicated an overall rate of absorption of 37% at the end of 2005.

Finally, the delays in the current programmes have had a knock-on effect on the needs identified for the next programme period, with a continuing need to maintain the focus on the compliance requirements of the acquis.

3.3.4 Intervention Rates

The review has also identified the approximate ratio of funding sources in the current programmes between the MS and EU. The analysis indicates that the EU funding

[6] The ability to 'absorb' the planned funding, in other words turning planned funding into actual disbursements on selected activities.

sources typically account for approximately 70% - 80% of the costs of the programme. The intervention rates vary between MS and fields of activity, but there is no major pronounced deviation from the approximate ratio in any one MS or field.

4 IDENTIFICATION OF NEEDS AND FINANCIAL REQUIRMENTS FOR THE FUTURE

4.1 Summary of the Drivers and Needs for Investment

4.1.1 Overview of Key Investment Drivers

Investment needs for water supply (WS) and waste water treatment (WWT) – both upgrading and building new infrastructure – is largely driven by the need for compliance with EU Directives, especially the Urban Waste Water Treatment Directive (UWWTD) – these form the basis for many of the policy objectives in most MS strategies.

Investment needs of municipal solid waste management (MSW) – expansion and creation of modern sanitary landfills and upgrading or closure of existing landfills – are driven largely by the Landfill Directive (compliance), particularly as most waste disposal across the MS remains landfill deposition; most National Waste Management Plans tend to be oriented towards implementation of EU requirements.

Investment needs for renewable energy sources (RES) are largely driven by targets for increasing use of renewable energy especially Directive 2001/77/EC regarding targets for share of RES in total electricity consumption. However, increasing economic growth and parallel increase in CO2 emissions of the energy sector also acts as a policy driver; some MS recognise the need to reduce dependency upon fossil fuels (and fossil fuel imports).

Investment needs of natural risk management (NRM) is driven largely be existing national programmes, which in turn respond to the range of natural challenges in the countries concerned (flooding, fire, drought). Most MS appear to lack specific and comprehensive policy on natural risk management; but addressing risks as nationally evaluated. MS vary in their vulnerability to natural hazards, which is reflected in different needs, although the need for responses to flood risk is a common requirement.

The national evaluations have examined the needs across these fields and found that rather than being driven by expansions of population or economy that the major driver is the need for replacement investment or for new investment in locations previously without adequate infrastructure. This especially the case in WWT and to a lesser extent in MSW and WS. The investment in RES responds to policy goals to expand these sources and investment in NRM reflects previous activity but recognising changes in the level of risk. This balance changes somewhat in the Southern MS, where demands from tourism, and for better resource management, are stronger and drive investment, especially in WS and MSW.

Further review of the objectives and needs for investment is presented by field, (Sections 4.2 to 4.6) after a brief summary.

4.1.2 Qualitative Overview of the Types of Investment Needed by Field

The type of investment needed in the next programming period is similar to that already identified in current programmes. In the fields of water supply, waste water treatment and municipal sold waste this gives rise to the concern to finish 'unfinished business'. In other words the demands set down by the acquis in the current period (and in previous periods in the case of the cohesion MS) continue to drive investment needs. In the case of RES, needs relate to the RES with identified national potential, while in the field of natural risk management, needs relate to previous MS programmes (largely wholly funded by the MS to date). A summary of the types of investment needed in each of the MS is presented in Annex 2.

4.1.3 Overview of Key Influences Across the Fields and Physical Requirements

The need for environmental investment, described above is driven by the need for compliance with the aquis (Fields 1, 2, 3), RES targets and the largest natural risks. We summarise by field, below, the key influences behind this investment. In the case of the acquis, is the need driven by the requirement to replace old infrastructure, or to meet rising demand, or a combination of the two? How is the nature of MS environmental potential for RES influencing needs?, and what are the largest risks? A summary of the physical requirements in each of the MS is presented in Annex 2.

4.2 Water Supply (WS)

4.2.1 Summary of Policy Objectives

Water supply (WS) objectives across all MS are driven in large part by the Drinking Water Directive (98/83/EC). This seeks to:

- Decrease enormous amount of Unaccounted For Water (UFW) leaking from worn-out pipeline systems; reduction of water loss in distribution network, mainly through investment in automated distribution systems and technologies
- Ensure sufficient water quantities especially for regions with irregular water supply, facilitating water and energy economy measures and introducing best available techniques to achieve sustainable use of resources; metering of abstracted, prepared and consumed drinking water
- Improve water quality in particular regions, especially rural areas and smaller settlements (usually <2000 population equivalent (PE)); replacement of decayed distribution networks, impacting both on drinking water quality and losses; renovation and upgrading of drinking water treatment plants
- Need for accreditation of quality testing labs owned by water supply companies
- Modernisation of surface, groundwater and drinking water monitoring, data collection and analysis systems
- Replacement of old pipelines, especially lead and asbestos cement pipes
- Gradual increase of price of service to achieve balance between greater cost recovery and social affordability

In addition policy objectives are derived from the Nitrates Directive (91/676/EC):

- Designation of nitrate vulnerable zones and waters affected by nitrate pollution
- Installation of iron removal equipment

and Surface Water Abstraction Directive (75/440/EEC):

- Improve raw water quality

Other directives acting as policy drivers include:

- Solvents Emissions (VOC) Directive
- Water Framework Directive
- UWWTD
- Other daughter directives

4.2.2 Overview of the Types of Investment Needed for Water Supply

The main types of investment noted across MS (usually addressed by current initiatives and requiring further investment as well) are:

- renovation and extension of drinking water network (both local and long-distance)
- renovation of existing drinking water production plants
- additional reservoirs to store surface water
- extension of current supply network, particularly to rural areas, smaller towns and settlements
- monitoring of water resources and reduction of water loss in distribution network: leakage control, water capture, illegal abstraction prevention, 'water-saving technologies'

Other types of investment include: new connections, replacement of old pipelines (especially lead and asbestos cement pipes), replacement of leaking water pipes, equipment for control monitoring performed by producers. Table 4.1a summarises the scale of investments associated with these types of investment

4.2.3 Overview of Key Influences and Physical Requirements

The need for investment in water supply (WS) is not driven significantly by increased household demand for water. Although drinking water demand is forecasted to increase across some MS (Spain, Slovakia, Hungary, Lithuania, Poland) demand is expected to remain below current supply capacity in some MS (Lithuania for example, only 30% of capacity of water supply infrastructure is currently used). In other MS, for example Malta, increases in water demand are due to be met by leakage reductions, water conservation and water control programmes.

Table 4.1a: Water Supply: Indicative investment Requirement (M Euro)

	Reservoirs	Drinking water production plant	Transport (inc leakage) - long	Transport (inc leakage) - local	Metering	Other	Total
Bulgaria	115 – 167	135 - 669	500 - 757	1,543 – 5,700	-		3,136 – 6,300
Cyprus	No needs identified						
Czech Republic	45	1,430	1,487	1,879	8	Monitoring: 19	4,867
Estonia	-	27.5	204 – 574		-		232 - 602
Greece	1,304.7						1,304.7
Hungary	2,121						2,121
Latvia	-	76	803		-		879
Lithuania	-	0.2	180	120	-		300
Malta	4						4
Poland	1,100						1,100
Portugal	-	87.2	931.2		-		1,018.3
Romania	-	1,400	2,500		-		3,800
Slovakia	-	-	165 - 248	200 – 250	-		365 - 498
Slovenia	320 – 465						320 - 465
Spain	3,790						3,790

Source: National Evaluation Reports

In some cases water demand is projected to decrease – partly due to increasing water prices, for example in Lithuania and Slovakia higher tariffs have led to an increase in the recycling of rainwater, although the effect of water prices on demand is generally not a major influence (for example evidence from Spain is that demand is relatively unaffected by higher water prices).

Where increased water demand is expected this is mainly attributed to increases in domestic water demand and rising levels of tourism development, and occurs mainly in the southern MS. Where household water consumption is projected to increase this is due as much to growth in living standards and purchasing power as growth of population. For example in some MS demand is extremely low – close to minimum water demand for human needs (especially in the Baltic States – see Table 4.1) with increase anticipated as a result of rising incomes and changes in consumption patterns. Slight increases in population growth and corresponding increases in households are not expected to critically impact domestic water demand (for example in Greece, Czech Republic). Some MS (for example Slovenia, Bulgaria) are likely to experience decreases in population and households.

Table 4.2 provides a summary of the relative levels of domestic (household) water demand, leakage and prices across the different MS based on the national evaluation reports.

Table 4.2: Overview of Household Water Demand, Leakage and Prices

Member State	Demand	Leakage	Prices
	l/inhab/day	% supply	euro/m3
Greece	250	45	1.00
Portugal	189	36	0.77
Spain	164	19	0.81
Hungary	107	19	0.65
Poland	134	no data	0.50
Slovenia	120	50	0.80
Czech	102	21	0.71
Slovakia	109	33	0,35
Bulgaria	95	61	0.20
Romania	150	31	0.40
Malta	220	20	1.09
Cyprus	212	20	0.33
Estonia	77	no data	0.74
Latvia	71	20	0.30
Lithuania	65	32	0.50
EU15 – average	119	30	0.63

Source: National Evaluation Reports

Notes: EU15 refers to the study MS. Data is taken for various years between 2000 and 2004, typically 2003, 2004.

Data on water prices exclude VAT and waste water treatment. These figures should be taken only as indicative given the variations in prices according to levels of usage and location of households

Industry water consumption has experienced a decline due to the closure and reduction in activity of water-intensive, older industries or closure of certain industry (referenced in all the central and eastern MS). Even where there are increases in consumption such as Portugal, this is not considered to be the main driver.

In sum, the need for investment in infrastructure is driven by compliance and EU requirements rather than increasing demands from the population or economy (Table 4.3). In southern MS the combination of tourism demand and domestic development pressure in coastal areas means that investment needs are also driven by economic and demographic change. Substantial parts of the existing infrastructure are worn-out and non-compliant, and has to be upgraded to meet Directives such as the Drinking Water Directive, for example in Portugal 40% of 2007-13 investment is aimed at rehabilitation of existing infrastructure and in Bulgaria 70% of water distribution network is in a very poor condition and likely non-compliant. In the Czech Republic 75% of the supply infrastructure is worn-out and the need for drinking water quality improvements are driven by the need for compliance. In the absence of the acquis it is likely that the rate of replacement of existing infrastructure would be lower.

Table 4.3: Projected Demand Trends for Water in the MS, 2007-2013

Member State	General Trend	Main Influences
Bulgaria	Decrease	-population decrease, likely to continue for next few decades -decrease in overall industrial demand due to slowdown in industries with high water demand -unit water consumption for household purposes has decreased recently -average size of household also decreasing
Cyprus	Increase	-Total water demand likely to increase. Population and number of households likely to increase in 2007-13 period. -increase in tourism in coastal areas likely to boost growth in urban population -per capita use expected to slightly increase
Czech Republic	Little change	-water demand unlikely to drop much due to current low levels -increases in tariffs tend to reduce water demand. -growth of industry unlikely to cause any extra growth in demand -low unit water consumption per capita per day likely to last for a long period (probably most of programming period)
Estonia	Decrease – no major change	-low fertility and aging likely to lead to further population decline. Population may decrease by 4-5% by 2015. -overall water demand could either decline due to population decline or increase due to connection of new areas to the public water supply system in the future
Greece	No change or slight increase	-anticipated population increase not expected to critically impact domestic water demand; household pricing policy likely to incentivise more efficient water consumption -agriculture sector (downward trend in GDP growth and employment) and manufacturing industry both unlikely to critically impact water demand

Member State	General Trend	Main Influences
		-upward historic trend for annual per capita water demand (1990-97; due mainly to development of agricultural sector). Continued upward historic trend expected, although no official forecasts for water demand exist
Hungary	Increase	-household water consumption to approximately 125 litres per person per day in 2015 –drinking water demand likely to increase by 10% by 2015
Latvia	No change or slight increase	-rapid economic growth observed from 2001-05 could lead to increase in water demand -however, there has been recent tendency towards to decrease in water use -no current data on unit water demand of households/inhabitants
Lithuania	No change or slight increase	-population decreasing mainly due to low birth rate and emigration -manufacturing industry likely to experience rapid growth and could lead to greater demand for water -water demand for households currently very low; water consumption by households likely to grow slowly -water consumption in rural areas will increase by 2013
Malta	No change or slight increase	-Population not expected to increase much therefore unlikely to be strong factor in water demand increases -recent reduction of demand due to water conservation programmes and leakage reduction -increasing pressure from tourism sector and economic growth, as well as slight increases in population, could lead to increase in demand, although water demand can also reasonably be taken as constant
Poland	Increase	-total economy demand for drinking water per capita is lower than EU and expected to rise -unit water demand has been decreasing over last 10-15 years, but there are no reliable projections for unit water demand regarding households -unlikely to be further decrease in household water demand because of demand being close to the minimum level necessary to meet human needs
Portugal	Increase	-Unit water demand per inhabitant expected keep rising in the 2007-13 period – per capita consumption (189 litres/inhabitant/day) likely to rise to 209 litres/inhabitant/day in 2013 -industrial water demand may either rise or fall; rise in prices may reduce industry demand although some industries (e.g. manufacturing) have own sources of abstraction
Romania	Decrease or no change	-population decline due to birth rate decrease, emigration, long-term workforce migration. Population likely to decrease by 1 million inhabitants by 2013. -drinking water demand trend difficult to quantify or control because national economic growth has increased recently and may lead to increase in water demand - an opposing trend to probable decrease from population decline
Slovakia	Decrease or no	-population for period 2007-13 expected to stagnate. Slow growth in number of households

Member State	General Trend	Main Influences
	change	-no extra growth of drinking water demand for industry expected. -decrease in water demand has been influenced by higher tariffs
Slovenia	Increase or no change	-population likely to grow until 2014 and then will slightly decrease -standard water consumption per inhabitant is 110-120 litres/inhabitant/day and will remain at same level with no significant trend
Spain	Increase	-number of households expected to increase between 2001-2015: -household and tourism water demand expected to increase from 3078 million to 3602 million m3 per year -industry demand also expected to increase from 1381 million to 2139 million m3 per year -agricultural demand expected to increase

Source: National Evaluation Reports

4.3 Waste Water Treatment (WWT)

4.3.1 Summary of Policy Objectives

The main objectives relate to the implementation of the Urban Waste Water Treatment Directive (UWWTD). This seeks to achieve a:

- reduction of surface water pollution from municipal waste water
- renovation, improvement or installation of wastewater collection systems and establishment of wastewater plants
- connection to wastewater services for majority of urban population
- cleaning, renovation, extension of sewerage network including leakage prevention that reduces pollution of groundwater and infiltration
- renovation, improvement and construction of wastewater pumping stations.

In addition implementation of the Sewage Sludge in Agriculture Directive (86/278/EEC) is also reflected in objectives to adapt sludge treatment infrastructure.

Policy objectives acknowledge the links between water supply and waste water treatment, implemented through 'mixed' projects – wastewater and water supply both addressed simultaneously. However, most of these are driven by the need to be compliant with UWWTD.

Some countries make the link between the UWWTD driven investments and the 2015 goals of the Water Framework Directive (WFD), although this reference is very often made in a broad sense and never explicitly detailed.

4.3.2 Overview of the Types of Investment Needed for Waste Water Treatment

The main types of investment noted across MS (usually addressed by current initiatives and requiring further investment as well) are:

- new Sewage Treatment Plants (STPs) especially for smaller agglomerations (<2000 PE)
- renovation or upgrading of STPs to a higher standard
- new sewerage systems
- further extension of sewage collection system
- sludge treatment

Other types of investment include: storm water detention tanks, reconstruction of trunk sewers, CSO (combined sewer overflows) upgrading, building or upgrading of pumping stations, sludge disposal or re-use, water pricing, monitoring of pollution and water quality. Table 4.1b summarises the scale of investments associated with these types of investment.

4.3.3 Overview of Key Influences and Physical Requirements

Some MS (such as Poland, Latvia, Estonia) have experienced a decline in the volume of wastewater requiring treatment, due to a fall in production intensity and stronger environmental policy, and a reduction of industrial output and increase in treatment efficiency. However, other MS are projected to see increase in the volume of waste water requiring treatment; with future increases in the number of connections to the sewage system likely to drive up domestic waste water volumes (such as Portugal).

A large share of existing wastewater treatment plants/sewage treatment plants (WWTPs / STPs) are non-compliant with the Urban Wastewater Treatment Directive (UWWTD). Many public utility networks and WWT facilities are considered obsolete and worn-out and not to comply with basic performance criteria. The quality of old plants and of operation is frequently considered to be poor and obsolete requiring plants have to be replaced or upgraded, for example in Slovakia most CSOs (combined sewer overflows) are non-compliant and require further investment

Much of the investment needed is required for rehabilitating existing infrastructure (e.g. 26% of investment in Portugal); with less investment (approx 13%) required for the construction of new plants, driven by compliance with the UWWTD. In technical terms the main deficiencies of existing WWT plants are the failure of mechanical/electrical equipment, inefficient and unsafe systems, poor structural conditions of treatment units, compounded by inadequate maintenance of installations.

In the majority of MS investment in WWT is considered to be a higher priority than WS because existing targets for connection and treatment rates are failing to be met and because many agglomerations are non-compliant. In some cases, all existing STPs require expansion or rehabilitation (e.g. Latvia). The pressure of written warnings and potential threats of legal action by the EU is a major driver (e.g. Portugal and Greece which as cohesion MS have had a longer period of time to ensure compliance).

Table 4.1b: Waste Water Treatment: Indicative investment Requirement (M Euro)

	New STPs	Renovation / upgrade STPs	New Sewerage	Renovation / upgrade sewerage	Sewage pumping stations	CSO upgrading	Sludge treatment	Sludge disposal	Total
Bulgaria	695 – 1,300	84 – 470	1,238 – 4,640	470 – 1,450	-	-	-	-	2,487
Cyprus	204								204
Czech Republic	78	73	13,650	6,300	90	60	-	-	2,400
Estonia	5	63	164	665	44	-	-	-	267
Greece	500								500
Hungary	3,738								3,738
Latvia	420	123	220	549	12	0	-	-	1,325
Lithuania	1 - 3	38 – 94	250 - 345	575 - 794	-	50	-	-	863
Malta	60								60
Poland	1,350 – 1,980		5,260 – 6,467		-	-	-	-	7,240
Portugal	190.45	40.5	1,053	400.3	-	-	-	-	1,958
Romania	1,700 – 2,900		1,900 – 2,100	1,060	-	-	-	-	4,800
Slovakia	917	360	345 -700	690 – 1,400	-	-	-	-	2,312
Slovenia	33	31	487	515	-	-	109	-	1,175
Spain	2,650								2,650

Source: National Evaluation Reports

In summary, a high share of WWT investment is compliance-driven – UWWTD compliance is the main driver. Many of the planned projects represent a continuation of previous programming period investment projects. Although compliance requirements are driven by health and environmental concerns, the specific influence of economic development objectives is rarely acknowledged explicitly. Only Cyprus makes mention of wastewater projects being for communities' benefit – reducing risks to local health and the environment – most of the MS tend to refer only to compliance.

4.4 Municipal Solid Waste (MSW)

4.4.1 Summary of Policy Objectives

Several directives drive policy on MSW but especially the Landfill Directive (99/31/EC). This Directive is directed to objectives for the:

- operation of sanitary landfills and transfer stations
- gradual restrictions in volume of waste disposed in landfills; reduction in proportion of biodegradable urban waste that will be deposited to sanitary landfills
- abolition of uncontrolled areas for disposal of solid waste
- creation of modern sanitary landfills (including gas capture); expansion and upgrading of existing sanitary landfills
- increase in proportion of population served by solid waste management systems
- implementation of waste prevention programs
- establishment of selective waste collection systems; development of kerbside waste collection
- expansion of systems for waste collection, sorting and reuse
- implementation of technologies of biogas production and combustion of municipal waste
- creation of hazardous waste management system
- the availability of services of centralised household waste management system to all residents
- return of the majority of waste into economic circulation particularly through recycling
- promotion of waste processing in proximity of its generation
- reduction in quantity of stored waste and provide waste elimination or storage in a manner safe to human health and environment
- reduction of emissions of greenhouse gases from disposed organic wastes

In addition other Directives influencing objectives include:

- Directive 94/62/EC – packaging and packaging waste
- Directive 2002/96/EC – end-of-life vehicles
- Directive 75/442/EC – Waste Framework Directive
- Directive 94/67/EC – incineration of hazardous waste
- Directive 2002/96/EC – waste electrical and electronic equipment

4.4.2 Overview of the Types of Investment Needed for MSW

The main types of investment noted across MS (usually addressed by current initiatives and requiring further investment as well) are:

- expansion and building of waste collection facilities
- manual/mechanical sorting facilities
- composting sites
- existing landfill close downs and building of new landfills/upgrading of existing landfills
- remediation of landfill sites
- incinerators/incineration plants
- recycling facilities/recycling yards
- additional waste treatment plants

Other types of investment include: training and public awareness raising campaigns, management of biodegradable waste, implementation techniques of biogas production and combustion of municipal waste, illegal dumping prevention, gas capture devices, additional composting, selective collection improvements, financial sustainability, cooperation and capacity building in municipalities. Table 4.1c summarises the scale of investments associated with these types of investment.

4.4.3 Overview of Key Influences and Physical Requirements

The influence on investment needs is less uniform in the case of MSW than the previous two fields. This reflects differing trends in waste generation across MS. However, most types of waste appear to be increasing in quantity – e.g. construction and demolition waste and municipal waste due to excavations for major development projects (development-related) as well as increasing household waste because of rising consumption. Table 4.4 summarises recent annual levels of MSW generation per capita, with national evaluations indicating a general expectation of an increasing trend, especially in household waste reflecting rising real incomes.

Table 4.1c: Municipal Solid Waste: Indicative investment Requirement (M Euro)

	Waste collection	Waste sorting	Recovery	Disposal - new disposal facilities	Disposal - remediation of existing	Total
Bulgaria	69	178	40	626		912
Cyprus	110					110
Czech Republic	79		35	414		529
Estonia	0.9	15.2	2	52.3		96
Greece	166.7	270.2	508.6	80.5		1,026
Hungary	1,736					1,736
Latvia	63	0	14	99	364	540
Lithuania	96		50	186		332
Malta	60					60
Poland	1,000 – 2,200					2,200
Portugal	1,000					1,000
Romania	137	-	46	1,503		1,686
Slovakia	55		32 - 54	209		307
Slovenia	120			302		427
Spain	3,665 – 4,922					3,896

Source: National Evaluation Reports

Table 4.4: Annual MSW Arisings

Member State	Arisings
	kg/yr/capita
Greece	416
Portugal	430
Spain	502
Hungary	465
Poland	256
Slovenia	411
Czech Republic	280
Slovakia	294
Bulgaria	502
Romania	292
Malta	625
Cyprus	470
Estonia	396
Latvia	240
Lithuania	290
EU15 – average	394

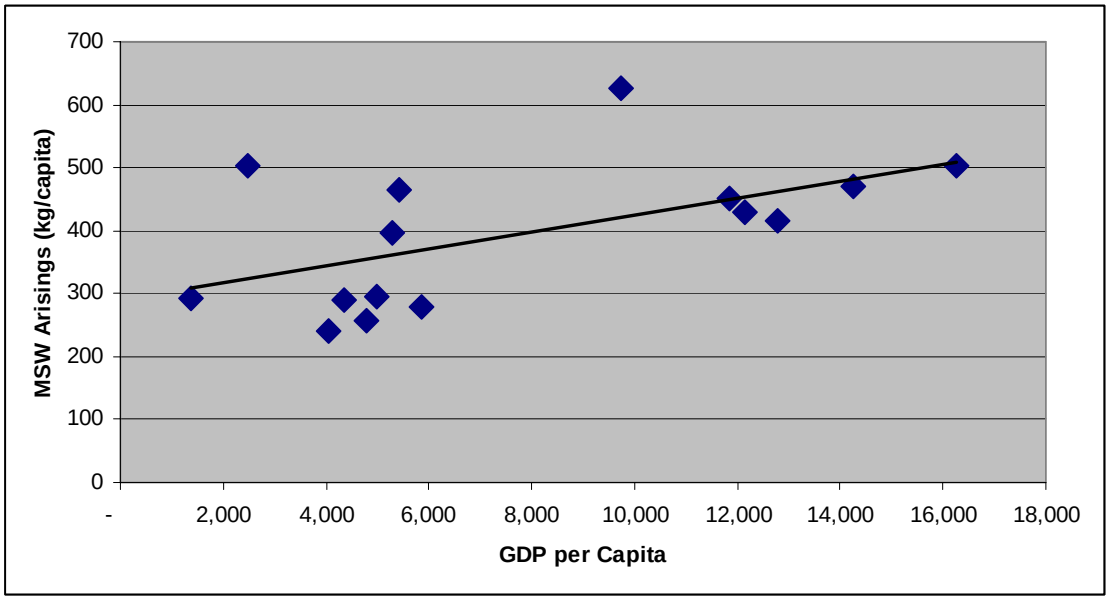
Source: National Evaluation Reports

Note: EU15 refers to the study MS. Data is taken for various years between 2000 and 2004, typically 2003, 2004.

As a result the major need for investment is the requirement for additional compliant treatment and disposal capacity. Although there is a major problem of upgrading or closing non-compliant landfills, there is also the need to expand overall capacity; and to invest in waste sorting, treatment and recycling activities. As with the previous fields, the need for additional capacity is linked to the requirements of the acquis in terms of the need for compliance, but investment is also needed to respond to pressures resulting from increased wealth creation.

The effect of rising real incomes on consumption patterns and the generation of waste can be seen in Figure 4.1, which indicates how arisings per capita increase with per capita GDP.

Figure 4.1: MSW Arisings Per Capita and GDP per Capita in the 15 MS



The effects of rising incomes on waste generation suggests that there is an increasing need to consider waste minimisation. Whilst much of the investment in this field is framed by the requirement to recognise and implement the waste hierarchy, which emphasises the need for waste minimisation and recycling, most MS are still focused on the disposal stage. The evaluations in the cohesion MS, especially Spain, but also Greece and Portugal have emphasised the need to take more proactive steps to improve resource efficiency and to minimise the volumes of waste arisings.

4.5 Renewable Energy Sources (RES)

4.5.1 Summary of Policy Objectives

Many MS policy objectives are driven by Directive 2001/77/EC – promotion of electrical energy production. This forms the basis of Energy Policies and 2010 targets for some MS (e.g Estonia, Greece); implementation of this Directive has also been key driver behind development of green electricity in Poland.

In addition Directive 2003/54/EC gives rise to a series of objectives:

- increase capacity for production of heat and electricity from RES
- increase utilisation of waste heat and energy savings
- decrease energy consumption for heating
- replacement of fossil fuels and decrease the load on the environment
- increase public and industrial energy efficiency i.e. support development of environmentally-friendly energy use in municipal and business sectors

Other Directives acknowledged in national policy include Directive 2003/30/EC – promotion of use of biofuels or other renewable fuels for transport and Directive 2003/87/EC – EU Emissions Trading Directive.

4.5.2 Overview of the Types of Investment Needed for RES

The main types of investment noted across MS (usually addressed by current initiatives and requiring further investment as well) relate to the different RE technologies, which vary across MS depending on the particular natural potential for RE:

- solid biomass/logging waste (mainly for heat production)
- liquid biofuels/additional efforts on biofuels
- solar thermal
- wind power/wind extension/wind equipment
- solar electric (PV)
- small hydropower
- geothermal – heat pumps
- biogas
- wave power / tidal

Table 4.1d summarises the scale of investments associated with these types of investment.

4.5.3 Overview of Key Influences and Physical Requirements

There is a widespread acknowledgement of the need to increase RES capacity across MS for a combination of reasons; some MS are driven by high CO2 emissions and desire to follow a sustainable development agenda (such as Cyprus), others by an overall rise in living standards and economic growth leading to higher consumption of electricity (such as Estonia), new legal framework for energy efficiency in buildings (such as Portugal), and the expected impact of liquid biofuels production on reducing high unemployment rates in agriculture (such as Poland).

In some MS the need for investment is RES is not considered a high priority (such as Slovakia which has no definite policy targets or policy framework; and Estonia where energy policy is heavily fossil-fuel oriented with a distinct lack of support for alternative sources in electricity production, linked to large/cheap supply of electricity from oil shale – resulting in only 0.3% share of electricity production from RES; with utilization of RES showing little change in the 1999-2004 period. Table 4.5 summarises the share of RES in total national energy and electricity consumption.

Table 4.1d: Renewable Energy Sources: Indicative investment Requirement (M Euro)

	Wind	Hydro (>15 MW)	Hydro (<15 MW)	Solid biomass	Liquid biofuels	Geothermal	Solar thermal	Solar electric (PV)	Total
Bulgaria	10	-	-	500	100	30	20	40	753
Cyprus	5								5
Czech Republic	696	-	200	32		-	-	-	1,168
Estonia	53 - 71	12		100	-	-	-	-	71
Greece	3,035	3,657	473	134		960	-	158	8,417
Hungary*	396	17.5		45	23	16	-	0.72	1,100
Latvia	73								73
Lithuania	173								173
Malta	60								60
Poland	9,648	846	488	1,464	-	290	537	216	6,134
Portugal	4,463	-	320	186	-	-	178	343	5,165
Romania	1,876								1,900
Slovakia	200								200
Slovenia	350								350
Spain	11.8	0.95		2.7	1.3	-	2.7	4.2	681

Source: National Evaluation Reports

*Note: *Other:* Waste: 22 M*euro*

Table 4.5: RES Share of National Energy and Electricity Consumption

Member State	RES as share in:		
	Primary Energy	Electricity	Target 2010 Electricity
Greece	15.6	9.6	20.1
Portugal	4.0	25.0	39.0
Spain	6.5	19.4	29.4
Hungary	3.6	0.6	3.6
Poland	4.7	2.0	7.5
Slovenia	29.1	32.0	33.6
Czech Republic	5.4	5.3	8.0
Slovakia	2.8	20.2	31.0
Bulgaria	4.5	6.4	-
Romania	5.3	9.0	-
Malta	0.0	0.0	5.0
Cyprus	4.0	0.0	6.0
Estonia	10.0	0.3	5.1
Latvia	46.0	48.0	49.3
Lithuania	9.2	4.6	7.0
EU15 - average	10.7	10.7	18.8

Source: National Evaluation Reports supplemented by data from http://www.unece.org/stats/trends/

Note: Data is taken for various years between 2000 and 2004, typically 2003, 2004.

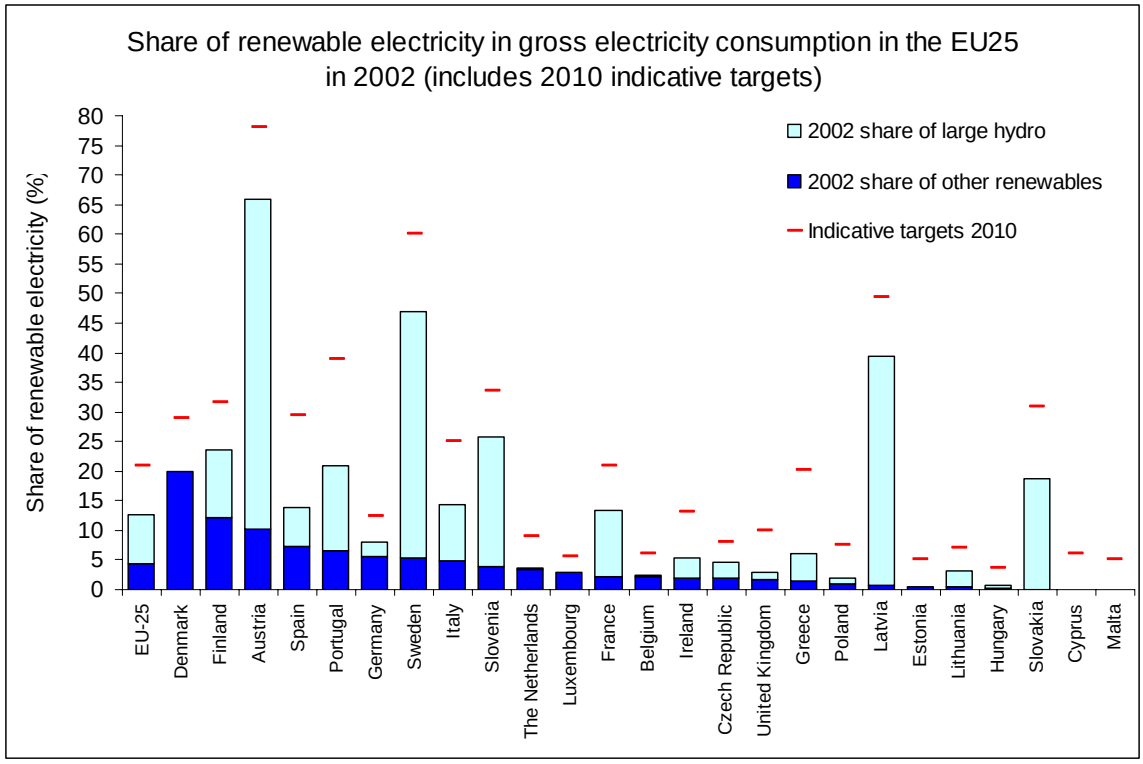
Most MS are seeking to expand RES, selecting technologies that have national potential. Biomass is considered to have a large potential in the majority of MS. Hydro-electric, geothermal and wind energy are the main alternative RES identified across the MS for electricity production. Solar thermal is a major source of heat, though much of this is through domestic rather than public investment. The types of investment needed for RES include hydropower stations, windmills, combined heat & power production plants, investment in solar (thermal and photovoltaic) and wind energy infrastructure.

Formal targets for RES as a percentage of gross electricity production ranges markedly across MS from 5% (Malta) and 6% (Cyprus) to 19% (Slovakia) and 20% (Greece). The likelihood of meeting targets differs between MS – some targets are considered to be too ambitious, others are considered to be more attainable: SI likely to meet target of providing 12% of its energy from RES by 2010 through high use of biomass and wind power; Poland is considered very unlikely to meet a 7.5% target (primary energy balance) in 2010 especially as annual investment (€270m) in RES is far from the estimated total capital costs for new RES installations for 1999-2010 – of approximately €4.4billion.

It is also worth underlining that the prices of RES have been and continue to fall. It is therefore important to balance investment between early investment, which can help develop the market and also encourage price falls, and late investment, which can build on the price fall in the meantime and hence obtain better value for money.

Finally, it is worth noting that a negative influence on investment is the opposition in some MS to RES because of their environmental impacts, e.g. opposition to hydropower plants in Latvia and Lithuania; and with wind power generation (windmills) opposed on grounds of noise and impacts on landscape and birds.

To put the study countries into context, an overview across EU-25 for RES share of electricity generation is presented below.



Source:
http://themes.eea.europa.eu/IMS/ISpecs/ISpecification20041007132211/IAssessment1116497885137/view_content/

4.6 Natural Risk Management (NRM)

4.6.1 Summary of Policy Objectives

Few MS have an explicit and official strategy covering the range of natural risks. The need for further policy development is acknowledged in a number of MS including Greece (where there is no specific comprehensive policy; acknowledged need to enhance cross-border cooperation and invest in coordination and response plans and systems) and Poland (where natural disasters are recognised as a problematic issue with a main objective to prepare a special act on status of disasters). Romania acknowledges the need to develop plans for all hydrographic basins to prevent drought and floods as a complete package; the need for better preparation of responsible institutions and population in order to reduce earthquake impact; and to improve local equipment and procedures in case of forest fires. Slovenia developed recently (2004) a Strategy on Spatial Planning, with areas highlighted as being at risk from dangerous natural processes.

There are specific policies in some MS for particular risks. For example in Portugal there are polices for forest fires:

- reduction of number of forest fires and burnt areas
- promotion of forest planning
- ensuring forest management
- reducing ignition
- fire propagation
- recovering burnt areas

At the EU level the policy initiatives are relatively recent and include:

- For flooding – the water framework directive and more recently the Flood Directive
- For forest fires – the Treaty establishing the European Community makes no provision for a specific common forestry policy. However, the EC has adopted forestry legislation on an ad hoc basis in order to protect forest resources – in particular, for forest fires. The Forest Focus Regulation[7], which applies to the period 1 January 2003-31 December 2006, is the latest in a line of community actions relating to forest fires which stem back to the late 1980s. The Forest Focus Regulation established a Community scheme to monitor and protect European forests.

4.6.2 Overview of the Types of Investment Needed for Natural Risk Management (NRM)

The main types of investment noted across MS are:

- flood protection:
  - wetland protection and development, embankments, reservoirs, land planning, infrastructure security and emergency actions, relocation of activities
  - extension of water storage, storm water collectors
  - watercourses upgrading
  - protective structures construction to prevent coastal erosion
  - monitoring, emergency response plans, communication and coordination mechanisms and plans
  - strict implementation of spatial plans
- drought:

[7] Forest Fire Regulation REFERENCE

- dams, wastewater reuse, water supply robustness, repair of irrigation systems
- enhancing cross-border cooperation and investment in coordination and response plans and systems

- forest fires:
  - determination of fire risk levels and compilation of fire protection plans, forest fire protection systems, international cooperation on rescue services (technical assistance and counselling)
  - monitoring, emergency response plans, communication and coordination mechanisms and plans

To put this into perspective –past investments are given in the figure below.

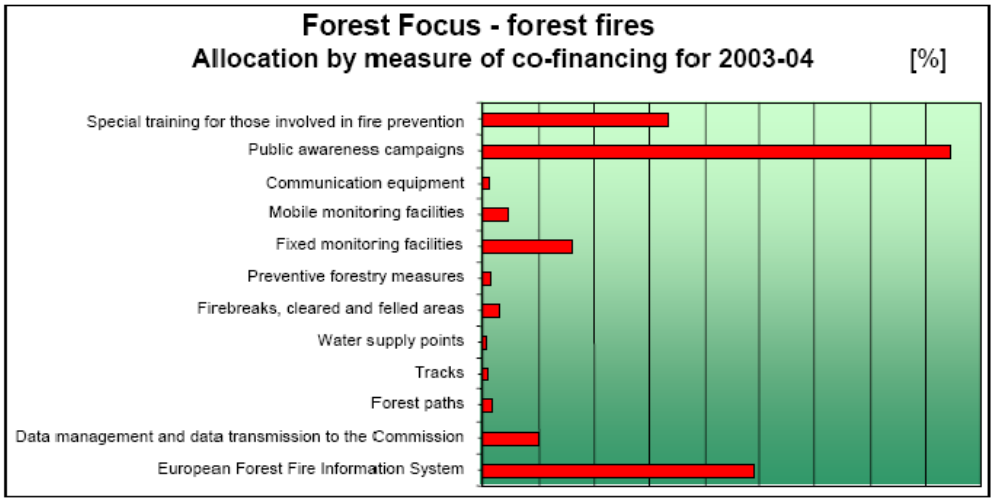


Figure 2: Allocation of EU co-financing by measure 2003-2004

Source: EC (2005)

Table 4.1e summarises the scale of investments associated with these types of investment.

4.6.3 Overview of Key Influences and Physical Requirements

Flooding is the greatest natural risk identified in most MS, with some MS very prone to flooding – for example 23% of land in Hungary is flood-endangered; and with regular damage reported in Slovakia from flooding. Forest fires are also a major natural risk in a number of MS, and are identified as the main risk in Estonia, Cyprus, and Portugal

Flooding is usually attributed to the climatic and hydrographic situation of MS: with specific causes identified including quick, violent storms (Malta); hydrographic situation and inadequate flood defences (Hungary); morphological situation of high-risk localities (Slovakia); mass deforestation (Romania); mixed Continental and Mediterranean climatic influence (Bulgaria), sewerage system problems (Greece).

Table 4.1e: Renewable Energy Sources: Indicative investment Requirement (M Euro)

	Drought	Fire	Flood	Heat wave	Storm	Total
Bulgaria	506					506
Cyprus	No needs identified					-
Czech Republic	-	-	899	-	-	899
Estonia	45					45
Greece	1,087					1,087
Hungary	480	-	1,464	-	-	1,944
Latvia	5					5
Lithuania	23					23
Malta	120					120
Poland	2,200					2,200
Portugal	250					250
Romania	500					500
Slovakia	-	-	575	-	-	575
Slovenia	24 - 168	4 - 28	2 – 14	-	-	210
Spain	95					95

Source: National Evaluation Reports

Flood risk is also attributed to man-made causes in some MS: with high levels of urbanisation considered to increase risks of flooding (high concentration of population, buildings and infrastructure). More generally, the tendency to develop social and economic activity in flood plains increases the probability of significant damage in future flood occurrences

The other major risks are forest fires and droughts: for example, 83% of forest resources are potentially threatened by forest fires in Poland. Most forest fires are caused by human activity – arson, agricultural activities, recreation; but with the risk of forest fires also climate-related, especially the occurrence of drought conditions.

Although risks have been reduced in some MS such as Cyprus and Portugal through measures to prevent accidental fires and to manage fires, other MS are considered to have made inadequate preparation for natural risks such as Romania and, in the case of flood risk, Malta. Other risks identified across the MS include earthquakes, landslides, and periodic water deficits.

4.7 Overview of the Scale of Investment Needed

The scale of investment needed in each MS to meet demand and / or particular legal requirements, and to allow replacement / refurbishment of non-compliant and/or worn out infrastructure in each field has been assessed. This is reported in detail in each of the national evaluation reports. The overall scale of investment needed for the period, prior to considerations of whether the market or the MS should be sourcing the investment rather than the Structural Funds – which is discussed in section 4.8 below – is summarised in Table 4.6.

The assessed level of investment needed is typically between 1% and 2% of GDP, based on an the average annual investment (dividing the total by seven years) and the average level of GDP over the period (see table notes). The major exception is the very high level of assessed need in Bulgaria (4.5% of GDP) and Romania (4.7% of GDP). It is clear that in these two MS there is not the scope to meet all needs in the next programming period, and that it will take the following programme period as well (2014 - 2020) to address the needs. In the case of Romania and Bulgaria, the needs have excluded the agreed deferment in compliance and related investment linked to formally agreed transitional arrangements, until the following programming period (2014-2020). Conversely, the assessed level of need in Spain and Cyprus is less than 0.5%.

Table 4.6 also summarises the needs by field. This indicates that the needs in Fields 1, 2 and 3 still account for a large majority of the share of investment needs. The exception to this is in Greece and Portugal, where the effects of previous programmes in contributing to progress in the provision in basic infrastructure, and the need to ensure that RES capacity is increased quickly to ensure compliance with national targets, is reflected in a lower share for Fields 1-3. In the case of Spain, the very high levels of funding through market obligations means that the need for RES related investment is small, with a consequent emphasis on Fields 1-3. In the other MS the share in these three fields is much closer to the current plans, although the needs in Fields 4 and 5 are given greater recognition, especially in Poland and Malta.

Table 4.6: Summary of the Assessed Scale of Environmental Investment Needed by Field and by Member State, 2007- 2013, (Million euro, current prices)

Member State	Water Supply	Waste Water Treatment	Municipal Solid Waste	Renewable Energy Sources	Natural Risk Man'nt	Total for Period	Average Annual Need as % GDP in 2007-2013	Share in Fields 1-3
Greece	1,305	500	1,026	8,417	1,087	12,335	1.0%	23%
Portugal	1,061	1,958	1,000	5,165	250	9,434	0.9%	43%
Spain	3,790	2,650	3,896	681	95	11,112	0.2%	93%
Hungary	2,121	3,738	1,736	1,100	1,944	10,639	1.7%	71%
Poland	1,100	7,240	2,200	6,134	2,200	18,874	1.0%	56%
Slovenia	465	1,175	427	350	210	2,627	1.1%	79%
Czech	1,200	2,400	529	1,168	450	5,747	1.0%	72%
Slovakia	455	2,132	307	200	575	3,669	1.4%	79%
Bulgaria	3,136	2,487	912	753	506	7,794	4.5%	84%
Romania	3,800	4,800	1,686	1,900	500	12,686	4.7%	81%
Malta	4	60	60	60	120	304	0.7%	41%
Cyprus	-	204	110	5	-	319	0.3%	98%
Estonia	232	267	96	71	20	686	0.8%	87%
Latvia	879	1,325	540	73	5	2,822	2.7%	97%
Lithuania	340	863	332	173	23	1,731	1.1%	89%
EU15	19,888	31,799	14,857	26,250	7,985	100,779	1.5%	66%

Source: National Evaluation Reports. Estimates of GDP based on estimates by Cambridge Econometrics – these may differ slightly from estimates taken from MS sources and used in the national evaluations. GDP is an average of the projected annual level of GDP over the programme period (in 2000 prices), except Bulgaria and Romania where GDP is a national estimate. Investment needs assumed to be in 2004 prices and deflated to 2000 prices for the purposes of the calculation.

The assessed levels of need can also be expressed as the number of years it would take to achieve the estimated level of need given projected levels of GDP (assuming 1% of GDP is invested each year) or if past levels of environmental expenditure[8] in the MS is maintained over the next programme period (Table 4.7).

Table 4.7: Estimated Years Given Levels of GDP and Environmental Capital Expenditure

Member State	Years @ 1% GDP	Years @ Past Levels of Environmental Expenditure
Greece	7.1	8.0
Portugal	6.3	6.2
Spain	1.3	1.6
Hungary	12.2	6.7
Poland	6.7	3.7
Slovenia	7.5	23.9
Czech	6.8	3.6
Slovakia	10.7	7.5
Bulgaria	31.6	30.0
Romania	32.6	18.9
Malta	3.9	2.0
Cyprus	1.8	1.8
Estonia	5.8	9.8
Latvia	18.8	11.3
Lithuania	7.0	20.4
EU 15	10.4	4.9

Sources: Projected GDP, Cambridge Econometrics; Estimates of Capital Environmental Expenditure by Member State, 1999; Ecotec for DG Environment, 2002

In some MS, (notably Hungary, Poland) environmental expenditure has exceeded 1% of GDP and the time required is therefore shorter than that estimated assuming 1% of GDP is invested. Conversely some MS (eg Slovenia, Lithuania) have spent less than 1% and would take many more years if investment continued at past levels.

4.8 Estimates of the Financial Requirements for EU Environmental Investment Programmes

The assessment of the investment needed, summarised in the previous section, takes no account of a range of factors that effectively reduce the need for EU investment programmes to be financed from the Structural and Cohesion Funds. These factors are:

- **Alternative Funding Sources:** The scope to meet investment needs through the market or through national, rather than EU, programmes in each Field (but mainly Fields 4 and 5)

- **Use of Supporting Measures:** The scope to reduce investment needs through the use of flanking or complementary measures – mainly through the

[8] Environmental capital and operating expenditure, and related employment, estimated for the candidate countries and the 'old' EU15 for 1999, reported in Ecotec, DG Environment, 2002. No systematic update to this assessment is available.

use of user charges in each Field (but mainly Fields 1, 2, 3). Additionally, the scope to use public-private partnerships (PPP) as a means of securing private sector investment finance has been considered

- **Administrative Capacity:** The scope to manage and deliver the indicative investment needs identified taking into account the administrative capacity of the Member State in each Field, (but especially Fields 1, 2, 3).

Each national evaluation has examined these factors and adjusted the assessed level of investment needed to take them into account. The result of the analysis is an estimate of the requirement for investment in EU programmes. This financial requirement forms the basis for the priority assessment and for the subsequent negotiation and design of the environmental programmes in the next period. Note that the estimated financial requirement is an assessment of the scale of the required programmes – not the specific allocation of Structural and Cohesion funding, which will be negotiated in detail on the basis of specifically agreed intervention rates between the MS and the Commission.

4.8.1 Alternative Funding

The scope to fund the needed investment from private sector or MS sources was examined, in the case of investment in RES and NRM. In the case of RES the scope to use a number of initiatives to underpin private sector investment in RES means that a substantial share of the investment needed can be funded without recourse to the Structural Funds. In particular the use of financial obligations on energy suppliers to provide a guaranteed price for producers of energy from RES has meant that energy users provide revenues to fund RES investment where there are effective market mechanisms. In other cases investment needs will be financed by the market because the RES is essentially a competitive energy source (for example much of wind power is commercially viable).

The evaluation has considered the extent to which the market (with any additional market obligations) is capable of meeting identified investment needs, and thus avoiding or reducing the need for SF support. In a number of MS (Slovenia, Spain, Greece, Czech Republic, Malta and Bulgaria) the market funds the majority of investment needed, between 67% and 98%. In Portugal and Poland, the market contributes a minority of the investment needed. All these MS use some form of market obligation to increase the finance that is raised through the market.

In the remaining MS, the national evaluations have excluded the investment requirements for RES that are commercially funded by the market (if any) and identified the investment that would need to be funded through some market intervention. In some MS (Cyprus, Hungary, Estonia and Latvia) there are existing market obligations but which are considered ineffective or inapplicable to the investments identified. In the remaining MS (Lithuania, Romania, Slovakia) no form of existing market obligation has been identified.

Table 4.8 provides a brief overview of the situation in each MS.

Table 4.8: Share of Investment Needs for RES Met by the Market and Market Obligations

Member State	Overall Market contribution to Needs	Contribution from Market Obligations	Comment
Greece	84%	60%	A significant scale of investment needed, but majority of funding will be from the market obligations
Portugal	40%	23%	A significant investment needed, but the obligations are less severe and make less contribution
Spain	0% (97% if RES included in the needs assessment)	23%	The total investment requirement of 23 billion (which is not included in the estimated total need) is almost fully funded (97%) by the market, being largely wind. 3% is not covered. Feed-in tariffs contribute 5 billion of the 23 billion required (23%).
Hungary	0%	0%	No estimate of market contribution. There is a market obligation, but the uncertainty over the operation and potential contribution has meant that no estimate is available
Poland	16%	5%	Market contributes a modest amount to the assessed needs, of which a third derives from market obligations
Slovenia	98%	13%	Most investment financed by the market, with a small contribution from obligations
Czech	67%	14%	Two thirds of investment needed is financed by the market with a small contribution from obligations
Slovakia	0%	0%	No estimate of market contribution which is assumed to be taken into account in the assessment of needs. No market obligations
Bulgaria	66%	6%	Two thirds of needs are met from the market. Small contribution from obligations
Romania	0%	0%	No estimate of market contribution which is assumed to be taken into account in the assessment of needs. No market obligations
Malta	67%	4%	Two thirds of total investment needed is financed by the market (ie not market obligation) of 67%. Small obligation / payment scheme contributes to PV - a small share of expected total RES.
Cyprus	0%	0%	5 MEuro for PV – for which there is no funding direct from the market and for which there are no provisions under the current market obligations
Estonia	0%	0%	No estimate of market contribution assumed to be taken into account in the assessment of needs. Ineffective market mechanism (feed-in tariff)
Latvia	0%	0%	73 MEuro for biomass co-generation for which there is no funding direct from the market and for which there are no provisions under the current market obligations
Lithuania	0%	0%	No estimate of market contribution which is assumed to be taken into account in the assessment of needs. No obligations

Source: National Evaluation Reports

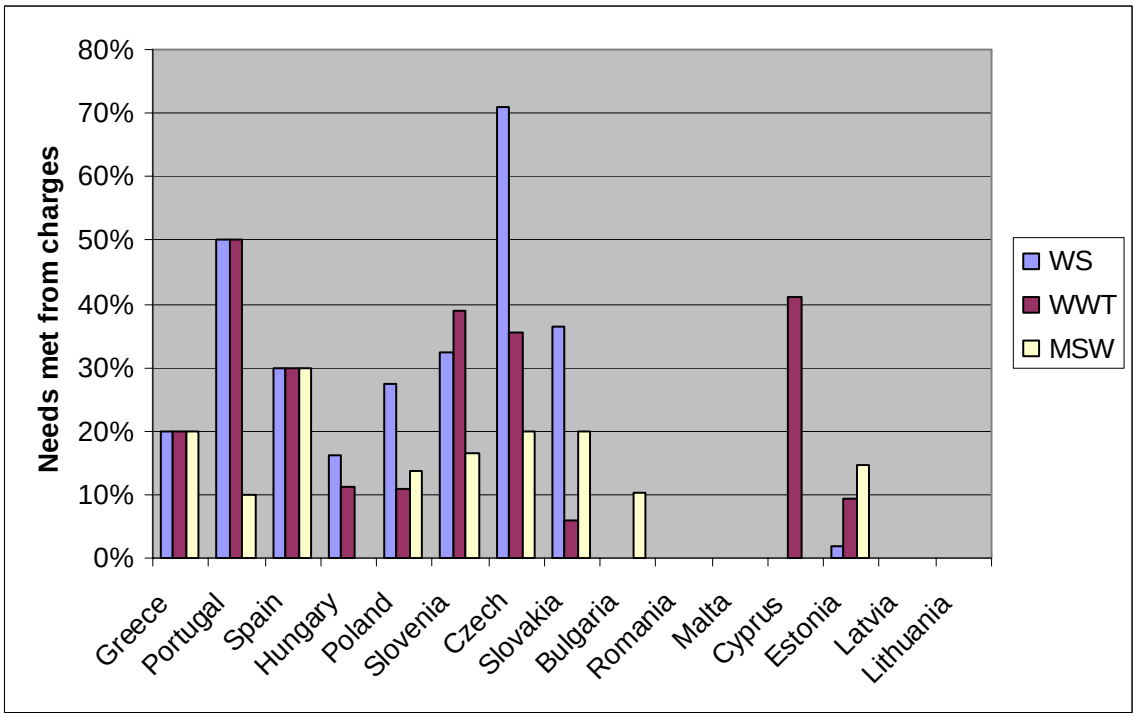
4.8.2 Supporting Measures Based on User Charges

The evaluation has sought to identify the scope to finance the investment needed from user charges, the payments made by households for the receipt of environmental services (water, sewerage and waste collection and disposal). These user charges are however, largely used to pay for the operation and running costs of the service rather than the capital expenditure in new or replacement infrastructure.

Figure 4.2 provides an overview of the extent to which the current level of charges generates revenues capable of meeting at least part of the investment cost. The analysis is subject to some uncertainty as real increases in charges are taking place in many of the MS, and which may not yet be reflected in the available data.

In some cases (Latvia, Lithuania, Malta, Romania) the charges only cover all or part of operating costs and make no contribution to capital costs in any of the fields. In other MS (eg Cyprus and Bulgaria) there are small contributions in one of the fields. In the remainder of the MS, user charges typically contribute between 10% and 30% of capital costs, with relatively higher contributions to water supply infrastructure and less to MSW. The highest contributions are in Portugal, where 50% of needs for water supply and waste water treatment are met from user charges, and in the Czech Republic, which has recently increased prices for water supply and contributes 70% of capital costs.

Figure 4.2: The Share of Investment Needs Met by Revenues from Existing User Charges



The evaluation has also considered the prospect of meeting investments needs from higher charges over the next programme period. As noted there is a general trend for real price rises which will contribute further to capital costs. However, these increases have also generated a wider concern over the affordability of basic environmental

services for lower income households. This political limit to future increases in charges is largely reflected in the evaluation, with only Poland formally acknowledging future increases in the assessment of financial requirements.

To inform the programme negotiations we have undertaken a separate analysis of the potential revenue from future increases in charges, where charges are limited to a benchmark of 5% of average household income for the lowest decile of household incomes (taken to be 30% of average household income for all households).

This analysis suggests (Table 4.9) that Cyprus, Malta and Greece could meet their investment needs by raising charges to a benchmark of 5% of average income for the 10% of lowest income households. In the case of Portugal, Spain, and possibly the Baltic states (depending on the shortfall in revenue for operating costs), additional contributions to meeting their needs from increased charges (political constraints aside) up to the benchmark level could be achieved. In the other MS, the benchmark has already been reached and suggests only very limited scope to secure additional revenue (which may still be required in part at least to cover operating costs) to meet investment needs.

Table 4.9: Current User Charges as % of Household Income and Potential for Additional Revenue

	Average HH Disposable Income (2003)	Household Charge for WS, WWT, MSW (c 2003)	Charge as % HH Income (Average)	Charge as % HH Income (Lowest)	Additional Revenue from 5% Charge of HH Income (Lowest)	Contribution of Additional Revenue to Needs (WS, WWT,MSW)
Member State	Euro / Yr	Euro / HH / Yr	%	%	Euro / HH / Yr	% of Needs / Yr
Greece	25,500	288	1.1%	3.8%	94	96%
Portugal	22,484	280	1.2%	4.2%	57	36%
Spain	33,022	480	1.5%	4.8%	15	15%
Hungary	15,932	269	1.7%	5.6%	0	0%
Poland	10,245	254	2.5%	8.3%	0	0%
Slovenia	15,696	391	2.5%	8.3%	0	0%
Czech	9,819	222	2.3%	7.5%	0	0%
Slovakia	7,854	138	1.8%	5.9%	0	0%
Bulgaria	3,253	115	3.5%	11.8%	0	0%
Malta	19,105	147	0.8%	2.6%	140	212%
Cyprus	26,385	104	0.4%	1.3%	292	161%
Estonia	7,404	85	1.1%	3.8%	26	18%
Latvia	6,790	89	1.3%	4.4%	13	3%
Lithuania	7,516	47	0.6%	2.1%	65	40%
EU14 - average	14,311	197	1.5%	5.1%	59	53%

Sources: Eurostat data for average household incomes plus data from National Reports. Charge data from National Evaluation Reports

Notes:

1. Lowest based on an assumption that the average income of the lowest 10% of households is 30% of the average income of all households

2. No data for Romania

3. Because of difficulties in standardising data to a common year and to constant prices, and because many MS do not have average national charges (they vary by location and volume), the analysis should be regarded as only as indicative.

To the extent that incomes of the lowest income households rise faster in real terms than investment costs over the next programme period (2007-2013), then it is possible that contributions to capital costs will increase. The majority of MS envisage real increases in charges, prompted in large part by the full cost recovery provisions of the Water Framework Directive, although political anxiety over affordability may yet constrain these ambitions. One interesting approach to affordability, from Malta, is in the design of tariff structures such that lower usage attracts a lower charge and ensures lower income households are able to afford minimum levels of usage (Box 4.1).

It is possible to design tariffs to protect lower income households. No MS currently have charges approaching 5% of average household income. If the levy was set at this level (and protection was provided for lower income households) all MS could raise charges and associated revenue very significantly. If the levy was set at this benchmark, then all MS could (assuming the revenue was fully committed to capital expenditure) finance their annual investment needs in these three fields, with the exception of Bulgaria, Romania and (marginally) Latvia.

Box 4.1: Malta Water Pricing and Social Aspects

Maltese water pricing uses a 'rising block' system where at lower levels of water use for households the rate per m3 is significantly lower than for higher use. As shown in the Malta country report, in 2000 there were nearly 13,000 accounts that fell under the social assistance category. This group represented around 4% of total water use in Malta and around 6% of domestic use. Total water used in 2000 was 715,000m3. The average consumption charge for the social assistance tranche was 0.56 EUR/m3, while for the general residential sector it was 0.79 eur/m3. Rates are higher for the tourist sector and commercial sector (bars and restaurants) where it is 1.98 EUR/m3, and highest for government (at 2.59 EUR/m3). Importantly water used by the tourist sector and also bars and restaurants, where affordability is higher, is charged at higher rates.

Details of the rising block: rates

- For 0 to 5.5m3/person per year there is no charge.
- For 5.5 to 11 m3/person per year the charges is 0.16 LM/m3 (0.37EUR/m3)
- For levels above 11 m3/person per year the charge is 0.27 LM/m3 (0.63EUR/m3)

Source: Malta National Report

The future intent to move to full capital and operating cost recovery means that by the end of the programme period, a substantially larger share of capital costs will (political concerns over affordability aside) be funded by users. Box 4.2 provides some additional reflections on the move to full cost recovery.

Box 4.2: Full Cost Recovery

According to the full cost recovery principle all the capital and operating costs of the provision of environmental goods and services should be fully recovered from the entity benefiting from the service. In short, users should pay for the cost of the water provision and waste water and waste collection, transport, treatment and disposal and also the full costs of electricity supply. The high capital cost of new infrastructure, combined with the cost of replacing obsolete infrastructure means that generally current user charges are only sufficient to cover operating costs.

As regards prices for resource use, the full cost recovery principle does not fully take into account the scarcity of the resource or its depletion, and a price is needed to reflect this. This can be done either via the introduction of a charge (eg water abstraction charge that goes on top of infrastructure cost repayment fees). This would lead to a more efficient use of resources. However, in practice even securing full financial cost recovery represents a major challenge.

Key insights from the national evaluations:

- There is a general move towards full cost recovery - for provision of water, electricity, waste services, and in other spheres too – for example in permitting/regulatory provision. This can be welcomed from an environmental point of view and also from an economic efficiency point of view.
- Note however that support for full cost recovery has to go hand in hand with efforts at making the provision of the goods and services cost-effective otherwise full cost recovery simply funds inefficiencies in service delivery
- Full cost recovery generally deals with the cost of the service provision (Eg water abstraction and supply infrastructure) and less with the value of the resource itself.
- The rate of progress towards full cost recovery is a sensitive political issue in most MS because of the concern over affordability of higher charges, especially for low income households.
- In some cases the reluctance to pay higher charges reflects a perception that the provision of certain services is a duty of the government and their access to it is a right for which they should not pay, or already pay via general taxes. This is especially the case with sewerage and domestic waste services which have traditionally been provided under a collective municipal or local tax. These issues need to be understood and addressed in any policy moving towards full cost recovery.
- In the new Member States and Cohesion countries the average household incomes have been and still are generally increasing quickly and it is important not to take past limits of affordability as indicative of future levels. Hence, in many cases the possibility for full cost recovery is greater than would appear from using historic data and affordability surveys.

4.8.3 Supporting Measures Using Public-Private Partnerships

The national evaluations have examined the MS provision for the introduction and use of public-private partnerships and their potential or actual use in the environmental sector. Details are presented in Annex 5. Key points from the analysis are:

- In a number of MS (such as Greece, Czech Republic and Poland) the legislative basis that would allow the formation of public-private partnerships is comparatively recent. In other MS (such as Hungary and Bulgaria), the basis of PPP seems uncertain

- The current perception in the MS is that while PPP may provide an effective solution to increasing private sector funding and risk sharing for some forms of infrastructure investment (especially transport) its utility in the environmental sector is much less evident, with issues of ownership and regulation, and the gap between economic prices and existing charges preventing profit making opportunities

- The field with the greatest opportunity is the provision of MSW management services, where discrete services (such as landfill disposal) can be defined and delivered at economic cost. Opportunities for PPP in the emerging sorting and recycling sector, where again economic prices can be charged, are also expected

- In the case of Spain, where PPPs have been trialed and tested, the evidence suggests that the general perception that PPP has limited scope in the environmental sector is correct, with no clear saving in public investment commitments.

In the light of the infancy of PPP and/or the lack of clear opportunities for viable PPP interventions the level of financial requirements identified, is unlikely to be significantly effected by PPP, and as a consequence there has been no adjustment in the estimated requirements to reflect PPP opportunities.

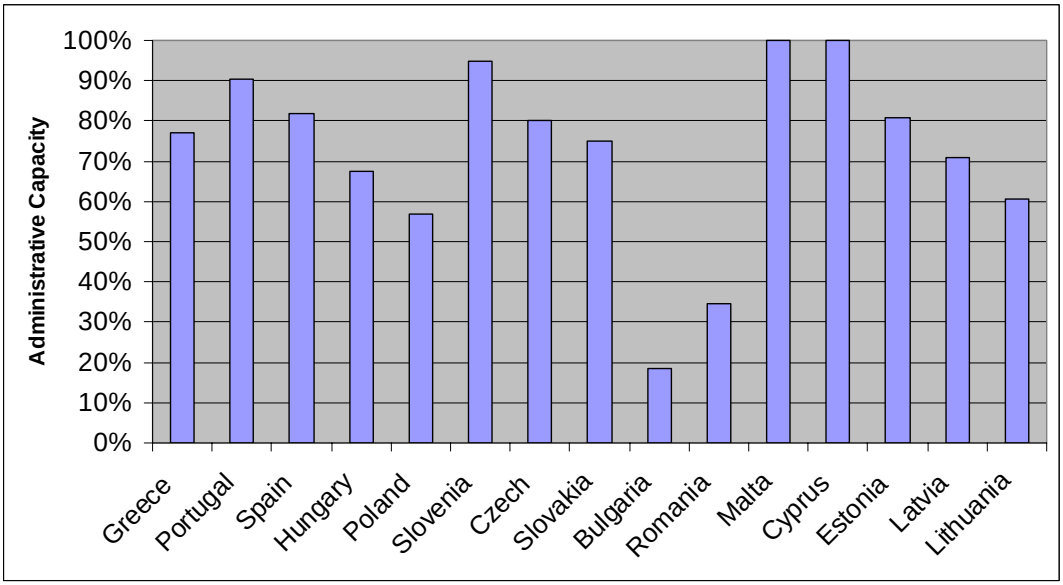
4.8.4 Administrative Capacity

The National Evaluations each considered the administrative capacity of each of the MS to absorb the scale of investment implied by the assessed level of needs after taking account of alternative funding sources and supporting measures.

The assessment (summarised in Figure 4.3 indicates that in some MS (Malta, Cyprus) there is not considered to be any constraints on the administrative capacity of the MS to design and deliver the requisite scale of programmes. In all other MS there was a general recognition that the scale of investment programme needed would be unlikely to be fully delivered in the programme period, based mainly on the experience of MS in implementing the current (2000-06) programme and the current programme over-runs.

The largest constraints were identified in Bulgaria and Romania where only 18% and 35%, respectively of the assessed scale of investment requirements were considered to be realistically capable of being delivered in the next programme period (2007-13), even after taking into account formal agreements to defer particular investments to the period starting 2014.

Figure 4.3: Administrative Capacity to Absorb Funding (% of estimated funding requirement)



Source: National Evaluation Reports

4.8.5 Overview of the Assessed Level of Financial Requirements for Structural & Cohesion Funding

Table 4.10 summarises the assessed level of financial requirement by MS and by field, taking into account the above factors. This indicates that the scale of financial requirement is typically less than 1% of GDP per annum over the programme period.

Only three MS have an estimated requirement in excess of 1% of GDP, Romania (1.6%), Latvia (1.6%) and Hungary (1.1%). The aggregate effect of taking into account these factors is a financial requirement of 47 billion euro, some 47% of the assessed level of need.

The financial requirement per capita can also be calculated, recognising that per capita incomes vary widely between these MS. On a per capita basis the highest level of requirements are in Latvia, Slovenia and Hungary, with the lowest requirements in Spain, Romania and Poland.

The importance of the requirements in Fields 1, 2 and 3 remain, with typically 75% - 95% of the estimated requirement in these three fields across the different MS. Portugal and Greece with a requirement to support RES and Malta, with the requirement for support with storm water collectors to avoid flooding risks, the exceptions.

Table 4.10: Summary of the Assessed Financial Requirements for EU Environmental Investment Programmes, 2007-2013, (Million Euro, current prices)

Member State	Water Supply	Waste Water Treatment	Municipal Solid Waste	Renewable Energy Sources	Natural Risk Man't	Total Req't	Total Req't per Capita (based on pop. in 2006)	Average Annual Financial Req't as % GDP in 2007-2013	Share in Fields 1-3
Greece	626	225	280	1,338	870	3,339	315	0.3%	34%
Portugal	477	881	720	2,789	250	5,118	512	0.5%	41%
Spain	2,122	1,484	2,182	681	95	6,564	162	0.1%	88%
Hungary	1,420	2,341	1,389	550	972	6,672	661	1.1%	77%
Poland	560	5,152	1,330	770	1,540	9,352	243	0.5%	75%
Slovenia	315	644	357	7	10	1,333	667	0.5%	99%
Czech	280	1,240	338	311	360	2,529	246	0.4%	73%
Slovakia	217	1,503	185	150	431	2,486	460	1.0%	77%
Bulgaria	447	354	245	121	152	1,319	169	0.8%	79%
Romania	1,520	1,920	554	200	200	4,394	202	1.6%	91%
Malta	4	60	60	20	120	264	660	0.6%	47%
Cyprus	-	120	110	5	-	235	294	0.2%	98%
Estonia	182	194	71	57	16	520	371	0.6%	86%
Latvia	616	928	378	73	5	2,000	833	1.9%	96%
Lithuania	204	518	199	104	23	1,048	299	0.6%	88%
EU15	8,991	17,564	8,398	7,176	5,044	47,173	285	0.7%	74%

Source: National Evaluation Reports. Estimates of GDP based on estimates by Cambridge Econometrics (CE) – these may differ slightly from estimates taken from MS sources and used in the national evaluations. GDP is an average of the projected annual level of GDP over the programme period (in 2000 prices), except Bulgaria and Romania where GDP is a national estimate. Investment requirements assumed to be in 2004 prices and deflated to 2000 prices for the purposes of the calculation. Population estimates from CE, except Bulgaria and Romania, national estimates.

4.8.6 Comparison with the Current Planned Programmes

The scale of investment, compared to the current programmes, is indicated in Table 4.11. This indicates that, on an annualised basis, the proposed requirements represent larger programmes than the current programmes n the majority of MS. This might be expected since the requirements represent the ceiling of investment requirements whilst the current programmes reflect previous negotiations on what levels of environmental investment are affordable, given non-environmental priorities. However, in a number of MS, notably Greece, the difficulties of absorption of current funding allocations, when taken into account in the estimate of requirements for the next period, provide a more realistic picture of the levels of investment that can be achieved. As well as Greece, there are reductions in the estimated requirements compared to current planned programmes, in Spain, Lithuania, Estonia and Czech Republic.

Table 4.11: Comparison of the Estimated Financial Requirement for EU Funding with Current Planned Programmes and with Assessed Levels of Need

Member State	Estimated Average Annual Requirements Compared to Current Plans	Estimated Average Annual Requirements Compared to Assessed Needs
Greece	69%	27%
Portugal	132%	54%
Spain	52%	59%
Hungary	361%	63%
Poland	108%	50%
Slovenia	366%	51%
Czech	91%	44%
Slovakia	139%	68%
Bulgaria	154%	17%
Romania	141%	35%
Malta	240%	87%
Cyprus	256%	74%
Estonia	78%	76%
Latvia	251%	71%
Lithuania	75%	61%

Sources: Based on data presented in Tables 3.1, 4.1 and 4.2

4.8.7 Comparison with the Assessed Level of Needs

Table 4.11 also summarises the difference between the estimated scale of financial requirements and the initial assessment of investment needs. This takes into account the three sets of factors described above, and results in an estimated financial requirement substantially below the level of needs. The most significant differences are

in Bulgaria and Romania, where due account has been taken of the practicality of achieving the levels of investment needed in a single programming period. The low figure in Greece partly reflects the present absorption difficulties, but also takes into account that whilst there is a very substantial level of investment needed in RES, the purchasing obligation in Greece is intended to finance a substantial share of this investment. At the other end of the range, analysis of these factors has only a limited effect in Malta, Cyprus, Latvia and Estonia.

The effects of taking into account the different factors can be summarised by comparing the share of financial requirements by field, with the share of assessed needs by field, to understand the effects of the analysis on the balance of investment (Table 4.12). In summary the largest influence on the balance of investment, is the effect in a small number of MS (Greece, Poland and Slovenia) of taking into account the purchase obligations for RES, which contributes significantly to the financing of RES investment. The effect of this reduction is to increase the share in other fields.

Table 4.12: Difference in the Balance of Financial Requirements for EU Funding Compared to the Assessed Needs

Member State	Water Supply	Waste Water Treatment	Municipal Solid Waste	Renewable Energy Sources	Natural Risk Man't
Greece	8%	3%	0%	-28%	17%
Portugal	-2%	-4%	3%	0%	2%
Spain	-2%	-1%	-2%	4%	1%
Hungary	1%	0%	5%	-2%	-4%
Poland	0%	17%	3%	-24%	5%
Slovenia	6%	4%	11%	-13%	-7%
Czech	-10%	7%	4%	-8%	6%
Slovakia	-4%	2%	-1%	1%	2%
Bulgaria	-6%	-5%	7%	0%	5%
Romania	5%	6%	-1%	-10%	1%
Malta	0%	3%	3%	-12%	6%
Cyprus	0%	-13%	12%	1%	0%
Estonia	1%	-2%	0%	1%	0%
Latvia	0%	-1%	0%	1%	0%
Lithuania	0%	0%	0%	0%	1%

Source: National Evaluation Reports

5 FRAMEWORK FACTORS INFLUENCING THE CHOICE OF STRUCTURAL AND COHESION FUND INVESTMENT PRIORITIES

5.1 Environmental Objectives of the Structural & Cohesion Funds (2007-2013)

The importance of environmental protection and improving resource efficiency as a contribution to EU, national and regional competitiveness and convergence objectives is reflected in the specified objectives of the Structural and Cohesion funds (Table 5.1).

The broad rationale for this investment is the increasing pressure on the environment which puts at risk the long term development of the EU economy. More efficient and less polluting methods of production and consumption need to be introduced if competitiveness and economic and social convergence is to be environmentally sustainable.

Table 5.1: Environmental Objectives of the Proposed Structural and Cohesion Funds (2007-2013) – Edited Extracts From Relevant Regulations

Fund	Total Financial Allocation	Relevant Priorities (edited to reflect the selected fields of study)
Convergence objective – ERDF[9]	€177.8 billion	3) Environment, including investments connected with: ▪ waste management, ▪ water supplies, ▪ urban waste-water treatment 4) Prevention of risks, including development and implementation of plans to prevent and cope with natural and technological risks; 7) Energy, including trans-European networks, which contribute to improving security of supply, completing the internal market, and integrating environmental considerations, improvement of energy efficiency and the development of renewable energies;
Competitiveness objective – ERDF[2]	€48.31 billion	2) environment and risk prevention, and specifically: b) stimulating energy efficiency and renewable energy production; d) developing plans and measures to prevent and cope with natural and technological risks.
Convergence objective – Cohesion fund[10]	€62.99 billion	Assistance from the Fund shall be given in the following areas ensuring an appropriate balance and according to the investment and infrastructure needs specific to each Member State receiving assistance: 2) achievement of the objectives of Article 174 of the Treaty falling within the priorities assigned to the Community

[9] COM(2004)495 Final. Proposal for a Regulation of the European Parliament and of the Council on the European Regional Development Fund. http://europa.eu.int/comm/regional_policy/sources/docoffic/official/regulation/pdf/2007/feder/com(2004)495_en.pdf

		environmental protection policy under the policy and action programme on the environment; 3) areas that can be developed on a sustainable basis and clearly present environmental benefits, namely energy efficiency and renewable energy
Cooperation objective – cross border and transnational programmes and networks - ERDF [2]	€ 13.2 billion	1) the development of cross-border economic and social activities through joint strategies for sustainable territorial development, and primarily: b) by encouraging the protection and joint management of the environment; c) by reducing isolation through improved cross-border water, waste and energy systems;

5.2 Framework Factors and the Priority Assessment

The review of current programmes indicates that the highest priority is attached to investment that contributes to ensuring compliance with the environmental directives. 90% or more of the share of environmental investment across the five fields is typically directed to the expansion / modernisation of existing, non-compliant infrastructure. The need for compliance (Fields 1, 2, 3) responds to the legal requirements as set out in the environmental acquis. Not all investment (eg reservoirs for the storage of water) is necessary for compliance, but the bulk of the investment in these fields is required to ensure compliance.

However, there are other objectives that environmental investment programmes recognise in principle and/or in practice. At a strategic level the rationales for investment funding from the Structural and Cohesion Funds, as described in the previous section, relate to the need to secure convergence of national and regional economies, and to support improved levels of economic competitiveness.

At the level of individual fields of activity there are also specific objectives, which contribute to the strategic objectives of regional development. The case for environmental investment (defined as comprising the five fields) to be funded by the Structural Funds is driven by the need to promote regional competitiveness and convergence through:

- compliance with EU environmental law (the environmental acquis) (Fields 1 to 3); and
- conformance with other policies (eg climate change or natural hazard management) (Fields 4 and 5).

In the case of compliance, the environmental standards set out in the acquis are those which are deemed necessary for a sustainable economy; and which therefore should be met in order for long term regional development. In the case of conformance with other policies, the rationale for use of the Structural Funds derives from the economic

[10] COM(2004)494 Final. Proposal for a Council Regulation establishing a Cohesion Fund. http://europa.eu.int/comm/regional_policy/sources/docoffic/official/regulation/pdf/2007/cohesion/com(2004)494_en.pdf

costs and benefits associated with climate change and natural risks and their effects on regional development.

Rationales other than the necessity of compliance that have been considered in more detail for the three fields are summarised below, together with consideration of the other two fields.

Water supply

In MS with significant water resource constraints this field is perhaps the most significant for regional development. If there is regional development it will lead to more demands on water. Water is becoming a scarcer and less predictably available resource. Currently in several countries (such as Hungary and Slovenia) providing healthy drinking water is a real issue in more remote and less economically developed areas, whilst in these areas small and badly managed public supply systems persist or the public supply systems is simply non-existent. There are potentially major consequences if water shortages were to lead to populations moving from parts of the EU territory where it is a problem (and they would have to if it became serious) to the areas of the EU where it is not (yet) a problem. There are important issues for the efficient management of water resources, with investments to reduce leakages, and to install metering offering significant value for resource management. In addition there is also drinking water quality related to health that has to be considered. There is a case for allocating say half the SF environmental investment resource to this in resource constrained MS and which not by any means depend just on compliance. Lower but still significant levels, say 25-30%, could be justified in other less resource constrained MS.

Waste Water Treatment

Development rationales for investment relate to where there are health risks and where investment has significant effects on environmental quality leading to economic benefits such as bathing water quality as a requirement for higher value tourism or river quality in major cities as a stimulus to development. However, action is needed immediately and as quickly as possible, given long lead times, with say an allocation of around 10-20% of environmental investment resources.

Municipal Solid Waste (MSW)

The basic argument for investment is the need to achieve compliance with the acquis. However, one could argue that there are two components for development: one for compliance that is designed to eliminate the health and contamination risks; and one that improves the management of resources. Arguably, the first component has to be addressed as quickly as possibly given the effects on productivity and on investment. The logic for the second component is similar to that of renewables and energy efficiency (which is that is since economic development will increase resource use the investment should be used to manage this effect). The resources should be distributed where they will make the biggest difference. The allocation would depend on the relative significance of these two components with say an initial allocation of 10-20% of environmental investment resources.

Renewable Energy Sources

Investment in renewable energy (Field 4) is driven by statutory national targets (where they exist) or otherwise generally indicative targets for the share of renewables in the

MS electricity supply mix by 2010. These targets, apart from where countries set them for themselves, are not mandatory, but failure to meet even the indicative targets may result in binding EU targets in future. The strategic rationale for including this Field derives not just from the potentially important contributions to economic development (which after taking account of displacement of activity associated with a reduced use of other energy sources is sometimes overstated), but from the recognition that dangerous climate change poses a major threat to economic stability and growth. Energy efficiency measures might also be included in this field because the logic for prioritisation is exactly the same. Say an allocation of 10-15% of the environment investment resources.

Natural Risk Management

Investment in natural risk management (Field 5) is driven by the need to reduce the risk of human and economic loss from weather related hazards (e.g. flooding, drought, forest fires). Historically there is no EU policy objective, although there is now a proposed EU Directive on flood risk and also a forest focus regulation and recognised need for collaboration to deal with risks and responses o these. There is nevertheless arguably a weaker case for allocating EU funding in this field than for more 'traditional' areas such as water supply and waste water treatment, because the EU is not responsible for the conditions that make the countries and regions prone to natural hazards. Rather, natural hazards should be high on the national government agenda, which implies that if the EU funding is used there will be a low probability of additionality. There are cross border issues (like the flooding of the Danube) which could clearly justify EU funding. The potentially high benefit cost ratio of preventive action in the areas of risk management and the avoidance of potentially major adverse economic shocks offers a case for spending some of the allocation in this field, say a maximum of 10% of environmental investment resources – with perhaps higher levels say up to 15% in MS subject to major flooding.

Other: Strategic Planning and Management

Previous programmes have demonstrated the value of having clear strategic plans setting out the rationales, specific objectives and timescales for investment. The management competencies to prepare and implement such plans is clearly of critical value in securing cost effective programmes and ensuring environmental investment is integrated with broader regional development plans. In all allocations there should be a 'top-slice of say 2-5% to cover the technical support necessary to ensure competent strategic planning and management.

5.3 Use of Multi-Criteria Assessment (MCA)

The priority assessment was undertaken using a multi-criteria assessment (MCA) approach to enable these rationales to be taken into account in assessing the desired balance of the investment programme across the different fields. This was based on an explicit set of criteria to reflect these rationales (Box 5.1). The contribution of the different types of required investment to these criteria was scored and aggregated for each field to gain an insight into the desired balance of the investment programme across the five fields.

Further details of the MCA approach are provided in Annex 3.

Box 5.1: Criteria for Scoring the Potential Impact of Different Types of Investment

Contribution of investment to:

1. securing compliance with the acquis (e.g. because of replacement of non-compliant treatment plant)

2. avoiding economic and social damages (e.g. because of reduced natural risks of flooding, fire or because of improved environmental quality, or because of increased security of supply)

3. encouraging new technology and market development (e.g. priming the development of local PV or passive solar market) with the potential to replace imports or generate exports

4. generating employment opportunities in line with national and regional employment goals (e.g. for employment in lagging regions, or in particular cities or in rural areas - because of improvements in environmental quality in particular areas or because of the location of utilities and construction firms)

5. providing employment and training opportunities for low skilled workers or 'hard to reach' groups (e.g. ethnic minorities, women, older workers)

6. promoting cross-border co-operation (e.g. management of cross-border flooding)

7. delivering national and regional environmental strategies and plans which are well integrated with wider development strategies and plans (e.g. where environmental priorities are well linked to economic or social objectives)

8. promoting more cost-effective programme design and delivery (e.g. encouraging the use of public-private partnerships, or more effective procurement, or through use of well developed technologies which take account of subsequent maintenance arrangements).

5.4 Review of the Investment Priorities Across the Fields

The results of the priority assessment are summarised in Table 5.2 and Figure 5.1, which indicates the preferred balance of investment by field, for each MS. The first and second priorities, for each MS are summarised in Table 5.3.

Table 5.2: Environmental Investment Priorities by Member State Across the five Fields of Study for the Programme Period 2007-2013

Member State	Water Supply	Waste Water Treatment	Municipal Solid Waste	Renewable Energy Sources	Natural Risk Man't
Greece	17%	22%	22%	20%	14%
Portugal	28%	25%	17%	22%	5%
Spain	33%	20%	31%	10%	1%
Hungary	23%	36%	22%	7%	12%
Poland	7%	56%	15%	7%	15%
Slovenia	25%	47%	26%	1%	1%
Czech	14%	48%	14%	10%	14%
Slovakia	11%	61%	7%	5%	16%
Bulgaria	40%	26%	19%	5%	10%
Romania	33%	44%	13%	5%	5%
Malta	5%	30%	30%	10%	23%
Cyprus	0%	21%	49%	30%	0%
Estonia	40%	35%	14%	9%	2%
Latvia	34%	46%	17%	3%	0%
Lithuania	24%	47%	19%	8%	2%
EU15	22%	38%	21%	10%	8%

Source: National Evaluation Reports. Note: There are minor allocations for technical assistance in Greece, Portugal, Spain and Malta.

The highest priority overall is attached to the investment in waste water treatment. The assessed priorities mean that Slovakia and Poland should each allocate over half of total programme resources to this field. In total ten of the MS (Table 3) attach the highest priority to this field, reflecting primarily the high cost of compliance with the UWWTD. The remaining gaps in compliance, especially in smaller settlements, and the threat of legal warnings and actions means that a substantial investment programme in the field is proposed. In aggregate terms, the importance of the field in large MS (Poland, Hungary, Romania) means that almost 40% of the total financial requirement estimated for the fifteen MS should be directed to this field.

Figure 5.1: Environmental Investment Priorities by MS and Field

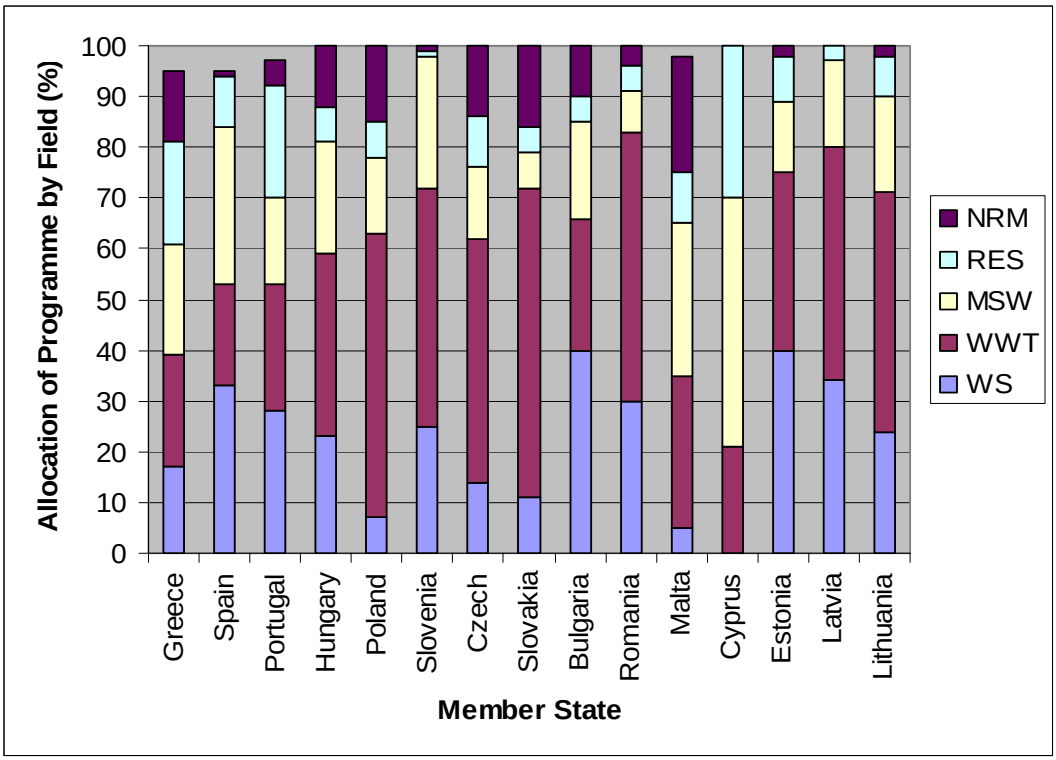


Table 5.3: Description of the First and Second Priorities, by MS (% share of the allocation in brackets)

Field	Highest Priority	Second Priority
Water Supply	Bulgaria (40) Estonia (40) Spain (33) Portugal (28)	Latvia (34) Romania (33) Lithuania (24) Hungary (23)
Waste Water	Slovakia (61) Poland (56) Czech (48) Lithuania (47) Slovenia (47) Latvia (46) Romania (44) Hungary (36) Malta (30) Greece (22)	Estonia (35) Bulgaria (26) Portugal (25)
MSW	Cyprus (49) Malta (30)	Spain (31) Slovenia (26) Greece (22) Poland (15)
RES		Cyprus (30)
Natural Risks		Slovakia (16)

Source: National Evaluation Reports

The second highest priority overall is attached to investment in water supply. This field represents the most important field in four of the MS (Bulgaria, Estonia, Spain and Portugal), and the second highest priority for four other MS.

The third highest priority overall is given to waste investments. Only in two countries - Cyprus (49%) and Malta (25%) does municipal solid waste represent the most important investment type (in Malta, first equal); in four other countries (Spain, Slovenia, Greece and Poland) MSW forms the second highest priority. In aggregate the required level of investment in MSW (17%) is only slightly smaller than the level of required investment in water supply (20%).

By contrast investment in RES and risk management is a relatively lower priority, reflecting the importance of purchasing obligations in funding investment needs for RES and the importance of MS own programmes for risk management. However, compared to current programmes, the proposed level of priority, especially in the cohesion MS, will lead to an expansion of EU programme activity in these fields.

National evaluators were also asked to identify other fields of investment that might be considered alongside the selected fields. The main items included, industrial waste (but was excluded on the grounds that the operation of the polluter pays principle obviates a requirement for SF support) and technical assistance, especially in terms of ensuring adequate and timely strategic planning of the environmental resource. This was particularly highlighted in the context of risk management but also was perceived to have benefits for water resources and the development of waste minimisation policies. Finally, in Malta and Cyprus, the case for support for energy efficiency as an adjunct to the RES field was noted. These additional items are reflected in the overall recommendations of the study (Section 7.2).

5.5 Investment Priorities within Fields

The preparation of material to support the MS negotiations also included consideration of the priorities within each of the fields, which were identified by evaluators on the basis of a simple ranking of the different types of investment. Annex 5 presents the results of these assessments.

6 THE MAIN IMPLICATIONS OF THE INVESTMENT PROGRAMMES FOR REGIONAL DEVELOPMENT

6.1 Potential Improvements in the Implementation of Environmental Directives

6.1.1 Water Supply

Drinking Water Directive

It is no surprise that, in general, priorities and timing in the OP's on water supply of the different MS are very much linked to the objectives of the Drinking Water Directive and the negotiated derogations.

The Drinking Water Directive sets limits specifically on drinking water quality and the type of measures for which funding is demanded is very much in line with this topic. Hence upgrading of drinking water production installations and source measures to reduce "raw water" pollution are the most predominant measures in the funding list. In Slovenia the main problem to be solved with investment projects is the establishment of safe regional drinking water supply systems in remote areas on topographically difficult terrain. The realisation of the Drinking Water Directive aims will also strongly benefit from the measures realised in the framework of the Waste Water Directive.

In a limited number of countries such as Bulgaria limited resources or unevenly distributed resources raises a demand for new reservoirs, but mostly the forecasts of water demand do not project a general need for more reservoirs. In most countries the drinking water supply network is quite well established with investments in new public supply network generally not required. However some Baltic States and Romania provide an exception to this general rule. as it is estimated that in rural areas in Lithuania only 30-40 percent of inhabitants use publicly supplied water, induced by affordability issues. If the goals of the Lithuanian rural development strategy foreseeing a number of measures and significant investments in the development of rural areas will be reached by 2013, the income level of rural inhabitants is expected to grow, and thus the affordability to pay for water services will also increase.

However, there is a huge need for replacement investment - as defined in some countries although mostly not seen as a priority by these countries. In Romania there are large losses (30-35%) in the water transport and distribution system. The investment needed is linked to the high level of leakage and hence not explicitly a consequence of the environmental acquis. In some countries the poor condition of the public supply network does create drinking water quality problems at the tap and funding these measures should be considered as an improvement towards the implementation of the Drinking Water Directive.

The identified financial requirement will make a significant contribution to ensuring compliance with the Drinking Water Directive. However, at least in Romania and Bulgaria, the proposed measures and scale of investment is unlikely to secure full compliance within the next programme period. The problems of poor ground and surface water quality as well as the need for replacement investment of the water supply network are unlikely to be fully resolved within the next funding period.

Water Framework Directive

Most countries do acknowledge the synergy achieved by measures for providing clean drinking water (Drinking Water Directive) and to reach a good ecological quality of both ground and surface waters (Water Framework Directive (WFD), deadline 2015).

One of the key policies of the WFD is to establish an adequate water pricing policy including the application of economic instruments. Economic instruments should provide an incentive for the sustainable use of water resources, thus supporting the achievement of the environmental objectives established under the WFD. Water prices should aim to allocate the costs to (at least) the three main water users (household, industry and agriculture). When considering the current status and main future directions on water pricing policy in the different MS, it is clear that full cost recovery is not feasible due to affordability issues. Some MS consider that water and waste water prices should cover operational & maintenance costs, while not providing any or only very limited revenue for replacement or new investment in infrastructure. Hence the cost recovery principle as stated in the WFD is not reflected in the SF/CF strategies of most MS for the next funding period. In Bulgaria, at the moment the water price covers the operation costs of the Water Supply and Sewerage Companies while the investments are subsidized by the State Budget. Due to this fact the sector has suffered from under investment over the last 15 years as the central government budget could not support the rehabilitation of the sector.

However, **the national evaluations do highlight the scope to include in the negotiations an increase of user charges in certain MS, as a means of reducing either the overall scale of the EU investment programme, or reducing the intervention rate within programmes.**

6.1.2 Waste Water Treatment

Urban Waste Water Treatment Directive

As noted in Section 6.1, this Directive has the largest impact in terms of the investment priorities and the implied allocation of funding within the EU programmes. Investment needs allocated in the next programming period 2007-2013 to waste water treatment are driven by the additional physical needs to meet the UWWTD, especially the provision of waste water treatment for all or most settlements between 2.000 and 10.000 PE.

As with the Drinking Water directive, **the scope to ensure full compliance with the Directive in MS, except Bulgaria and Romania, by the end of the next programme period is doubtful.** The estimated financial requirement is, in aggregate, only half the assessed level of need, and reflects the major issue of absorption in many MS. The technical capacity needed in smaller settlements should be adequately tackled by technical assistance projects.

Furthermore, waste water treatment needs in smaller settlements (remote rural areas < 2.000 PE) will only be addressed to a certain extent in a limited number of MS and are in general not considered by the MS, as this is not a pre-requisite of the UWWTD. In Lithuania, set as a sensitive area (according to the requirements of the UWWTD) since all Lithuanian rivers discharge into the Baltic Sea, the majority of the settlements below 2.000 PE have only mechanical treatment. Furthermore, the connection rate to sewerage systems in these settlements is less than 30%.

6.1.3 Municipal Solid Waste

In most MS the necessary legislation is in place to transpose the requirements of the the relevant acquis. **The proposed investment allocated in the field of municipal solid waste for the next programming period are focusing on the implementation of these transposed Directives** (e.g. reduction of bio-degradable share of waste landfilled and closure of old landfills according to the Landfill Directive) and general EU principles of waste management (waste prevention and reduction). As a consequence the programmes will both improve environmental quality through more efficient and effective collection and disposal systems, and secure increased levels of waste recycling and recovery. However, due to absorption problems, as with the previous field, **the proposed programmes will be unable to achieve a general level of full compliance with the acquis by the end of the programme period.**

A point of concern is the widespread need for the remediation of numerous abandoned small landfills, potentially causing groundwater pollution. In Poland nearly 94% of municipal solid waste is disposed of by landfilling in local dumps, whose technical properties do not protect the soil or groundwater against adverse impacts. In Slovenia, most of the smaller landfills have been closed but still represent active pollution sources. In the light of the 2015 WFD requirements, it is clear from the suggested programmes that **this issue will not be resolved within the 2007-2013 programming period.**

6.2 Implications for Regional Development and Convergence

The suggested environmental investment programmes for the next (2007-2013) programming period will impact on regional development and convergence through, for example, the extension of sewage treatment in smaller settlements, often located in less developed regions, and the removal or refurbishment of non-compliant landfill sites. These improvements will in turn benefit local businesses and contribute to higher quality of life for residents as well as provide the required conditions to sustain tourism.

The specific consequences of this investment for regional development and especially for regional convergence are based on a number of different effects. These are often hard to disentangle from each other but essentially result from two main influences:

- The economic impacts resulting directly from the investment in those environmental industries receiving additional investment, taking into account the nature and location of the related supply chain. The impacts can be assessed in gross terms taking the investment as a simple injection into the economy or in net terms taking onto account alternative uses of the investment. The relative balance of investment across regions within a MS will also influence regional convergence

- The impacts of a cleaner environment on: the direct costs to business because of reductions in treatment costs and lower resource costs; the prospects for retaining and attracting footloose business investment and mobile groups within the workforce, often the higher skilled; and on human health and related health costs and with consequent benefits in terms of improved productivity.

In addition, there are specific opportunities to improve regional convergence through the suggested investment programmes by ensuring risks, especially relating to water resources, are more effectively managed through EU co-operation.

6.2.1 Economic Impacts

The gross economic impacts on the MS can be estimated in terms of the additional level of Gross Value Added (GVA) and related employment effects. The gross economic impact calculates the additional economic impact as the result of a simple injection of investment equal to the size of the funding requirement. The results differ between MS in approximate proportion to the relative size of the funding requirement as a share of GVA. Impacts will be greater in those MS where funding requirements are a greater share of GVA.

The net economic impact calculates the additional economic impact as the result of the proposed balance of investment compared to an injection of the same amount but invested in items in the same proportion as current MS investment. The impact is therefore the consequence of the differences in the pattern rather than the scale of investment. It is therefore possible for the Programmes to generate a negative net impact because of the structure of the economy and the relative employment intensity of the proposed Programmes compared to current investment activity.

The economic impact on MS has been calculated using the econometric model operated by Cambridge Econometrics. Details of the modelling work are presented in Annex 8. The main results are summarised in Table 6.1. The model currently does not include Bulgaria and Romania and the impacts in these MS are not included in the subsequent results.

Table 6.1: Additional Economic Impact (GVA (Meuro) and Employment ('000)) and as % Change in 2013 as a Result of Proposed Funding Requirements

	Gross Value Added (GVA)				Employment			
	Gross Impact		Net Impact		Gross Impact		Net Impact	
	Meuro	%	Meuro	%	000	%	000	%
Greece	2,370	1.7%	- 150	-0.1%	25	0.6%	- 6	-0.1%
Portugal	2,365	1.9%	- 679	-0.6%	26	0.5%	14	0.3%
Spain	3,822	0.6%	1,052	0.2%	108	0.6%	51	0.3%
Hungary	2,301	4.2%	555	1.0%	55	1.4%	- 9	-0.2%
Poland	3,058	1.7%	867	0.5%	119	0.8%	- 115	-0.8%
Slovenia	288	1.2%	- 165	-0.7%	2	0.2%	- 2	-0.3%
Czech Republic	612	1.0%	- 6	0.0%	26	0.5%	- 13	-0.3%
Slovakia	1,627	6.0%	446	1.7%	27	1.2%	12	0.5%
Malta	-	0.0%	-	0.0%	-	0.0%	-	0.0%
Cyprus	-	0.0%	-	0.0%	-	0.0%	-	0.0%
Estonia	193	2.6%	24	0.3%	1	0.1%	- 0	-0.1%
Latvia	791	8.2%	151	1.6%	-	0.0%	-	0.0%
Lithuania	421	2.8%	78	0.5%	-	0.0%	-	0.0%
EU13	17,848	1.4%	2,173	0.2%	388	0.7%	- 69	-0.1%

Source: Cambridge Econometrics based on MS National Evaluation Reports

Gross Value Added (GVA)

The results indicate that the programmes across the 13 MS would in 2013 **generate a gross additional level of GVA of 17.8 billion euro, representing an increase of 1.4% in GVA in 2013 (in 2000 prices) than would have been the case without the Programmes.** The largest impacts are in Latvia (8%), Slovakia (6%) and Hungary

(4%), with negligible impacts in Malta and Cyprus. **The net additional impact** (comparing the pattern of investment in the programmes compared to MS current investment activity) **is slightly positive** for the 13 MS taken together, suggesting that the programmes have slightly larger multiplier effects than the current activity. This may be explained by the nature of the capital goods purchased with the programmes (with a higher domestic component reflecting the high levels of construction) compared to current activity. However, in some MS (notably Slovenia and Portugal) the effects of the programmes have a slightly negative impact. In contrast the net economic benefits in Latvia, Slovakia and Hungary are 1% or more of GVA in 2013.

Employment

The results indicate that the employment effects of the programmes are smaller than the effects on GVA. **The gross impact is an additional 388,000 jobs in the EU13** examined, with the largest effects in Slovakia Poland and Hungary. The large investment in Latvia relative to GDP does not have the same employment impact as it does on GVA, reflecting the low labour intensity of the activity (waste water) funded by the programme. **The net employment impact across the 13 MS is slightly negative because the programmes are relatively less labour intensive** than current investment programmes. This effect is greatest in Poland where the net additional employment impact is a loss of 0.8% of employment in 2013 without the programmes. The largest net benefit in 2013 is in Slovakia (0.5%).

Regional Convergence

For a small number of the larger MS, national evaluators were asked to provide a very approximate indication of the possible regional (NUTS I or NUTS II definitions) distribution of investment in line with the priorities identified. These indicative investment patterns were then used to assess the likely impact on regional convergence by examining the relative effects on lower performing, compared to higher performing, regions within the MS. The results of the analysis are only tentative (Table 6.2) but suggest that, **in most of the MS (Greece, Portugal, Hungary, Czech Republic and Slovakia) the investment programmes have the potential to help accelerate convergence**. Only in Spain was the distribution of investment considered to have no effect on regional convergence.

Table 6.2: Tentative Results on the Impact of the Investment Programmes on Regional Convergence within MS

Member State	Suggested Impacts
Greece	The programmes are too small to make much difference to the rate of regional convergence. Although more remote regions see a higher increase in output growth over the funding period
Portugal	The programmes have the potential of improving convergence leading to higher relative growth in Centro, Alentejo and Algarve. However, this is not the case in Norte, the poorest region of Portugal.
Spain	The programmes are unlikely to accelerate the rate of convergence between regions. The impact of the investment is greatest in the more remote regions to the west and south of Spain, but the

	difference compared to the richer regions is very small
Hungary	The programmes have the potential of improving the rate of convergence, especially between Southern Transdanubia, the Northern Great Plain and the Southern Great Plain, with the rest of Hungary. However, although the additional investment is expected to result in higher output per capita growth in these regions, it is not enough to overtake the growth rate in the more successful region of Central Hungary (Budapest)
Czech Republic	The programmes are too small to have a major effect on convergence of the regions, although regions outside Prague benefit more than the capital.
Slovakia	The programmes have the potential of improving the rate of convergence between Bratislava and the rest of the country.

Source: National Evaluation Reports (regional investment distribution) and Cambridge Econometrics

6.2.2 Impacts from a Cleaner Environment

Reductions in Direct Costs to Business

Currently, poor water quality requires extensive expenditure on treatment prior to distribution or use. Improvements will reduce both the costs of treatment to the water supply sector (a clear case of win-win)[11] and to agriculture and industry associated with own-treatment of water for production processes. Improvements in surface water quality make the resource more suitable for economic uses like: cooling water, irrigation and industrial water. **This brings significant direct cost reductions to water intensive industries in the majority of MS because of current problems with quality.** For example in Slovakia, water-intensive industries such as chemicals and metals as well as the power sector are expected to experience yearly growth rates of between 4-11% per year.

A general improvement in water quality and expansion of supply improves resources such as fish stocks, with benefits to commercial fisheries and to aquaculture, and enables improved levels of recreation and tourism. **Benefits are expected to accrue to all MS, but especially those dependent on tourism** for example those with coastlines in the Baltic, Black and Mediterranean seas. For example severe water stress in Cyprus has strong implications for the agricultural and tourism sectors, which are both important to the Cypriot economy. Fisheries have also developed into a major production area, suggesting a need to address the water scarcity situation through greater investment. An increase in total water demand in Cyprus is anticipated, in part due to an expected growth in the number of tourists. The tourism sector already consumes 5% of water. In Greece, investment in drinking water quality and supply are both critical to meet water demand in regions with insufficient own resources, or those which face peak demand in the dry period due to tourism activity, such as the Aegean islands or areas of Northern Greece.

[11] For example, a major source of fresh water in Malta comes from reverse osmosis desalination plants that require unpolluted sea water.

Reuse of second class water from the wastewater treatment for agriculture implies less demand on ground water for irrigation. Reduced contamination will also have implications for groundwater. This will both slow down the depletion of the aquifer, and maintain its quality, which is a critical resource in water constrained MS, especially Malta and Cyprus.

Cost savings are also expected from the investment programmes because they will stimulate resource efficiency, the recovery of materials and the recovery of energy. Recovery of materials will lead to a decrease in the demand for primary production that, to the extent that it is imported, will stimulate an increase in local competitiveness. It is also likely to create employment opportunities, associated with collecting, recovering and recycling secondary materials. Recovery of energy will lead to a decrease in demand for energy generation from other sources.

Impacts on Investment and Location Decisions

Polluted waters can be a major nuisance (e.g. odours or unsightly plumes) for local businesses and residents, as well as a health risk. Even if they are not subject to direct disease contagion, the reduction in quality of life can lead to long-term debilitating conditions, and a significant incentive for more mobile workers and footloose investment to relocate. In Poland, although the recognition of this link is still fairly marginal, there is an acknowledgment that the use of Structural Funds to improve **environmental quality will be a factor in contributing to investment and the rise of employment and growth of GDP.** In the Czech Republic, a dense population and highly developed agricultural industry (both plant and livestock), which place pressure on natural sources of ground and surface water, which are already limited, means that the investment will facilitate both urban and rural development.

In Estonia, the wastewater transmission systems are generally old and need rehabilitation or replacement; pipelines are made of steel or cast iron and are heavily corroded. Wastewater leakage rates into the soil and storm water infiltration rates into sewerage are both high. This has negative impacts particularly on sparsely developed areas, such as gardening cooperatives and summerhouse areas, and highlights the need for wastewater investment, in order to reduce the negative effects on local agriculture and farming. The status of sewerage systems is one factor which explains divergence between regions – for example in Bulgaria, the South-West region has experienced explosive development in clear contrast with the slow progress of the Northern regions, and the differing status of their sewerage systems has been cited as one reason for the regional differences.

Health Benefits

Poor waste quality and inadequately treated sewage can cause significant health problems, and is identified as a particular problem in Hungary and Slovenia (where investment will provide a particularly important benefit to rural, less-developed areas, where public water supply connection and provision of good quality water are both still outstanding issues). These are often microbial in character responsible for light digestive diseases (stomach upsets) to fatal cases of dysentery. The direct benefits depend on how people are exposed to waste water if it is not treated properly. The economic costs in terms of the loss of working days can be significant. The impact of health effects on levels of tourism is also significant, especially in the context of poor quality bathing waters. Reference to studies that have estimated the willingness to pay for clean bathing and surface waters, suggests that **the health benefits of improved**

water quality alone are of the same order of magnitude as the required investment costs[12]. The importance of clean bathing waters is especially important for MS with a Mediterranean coastline. Water quality is seen as crucial in Bulgaria to developing the tourism industry and improved water treatment is forecast to lead to increased possibilities for recreation, fishing and water sports.

6.2.3 Management of Natural Risks

Flood protection measures such as natural inundation areas or winterbeds, provide potential for win-win situation and regional development, for example through reducing economic damage, recreation potential and impacts on agriculture. In Slovenia, **droughts cause severe damage to rural agricultural areas, and therefore anti-drought measures are considered to be funding priorities with large win-win potential for regional development.** Flooding is a serious issue in several Member States. In Bulgaria the 2005 floods inflicted damage upon 80% of the territory, causing severe damage to infrastructure, households, and municipalities and resulting in homelessness for a significant proportion of families. This suggests better flood protection would have a considerable effect on achieving more consistent regional development.

In Portugal, disastrous forest fires have resulted in a **loss of an average 5.3% of total forest and natural vegetation area each year** in the last five years. Economic costs have been significant; forest areas are estimated to generate an average return of €344/ha, GVA for forestry and related sectors was €3.3 million in 2003 and associated employment was 113,000. This highlights the need for a more comprehensive fire prevention strategy, which in Portugal ought to be centred around forest cover improvement ("consolidation"), rather than continuing expansion. Portugal is also severely affected by coastal erosion, which is likely to be responsible for the disappearance and retraction of beaches, which form a vital part of the Portuguese tourism industry (tourism itself represents 8% of Portuguese GDP and 10% of all employment). This adds further weight to the need for natural risk management programs to combat such erosion. In Cyprus, measures taken for the prevention and control of forest fires, such as an increase in the number of employees in firefighting forces, the construction of new forest roads, creation of mobile patrols for prevention, detection and early intervention, are all likely to have positive benefits for regional development.

Drought occurrences in Spain have major economic implications for the country's economy, suggesting a need to invest in ways to combat drought so as to prevent severe damage to regional development. **A drought in the late 1990s affected central and southern parts of the country, resulting in losses of over €800 million** in the cereal, olive oil and livestock sectors.

[12] Baltic WTP estimate (Euro 20 / person / year in 1999 prices); Lake Balaton WTP estimate (Euro 22.5 / person / year in 1999 prices). For the resulting benefit estimates see Study of the Benefits of Compliance with the Acquis, Ecotec, et al, DG Environment, 2001

6.3 Contribution to Combating Climate Change

6.3.1 Links between Climate Change and Regional Development

Climate change is both affected by and affects regional development. Insofar as regional development can be achieved with low carbon emissions, a contribution is made to avoiding climate impacts; at the same time, any climate change impacts that do occur can set back development, particularly in the areas of agriculture, nature protection and human health.

The countries covered by this study are significant in both aspects: nowhere else in Europe are carbon emissions both rising and falling as strongly as in these 15 countries. They are falling particularly in central and eastern Europe, though only in aggregate – there have been large reductions in industrial emissions but quickly rising emissions from homes, commercial activity and transport; industry is also likely to recover and contribute to rising emissions. Southern Europe is seeing quickly rising emissions: in Spain in particular, there are very significant increases – the gap between its Kyoto commitments and current emissions is the highest in Europe.

At the same time, **Southern Europe is likely to face the brunt of any European climate change impacts: drought much of the year and sudden heavy rains leading to flash flooding are predicted to be more common. Central and Eastern Europe are among the most exposed to flooding risk from the major river basins** and significant populations along them. Also, given the more agrarian economies, they are exposed to shifts in rainfall and temperature more than in Northern Europe.

The goals of regional funding for renewable energy are primarily three-fold:

- Overall climate targets: Achieving the Kyoto (or burden sharing) commitments on reducing greenhouse gases
- Renewable electricity: Providing the share of electricity generation from renewable sources by 2010 specified in the targets under Directive 2037/2000 or in accession agreements
- Biofuels: helping meet the indicative target of providing 5.75% of total fuel consumption from renewable sources by 2010

6.3.2 Measures to be Taken to Stimulate Alternative Sources of Energy

A variety of mechanisms are in place around Europe to stimulate alternative sources of energy, and in particular to assist in meeting the targets set under 2001/77/EC, the RES-E directive (Table 6.3)

Table 6.3: Indicative Renewable Electricity Targets for 2010 (Share of RES in Electricity)

Member State	*Reported in 1997*	*Target for 2010*
Greece	8.6	20.1
Spain	19.9	29.4
Portugal	38.5	39
Cyprus	0.05	6
Czech Republic	3.8	8
Estonia	0.2	5.1
Hungary	0.7	3.8
Latvia	42.4	49.3
Lithuania	3.3	7
Malta	0.0	5
Poland	1.6	7.5
Slovenia	29.9	33.6
Slovakia	17.9	31

The targets for the new Member States are set out in the accession treaty: 1997 was the reference year

The most effective measure is a feed-in tariff that guarantees a high payment for anyone generating renewable energy. Obligations for generators to meet a quota (or buy credits from other over-producing generators) is also effective, though not to as great a degree. Tax deductions and fiscal measures are common measures, though their impact is not always as easy to determine. To put the issues into context, the figure below presents an overview of mechanisms in place to support RES in the old EU-15.

Table 3 Support policies for renewable technologies in the EU 15

Country	Capital subsidies	Feed-in tariffs	Certificates/ obligations	Competitive tender	Fiscal mechanisms
Austria	X	X	H		X
Belgium	X	X	X		X
Denmark	H	X			X
Finland	X				X
France	X	X		X	X
Germany	X	X			X
Greece	X	X			X
Ireland	X			X	X
Italy	X	H	X		X
Luxembourg	X	X			
Netherlands	X	X	X		X
Portugal	X	X			X
Spain	X	X			X
Sweden	X		X		X
UK	X		X	H	X

X: Mechanism currently present
H: Historical policy, now changed

Source: Adapted from Stenzel, Foxon and Gross (2003).

Source: EEA Technical Report 1/2004 - Energy subsidies in the European Union: A brief overview

A key justification for European funding in RES is to stimulate new markets in which additional market mechanisms can be effective. For example, investment in demonstration projects like solar roof initiatives, or investment to subsidise the installation of micro home RES systems, can help generate a supply chain that can then take advantage of market incentives: without a viable number of importers, installers and technicians, there is no market to incentivise.

Even wind energy, which is increasingly commercial in Europe, must be installed at a local level to demonstrate the technology, elevate technical capacity and create a market – all of which must be underpinned by adequate characterisation of the wind resource and environmental assessments of wind installations. As noted in several country reports, there is often a conservatism to overcome that prevents exploiting available resources.

There are several key areas of renewable energy development that consistently show needs for future enhancement; for example, beyond renewable electricity, is a need to enhance the use of RES for heat production. A new Directive this year, six years behind that for electricity, will help to stimulate interest. Additional measures to promote energy savings (for which the potential is very large) will make renewable energy penetration easier.

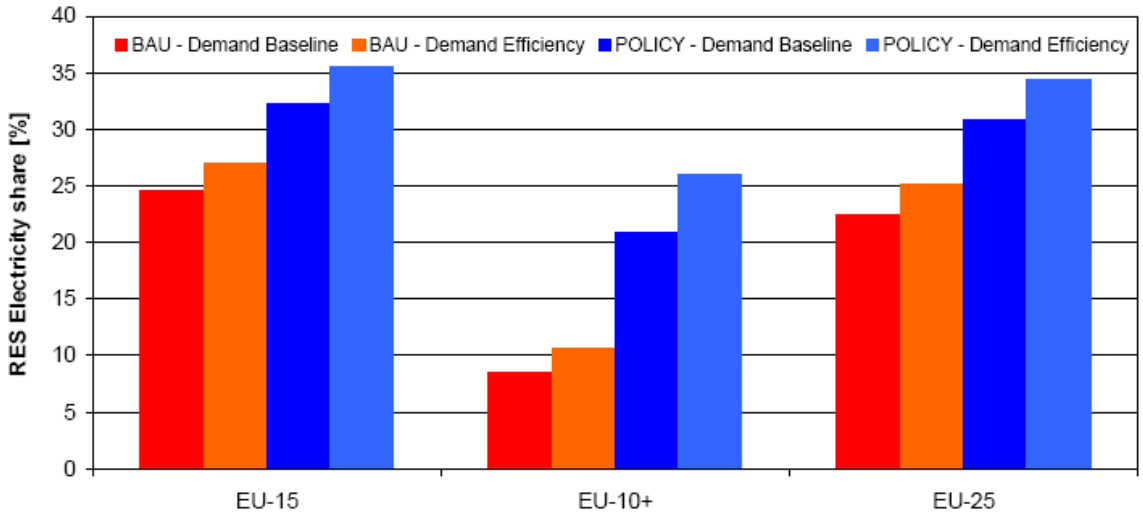
In most respects the issues do not differ between the MS but they can differ in degree – for example the very large potential for efficiency in new Member States, or the potential for biomass as a heat source, for example.

A European assessment of the share of energy from renewables by 2020[13], (Figure 6.1), indicates that under business as usual conditions (red bars), the EU 25 might reach 22% RES-E by 2020; with additional policy measures it could reach 31% (dark blue bar); in another scenario in which demand efficiency is improved (orange and light blue bar), these numbers are higher. It is striking to note that there is significantly greater scope for improvement in new Member States as a result of additional policy, indicative of the benefits in terms of climate change from the investment programmes.

European programmes are already credited with increasing interest in renewable energy and creating markets, however these are generally still small and under-exploiting potential resources. The suggested programmes, even when taking into account the levels of funding through purchaser obligations can boost the efficiency of EU policy by investing in those MS where funding can have the greatest impact.

[13] Ragwitz, M, J. Schleich, C. Huber, G. Resch, T. Faber, M. Voogt, R. Coenraads, H. Cleijne, P. Bodo, 'FORRES 2020: Analysis of the renewable energy sources' evolution up to 2020,' April 2005

Figure 6.1: Share of Energy from RES, Different Policy Scenarios, 2020



Almost all of the countries studied face a challenge in meeting their 2010 RES-E Directive targets, with significant investment needed. Spain, for example, is estimated to need an investment of 23.6 billion euros from this point to 2010 in order to meet its target. However, planned government direct investment in renewable energy will only be about 3% of this figure. The rest, it is hoped, will come from private enterprise (see Table 4.8). The combination of tax credits and feed-in tariffs are meant to provide favourable conditions for business to invest in renewables. However, it is clear that really only wind energy is attractive at the moment, although as the resource is developed siting options will become more limited and expensive to exploit. Thus there is a need to create markets for other, currently less commercial RES like solar thermal and photovoltaics.

In Portugal, investment of some 5.5 billion euros is needed by 2010, of which the combination of investment subsidies, tax deductions and feed-in tariffs are estimated to provide about 4.3 billion euros – if the market is not hampered by bottlenecks in administrative project approvals. Here again, wind energy is attractive while a source of particular potential importance to Portugal, wave energy, is under-funded and not yet commercial.

In Poland, increasing attention is being paid to renewable electricity, but there are bottlenecks with the main potential source: much of the best land for wind energy is in protected nature areas; there is opposition to the creation of large hydro dams; and there is insufficient incentive for farmers to plant energy crops, and there is fierce competition for the available biomass. Experience has also shown that official support is far less than that foreseen – for example, only 25% of the level promised for 2000-2004 was delivered.

Within the realm of financial and technological assistance, the suggested programmes can make a number of specific contributions, identified from the country reports:

- Secure the integration of RES support mechanisms to ensure there are no essential gaps, for example between fuel supply and biomass power plants; between permit and siting processes and the construction of windmills;

between introducing newer technologies on the one hand and supporting more mature markets on the other.

- Provide financial support to get robust RES markets in place: a pre-requisite for market instruments to be effective

- Enhance a focus on small hydro, PV, biogas/liquid biofuels, that are currently less able to compete with other, cheaper RES sources.

- Ensure RES uptake is supported by energy savings measures: as RES-E and biofuels targets are defined as a percentage of the total demand, if the total is less the need for RES production is less: this is a challenge in most of the MS.

- Address technical limits on the capacity to incorporate variable power input to the grid, and the limited funding for grid extension to connect resources like wind farms, which tend to be generally viewed as outside the financial support for RES.

While financial aspects are clearly important to the development of RES, the country reports indicate that a range of ancillary problems also need to be dealt with:

- Underachievement and poor enforcement of government targets/policies to date often lead to pessimism about stated funding/goals for the future.

- Bureaucratic delays in the processing of subsidies, permits, siting requests

- Concerns about the use of water and fertiliser use in biomass production and concerns about promoting monocultures

- Lack of clarity in responsibility for RES policy (i.e. ministries of economy, environment, agriculture in HU acting independently)

- Progressive but inadequate policies, for example where there is a feed-in tariff, but the incremental rate is too low to be effective or fixed at the same level for all sources and hence only affecting the cheapest.

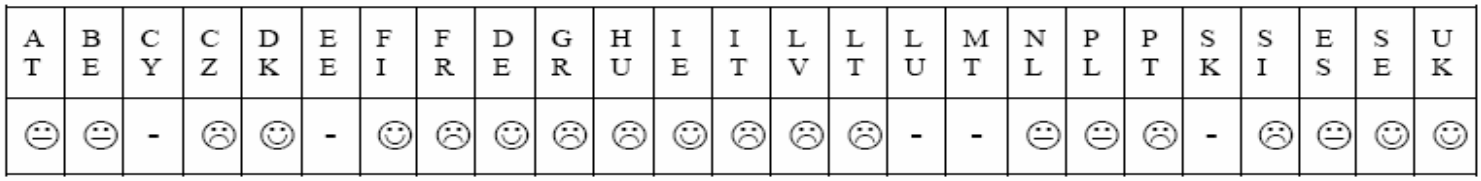
- Government policies that do not integrate the non-energy benefits of RES into their assessment of priorities and hence under-emphasize them.

- Conflicts over nature protection and siting of RES facilities in some MS.

A European Commission assessment of administrative barriers to RES shows (Figure 6.2) that not one of the studied MS has a positive rating, and quite a few are negative.

Figure 6.2: Administrative Barriers to RES Deployment, Excluding Grid Connection

Estimation of administrative barriers to renewable energy deployment in the EU, excluding grid barriers



Source: European Commission, Communication: 'The support of electricity from renewable energy sources,' COM (2005) 627, 7 December 2005

6.3.3 The Climate Change Impact of the Programmes

The assessment of the needs for funding of RES in the 15 MS considered three main factors:

1. Distance to the renewable electricity targets
2. Technical and/or economic potentials in each resource
3. Current funding and market strength

Points one and two generally work together - Member States will tend to seek to achieve their targets by exploiting their most abundant or least expensive renewable resource. In doing so, however, they often put in place support schemes or stimulate a private market that is effective in exploiting these resources (point three). As a result, the most technically or economically promising sources of energy are not always the ones for which SF/CF support is most needed.

Table .4 below, summarises the main priority technologies identified for support in each of the Member States. It is immediately obvious that the cheapest and most abundant sources are still the RES most in need of support – wind and solid biomass in particular. The importance of solid biomass is emphasized in those countries where it is already a significant source (Baltic States, south-eastern Europe) but also in countries where its potential has yet to be exploited to as great a degree (Spain, Cyprus, Portugal).

Photovoltaics also feature, in this case not because they are cheap, which they are not,, but because the potential is great (ES, MT, CY for example), and market forces are less likely to support them at this point due to high costs.

Table 6.4: Priorities for Funding of Renewable Energy Sources by MS

RES Type	First Priority	Second Priority	Third Priority
Wind	CYP, CZ, EE, GR, LT, MT, PL, PT, SI	ROM	MT
Solid Biomass	BUL, ES, HU, LV, ROM, SK	CZ, PL, MT, CYP	PT, SI, GR, LT
Biogas	LV	SI, HU	CZ
PV	CYP		PL, ES, MT
Solar Thermal Heat		ES, MT, PL	CYP
Hydro (>15 MW)		PL, GR	
Hydro (<15 MW)	ROM, SI	CZ, PT, SK, LT	
Liquid Biofuels	HU	BUL, MT	CYP
Geothermal		SK	BUL, PL, ROM, HU

Source: National Evaluation Reports

These findings are consistent with a report of the potential of different RES in EU25 (Table 6.5) showing that biomass, wind and PV have the most potential to grow given supportive policies. This report also indicates that solar thermal electric and wave and tidal power have potential, which were not generally identified in the national assessments – largely due to the lack of activity and low MS priority. These RES may be more likely to be post 2013 options due to their early stage of development.

Table 6.5: RES-E Production (2001) and Potential (2020) for the EU-25 in TWh, Under Two Scenarios: Baseline and Extra Policies *(The three highest growing technologies are in bold)*

RES-E type	2001	2020 (Baseline)	2020 (Extra Policies)	% growth 2001 – 2020 (Extra Policies)
Wind	34	385	461	1256%
Biomass, Biogas and Waste electric	37	141	338	814%
PV	0.2	8.8	17.9	8850%
Solar Thermal electric	0	12.7	21.7	(rising from zero)
Hydro (>15 MW)	288	293	306	6%
Hydro (<15 MW)	38	44.3	48.4	27%
Geothermal electric	6.3	7.5	8.2	30%
Wave and tide	0	8.4	33.2	(rising from zero)

Source: (Ragwitz, et al. 2005)

Based on the identified funding requirements and RES priorities it is possible to estimate the amount of funding each RES type might receive, and hence the implied emissions reductions based on the different properties of those RES types. Note that while many national reports give specific breakdowns of RES type under the total need, they rarely do so for the final requirements after the subtraction analysis, instead giving indicative priorities, which is therefore the basis for this analysis.

The estimated CO2 savings implied by these funding priorities are presented in Table 6.6. **The annual CO2 savings across the 15 MS total some 10400 Kt, equivalent to roughly 7% of current annual CO2 emissions from these MS**[14]

Table 6.6: Estimated Annual CO2 (Kt) Savings Following RES Funding (electricity applications only)

	Wind	Solid Biomass	Biogas	PV	Hydro (>15 MW)	Hydro (<15 MW)	Geothermal	Total
Bulgaria	-	163	-	-	-	-	118	281
Cyprus	2	3	-	-	-	-	-	5
Czech Republic	128	209	25	-	-	78	-	440
Estonia	63	-	-	-	-	-	-	63
Spain	-	917	-	17	-	-	-	934
Greece	736	600	-	-	892	-	-	2,228
Hungary	-	494	79	-	-	-	356	929
Latvia	41	34	-	-	-	25	-	100
Lithuania	-	98	24	-	-	-	-	122
Malta	11	-	-	1	-	-	-	12
Poland	195	319	-	27	237	-	346	1,123
Portugal	1,534	1,251	-	-	-	930	-	3,715
Romania	49	179	-	-	-	67	130	425
Slovenia	1	8	1	-	-	1	-	11
Slovakia	-	7	-	-	-	5	30	43
EU15	2,760	4,282	129	45	1,129	1,106	980	10,431

Source: Based on National Evaluation Reports

Note: the calculation takes into account an indicative price per unit of capacity, a figure for annual operating hours, and an EU average emissions factor.

[14] based on 2004 emissions data, the most recent reported.

The investment of 6,543 million euros to support RES generates a saving of 10,430 KtCO2/annum. Taking an expected lifetime of 20 years and discounting at a rate of 4%, the cost (not including O&M) is €44 per tonne of CO2 avoided. Different assumptions could be made for this calculation, but it indicates that the investment is supporting abatement from renewable energy with costs that are not atypical recognising that this investment is in designed in part to support RES that are currently less commercial.

6.4 Potential Improvements to the Management of Natural Risks

The 15 countries covered by this study are particularly vulnerable to a range of natural hazards. The most prevalent of these are flooding, forest fires and drought, with erosion also problematic in coastal regions and windstorms rounding out the list of the five most problematic events.

Although these hazards are 'natural,' it does not mean that there is no human element involved, or that their impacts cannot be minimized. The human element is clear when noting, for example, that half of forest fires in Spain are intentionally set, usually to clear brush using traditional methods, but which get out of control. Add to this equation the poor management of forests, for example by replacing fire-resistant native species with over-dense eucalyptus groves, and the naturally occurring risks are exacerbated.

Thus it is worth bearing in mind that hazards leading to impacts do so through a chain of three linked factors:

- Sources (e.g. rain)
- Pathways (e.g. rivers)
- Receptors (e.g. populations crowded in a floodplain)

There are therefore different points where interventions could be helpful to help avoid or manage natural risks. See Annex X for further discussion of these factors.

It is very difficult for anyone to affect original sources in any direct way – wind, rain and earthquakes will happen – except in two cases:

- Preventing the intentional starting of fires, and
- Limiting global warming due to the use of fossil fuels and the subsequent impact on the hazards examined in the study.

The emphasis of risk management is therefore on pathways and receptors. Taking the example of flooding, rivers throughout Europe have been used to serve as canals for boat traffic and to recover valuable land. The result is that the natural buffer of floodplains, which can take up excess water when needed, have largely disappeared or been populated. River levels then rise not just in those floodplains but along the whole length.

Combating the impacts of natural hazards involves several steps:

- Risk identification

- Prevention
- Combating events
- Post-disaster relief
- Remediation and reconstruction

Each element is important to an overall policy. Identification is being achieved through such efforts as the European Forest Fire Risk Forecasting System, EFFRFS. Being aware of high-risk areas allows appropriate prevention to take place, and programming of resources to be available there in the event of an event, for rescue, relief and remediation.

Nevertheless, much of the civil protection methods put in place in the 15 MS focus on identifying problems, combating events and disaster relief. Prevention would be the ideal method to deal with hazards, but is among the most difficult – factors affecting risk, as noted above, include rather intractable problems such as global warming, long-held traditional farming methods, and the seemingly inexorable development in vulnerable areas.

Similarly, remediation and reconstruction would be opportunities to rethink vulnerability and prevent future events which are not necessarily built into current disaster relief programmes. An example is Bulgaria's application to the Solidarity Fund for relief following two episodes of flooding in 2005. WWF (2005) argued that the Bulgarian government was planning to simply reconstruct using the same engineering approach to flood control rather than enhancing natural retention zones. The whole length of the Danube and its tributaries suffer from the same problem, with nearly 80% of the floodplains being cut off from the river due to development over the past 150 years.

Preparations to combat natural hazards at Member State level show a growing awareness of the problem, though hampered by insufficient budgets and a continued need to shift previous patterns of thinking.

Unfortunately for these regions, the future of natural hazards management will not be made any easier by the climate. Under certain assumptions about future climate change, Southern and South-eastern Europe in particular will see increased drought, while being vulnerable to heavier downpours and flash flooding. A model of potential future drought in Europe due to climate change clearly indicates that much of the study region would be at risk of having '100 year' droughts return every ten years.

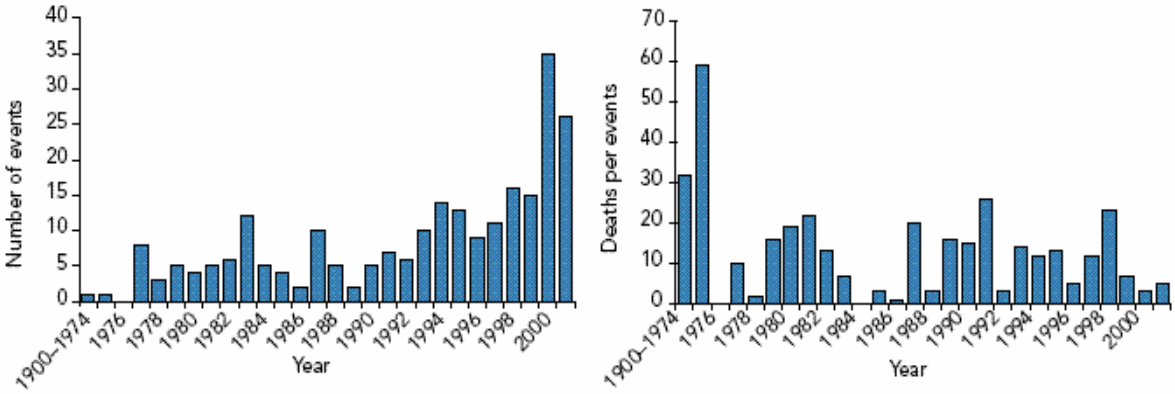
Given the difficulty of addressing current natural hazards, worsening conditions in future means that far more effort will have to be made at several levels: from the legal to the engineering to personal behaviour (Table 6.7).

Table 6.7: Examples of adaptive measures to Natural Risks

Adaptive measure	Health and extreme weather events
Administrative / legal	• Create disaster preparedness programmes • Employ land-use planning to reduce flash floods • Ban precarious residential placements • Implement weather watch/warming systems • Plant trees in urban areas • Implement education campaigns
Engineering	• Construct strong seawalls • Fortify sanitation systems • Insulate buildings
Personal behaviour	• Heed weather advisories • Heed fire risk warnings • Schedule work breaks during peak daytime temperatures

Efforts to deal with flood risk indicate that impacts can be minimised. While flooding events have become more common, deaths per event have diminished (Figure 6.3).

Figure 6.3: Frequency and Impact of Flooding Events



The suggested investment programmes enhance current MS programmes, especially in the context of the Water Framework Directive which encourages river basin management across national boundaries, and hence is capable of contributing to the management of flood and drought risks.

The main priority for funding identified in the national evaluations is for managing flood risk (10 of the 15 MS) and forest fires (3 of 15).

Flooding has historically been the most common and dangerous natural risk in Europe,. Flood protection tends to require more expensive infrastructure compared to the management of fire and drought risks, although drought programmes are particularly expensive in some southern European where the problem is endemic. Indeed, it is because drought is a persistent problem in countries like Spain that the investment contemplated to relieve it doesn't fully register as a disaster relief measure *per se* in these funding requirement calculations. It is complex to determine what

portion of water management plans would be related to natural risks and what portion to major infrastructure works to account for population and economic growth, and changing patterns of water use.

Finally, a number of the MS reports identify the importance of strategic planning for the management of natural risks, to anticipate the need for a range of different solutions – information and communication, planning, training as well as infrastructure investment. Often money spent on avoidance through appropriate awareness, planning and strategies can be more cost-effective than construction efforts. Reducing risk is by definition a difficult task to quantify and any evaluation of likely cost-effectiveness will be non-trivial, but full risk assessment and response planning can not only help identify local / regional / national cost-effective measures but can be a cost effective measure in itself as the basis of awareness, co-ordination and communication and requires support if it is not already robust and needs strengthening, for example in the case of cross-border coordination of flood risk.

7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

7.1.1 Needs and Drivers for Environmental Investment

The national evaluations have assessed the need for environmental investment in five fields. The first three fields (water supply, waste water treatment and municipal solid waste) require investment to ensure compliance with the environmental acquis. This largely requires investment in the replacement of worn-out infrastructure (e.g. non-compliant sewage plants, non-compliant landfills), rather than in new infrastructure to meet increased demands because of economic or demographic change. In some MS, population is expected to fall, whilst structural industrial change means that some resource intensive industries are closing.

The failure to secure compliance and to risk EU legal action represents a dominant influence on the scale and type of investment needed. To achieve levels of compliance without EU funding programmes will extend the time to achieve compliance by a factor of four (based on an average intervention rate of 75%). Even with the assistance of the Structural and Cohesion Funds, full compliance is unlikely to be achieved by the end of the next programme period.

The failure to achieve compliance is not just bad for environmental quality. Poor environmental quality exacerbates regional disadvantage and the problems of convergence. This is formally recognised in the Structural Fund regulations for the new programme period (Section 5.1). Section 6.3 summarises some of the benefits for regional convergence from the suggested investment programmes. However, as noted in the review of plans for the current period, (see Section 3.0), the explicit and intentional achievement of regional economic development benefits from environmental investment is often poorly articulated, with legal compliance rather than wider development rationales defined.

In the case of the last two fields (renewable energy sources and natural risk management) the drivers of investment relate to additional levels of activity to supplement and accelerate the benefits of national programmes. This is especially important as the risks and damage costs of climate change and of flooding especially increase through time.

The major driver is the need for replacement investment or for new investment in locations previously without adequate infrastructure, rather than being driven by expansions of population or economy. This is especially the case in WWT and to a lesser extent in MSW and WS. The investment in RES responds to policy goals to expand these sources and investment in NRM reflects previous activity but recognising changes in the level of risk. This balance changes somewhat in the Southern MS, where demands from tourism, and for better resource management, are stronger and drive investment, especially in WS and MSW.

7.1.2 Investment Needs and Financial Requirements

The funding available from the Structural and Cohesion Funds in the next programme period is a scarce resource. The scope to augment the resource through additional MS

policies is therefore important. Four sets of policies have been identified and reviewed in the national programme evaluations:

- Increased levels of user charges for the consumption of environmental services (water and waste water treatment, and municipal waste services) to increase the finance available for capital expenditure as well as operating costs

- Use of national purchasing obligations to fund the expansion of renewable energy capacity

- Use of cross-border measures to improve resource and natural risk management, in the context of the provisions of the Water Framework Directive.

- Use of public-private partnerships to increase access to private sector investment funds.

All four sets have the capacity to ensure that the maximum level of investment needed is financed from users and through national programmes. We briefly review the contribution of these sets of measures.

User Charges

User charges for environmental services are levied in all MS. These charges have traditionally been part of municipality finance, and have previously been only loosely based on the costs of service delivery; with tariff structures often further obscuring the nature of costs to the user, and containing various implicit or explicit cross-subsidies. These user charges are however, largely used to pay for the operation and running costs of the service rather than the capital expenditure in new or replacement infrastructure. However, in some MS, user charges contribute between 10% and 30% of capital costs, with relatively higher contributions to water supply infrastructure and less to MSW.

The evaluation has also considered the prospect of meeting investments needs from higher charges over the next programme period. There is a general trend for real price rises which will contribute further to capital costs. However, these increases have also generated a wider concern over the affordability of basic environmental services for lower income households. This political limit to future increases in charges is largely reflected in the evaluation, with only Poland formally acknowledging future increases in the assessment of financial requirements.

Analysis of the potential revenue from charges set at 5% of average income for the 10% of lowest income households suggests that Cyprus, Malta and Greece could meet their investment needs by raising charges to this level. In the case of Portugal, Spain, and possibly the Baltic states (depending on the shortfall in revenue for operating costs), additional contributions to meeting their needs from increased charges (political constraints aside) up to the benchmark level could be achieved. In the other MS, the benchmark has already been reached and suggests only very limited scope to secure additional revenue (which may still be required in part at least to cover operating costs) to meet investment needs.

It is possible to design tariffs to protect lower income households. No MS currently has charges approaching 5% of average household income. If the levy was set at this level (and protection was provided for lower income households) all MS could raise charges and associated revenue very significantly. If the levy was set at this benchmark, then all MS could (assuming the revenue was fully committed to capital expenditure) finance their annual investment needs in these three fields, with the exception of Bulgaria, Romania and (marginally) Latvia.

The future intent to move to full capital and operating cost recovery means that by the end of the programme period, a substantially larger share of capital costs will (political concerns over affordability aside) be funded by users.

Renewable Energy Purchasing Obligations

The evaluation has considered the extent to which the market (with any additional market obligations) is capable of meeting identified investment needs, and thus avoiding or reducing the need for SF support. In a number of MS (Slovenia, Spain, Greece, Czech Republic, Malta and Bulgaria) the market funds the majority of investment needed, between 67% and 98%. In Portugal and Poland, the market contributes a minority of the investment needed. All these MS use some form of market obligation to increase the finance that is raised through the market.

In the remaining MS, the national evaluations have excluded the investment requirements for RES that are commercially funded by the market (if any) and identified the investment that would need to be funded through some market intervention. In some MS (Cyprus, Hungary, Estonia and Latvia) there are existing market obligations but which are considered ineffective or inapplicable to the investments identified. In the remaining MS (Lithuania, Romania, Slovakia) no form of existing market obligation has been identified.

Enhancements to National Programmes

The investment identified in the national evaluations as requiring financial support through the SF programmes is that required over and above the normal MS programmes. In the case of natural risk management there are established MS programmes, which the SF should not seek to replace. However there are clear cases where SF support is required. In particular, where there are significant increases in the potential risks, partly as a result of increased economic development, and/or these are associated with cross-border risks, especially in the context of the Danube flood risks, the suggested investment programmes enhance current activity. There are also investments in strategic planning and plan preparation that, given the likely economic efficiency would provide a strong case for SF support.

Public-Private Partnerships

The national evaluations have reviewed the scope to expand the use of public-private partnerships (PPP) as an aid to encouraging private sector contributions to investment. The review suggests that at the present time there is little scope for any substantial expansion of PPP in the environmental sector, and that the opportunity for any significant expansion of PPP is limited to a small number of activities, most notably in the area of waste disposal and recycling.

7.1.3 Priorities

The investment priorities in the suggested national programmes have been assessed based on the type and scale of investment needed, taking into account a range of criteria related to the achievement of the acquis, regional convergence, and avoiding the economic losses associated with climate change and natural risks.

The assessed priorities would result in the majority of investment taking place in the first three fields; driven by the acquis and indirectly by the associated improvements in regional convergence resulting from environmental improvement. The need to complete projects and sub-programmes already started within the current programme period is an important influence in these three fields. The balance of priorities also reflects the desire and scope to maximise financial contributions from users of environmental services (including energy) within the MS. The national assessments, especially in the cohesion MS, also stress the importance of resource management through higher user charges (providing an incentive to lower demand), resource planning and waste minimisation.

The suggested investment programmes will contribute to regional development as a result of:

- Direct economic impacts including net additional improvements in Gross Value Added (GVA) and accelerated regional convergence
- Improved environmental quality delivering direct economic benefits, cost savings and new technological and market opportunities
- Long-term mitigation and adaptation to climate change, with a significant contribution to savings in CO2 emissions
- Enhanced EU scale management and strategic planning especially linked to the cross-border management of water resources, avoiding major impacts from natural risks.

7.2 Recommendations

The review of national evaluations has identified a number of generic issues where recommendations appropriate to all or most of the fifteen MS and the associated MS negotiations on the Structural Fund allocations would enhance the efficiency and effectiveness of the resulting investment programmes.

1. **Link Environmental Strategies to Wider Development Strategies** – use of the Structural and Cohesion Funds to achieve compliance with the environmental acquis should be made on the understanding that improved environmental quality is vital for improved economic competitiveness. Consequently, environmental strategies should recognise that environmental improvement is an important contributor to wider economic and sustainable development objectives, and more fully articulate the links to the broader development strategies so that priorities reflect the linkage. This is especially important in the context of regional Operation Programmes.

2. **Apply Spatial Planning Perspectives** – the preparation of the environmental strategies should make explicit reference to national and regional spatial

development perspectives, especially where influenced by and contributing to the implementation of the Water Framework Directive. The scope for more efficient use of investment for water supply and risk management through well researched and developed perspectives is acknowledged in a number of MS.

3. **Emphasise Prevention and Demand Management** – the scope to manage investment needs through effective preventative measures (such as waste minimisation) and demand management (especially of water) should receive strong recognition in the national and regional environmental strategies. This is argument is increasingly evident in the cohesion MS.

4. **Acknowledge Full Cost Recovery Principles** – the national evaluations all recognise the importance of user charges, but also that at the present time, the current level of tariffs do not cover the full costs of environmental services. Charges may cover operating costs but do not contribute to the costs of investment. There are important political constraints to the application of the principle of full cost recovery because of the implications for affordability of higher charges. However, acknowledgement of the principle in environmental strategies (with reference to the polluter pays principle) would ensure that the negotiation and the implementation of the programme maximised the funding from the application of user charges.

5. **Encourage Programmes to Provide Clear Data on the Extent of Current User Charges and Levels of Full Cost Recovery** – the scope to secure additional funding for the required capital investment is difficult to define without specific information on the level of charges (which can be hard to disentangle from general municipal taxes, and which vary by area, type of user and scale of use) and the extent to which current levels of operating costs allow revenues to be allocated for capital spend. Such data will also help in the analysis of affordability issues as they arise during the programme period.

6. **Enhance Current Project Pipeline Capacity through Specific Field Strategies** – the national evaluations acknowledge the scope to build on current project activity is considerable. However, the national evaluations have also emphasised the problems of absorption, and reflected this in the proposed scale of investment programmes, although the proposed programmes are generally larger than in the previous period. Careful development and management of the project pipeline will as always be central to efficient programme delivery. The design and use of field specific strategies will allow the necessary focus but also allow the MS to place the specific field investment programme in the context of existing national provision including delivery capacities.

7. **Create Markets for a Broader Range of Renewable Energies** - most countries are focusing on financial or market measures that benefit the most commercial technologies. More significant from the perspective of the need for funding support in the 2007-2013 period is the need to develop the less commercial sources through demonstration and capital support so they can gain a stronger foothold in the market and unlock their potential sooner rather than later.

8. **Ensure MS Provide Suitable Hazards Monitoring and Related Emergency Response Plans –** practice has shown that early warning and a co-ordinated well resourced response can be a very effective tool to avoid damages. The resource needs are often greater than local capacity and efficiency requires a multi-regional co-ordinated response, reflected in the need for greater national and regional spatial planning for risk management (Recommendation 2).

ANNEXES

ANNEX 1: OVERVIEW OF CURRENT NATIONAL ENVIRONMENTAL STRATEGIES AND POLICY FRAMEWORKS

Member State	Brief Characteristics
Greece	Environmental policy is EU legislation-driven. Compliance with environmental acquis remains the determining factor in identifying investment requirements. Sustainable development and Lisbon Agenda are key strategic directions in national policy. Key stated objective is integration of the environmental dimension in all sectoral policies and in evaluation. Current development policy is based on Government's National Reform Programme (Lisbon) that covers period 2005-08. One priority axis is SD with special emphasis on basic environmental infrastructure on solid waste and WW management, civil protection and risk prevention, protection and promotion of natural environment, environmentally friendly urban transport etc. Acknowledgement of past environmental investment contributing significantly to raising quality of life of inhabitants but little mention of role of environmental investment in wider development objectives. RE policy is an integral part of energy policy and is well inscribed in the regional economic development strategy. Key drivers of RE policy are the targets and commitment to Kyoto principles with respect to CO2 emissions, which are showing an accelerated rate of increase in Greece.
Estonia	Increased pressure on environment has raised the importance of developing a practicable environmental policy. The National Environmental Strategy (NES) specifies priority goals of environmental management and protection. NES based on Lisbon Agenda, EU SDS and Directives and MS Strategies ("Estonian Success 2014" and "Sustainable Estonia 21"), and legislation. Meeting acquis requirements is a main principle. NES specifies areas of environmental management and protection and defines main tasks to be achieved by 2010. One of the policy goals is "environment, health and life quality" – this includes Water Supply objectives. Environmental investments made according to National Development Plan (NDP) and Estonian National Environmental Action Plan. NDP covered 2000-06. Structural assistance and development aims are broken down by 4 priorities; Priority 4 is infrastructure and local devt, under which lies the measure "development of environmental infrastructure".
Czech Republic	The State of the Environment Policy (SEP) 2001, is based on principles of SD, international commitments and recommendations in the framework of UN, OECD, EU and the requirements of a civic society. The SEP forms the environmental pillar of the SD Strategy. The newly updated SEP will take into account conclusions of Global Summit on SD in Johannesburg, the EU SDS and the Lisbon Agenda, the 6th EU EAP and conclusions of the 5th conference of the UN Economic Commission "An Environment for Europe". The general framework of the SEP is based upon an interest in the further

	improvement in the quality of the environment in CR and in implementing the principles of SD on global scale.
Cyprus	Environmental policy is mainly driven by international obligations and the need to harmonise EU policy with the EU acquis communautaire, as well as national priorities over issues such as security of water supply.
Bulgaria	NSEAP (2000-06) – National Strategy on the Environment Action Plan – focused on establishing the legal and administrative framework for effective environmental management. This differs from the new NSEAP (2007-13), which is aimed at achieving definite measures required for implementing new legal obligations. The overall long-term objective is to improve quality of life of the population in the country by ensuring a healthy and favourable environment, preserving the natural heritage, building on sustainable environmental management.
Portugal	Main environmental policy driver in the 2000-06 period has been the requirement to comply with EU legislation National infrastructure plans existed for the 2000-06 period in most of the fields. PEAASAR (Strategic Plan for Water Supply and Waste Water) was a national infrastructure plan developed to prepare investment decisions for 2000-06. The first Strategic Plan for MSW (PERSU) (1997) set targets for 2005. The National Strategy for the Reduction of Biodegradable Urban Waste (ENRRUBDA) (approved 2003) set targets for biodegradable waste, which have been incorporated into the new National Strategy on SD. There appears to be a lack of a clear link between current environmental strategies and broader development strategies – many of the infrastructure plans appear to be investment plans.
Slovenia	National Environmental Protection Plan and Action Programme (NEAP) and National Development Plan (NDP) are the main strategic documents, defining national environmental policy and the main objectives of different environmental sectors. Main policy objectives are: introduction of comprehensive water management policy, introduction of waste management policy measures, reduction of industrial sources of pollution to water, land and air, reduction of water pollution from dispersed municipal and agricultural sources of pollution and protection of biodiversity and protected habitats. A strategic document entitled 'Development Strategy for Slovenia' declared 5 development priorities and action plans. This development strategy also acts as the Sustainable Development Strategy for Slovenia, transposing the Lisbon Strategy goals. National Energy Plan (NEP) was developed in parallel with Strategy for Economic Growth of Slovenia and National Plan of Environmental Protection. NEP focuses on promotion of efficient use of energy and use of RE and defines 3 strategic objectives in the energy field: security of energy supply, competitive energy sector, reduction of negative environmental impacts. NEP also takes into account strategies, action plans, directives and other EU docs as well as SI's obligations to reduce GHG emissions by 8% by 2010- derived from Kyoto.
Latvia	Environmental policy has been focused on EU-related requirements and is likely to still be guided by EU requirements in the next programme period. Environmental policy is guided by: moderate economic growth balanced between economic

	branches and regions, minimisation of social and economic differences, minimisation of impact from main sectors (transport, industry, energy, agriculture, housing, tourism), more efficient use of natural resources and waste management.
Slovakia	Basic environmental policy is the Strategy, Principles and Priorities of the State Environmental Policy (1993). The Strategy sets out principles, which govern the State Environment Policy including solution of environmental problems as problems of the economic development of society; application of environmental policy in all sectors of the national economy as well as at level of local authorities and in the tertiary sector; perception of a healthy environment as the basic condition for an improvement in the state of health of the population Priorities include: atmospheric protection against pollutants, esp GGs and global environmental security, ensuring quality and sufficient quantity of drinking water and a reduction in pollution of other waters below admissible levels, and minimisation of creation, use and recycling and correct disposal of waste. Document focusing on the implementation of the strategy is the National Environmental Action Programme II (NEAP II). NEAP II is aimed at improving environmental situation as part of overall environmental security in Europe and globally. It aims to harmonise environmental law with EU law in areas such as waste management, control of industrial pollution and management of risks. Realisation of proposed measures of NEAP II is conditional upon application of the fundamental principles of SD – integrity principle, subsidiarity principle, auto-regulation and self-supportive development principle, preventive care principle, environmental favourable economy and behaviour principle.
Romania	Main aspects of environmental policy are related to strengthening institutional capacity of central and local authorities involved in environmental issues, e.g. finding ways and instruments to encourage companies to comply with the environmental legislation. All internal policy on environment corresponds to the acquis and was driven by it Numerous strategic documents give emphasis to the importance of environmental quality for economic development and regional convergence. Creation of environmental strategies, as a component of SD, is consistent with recommendations of the European Environmental Agency. Integration of environmental policy in the further development and implementation of sectoral and regional policies represents one of Government's main priorities in 2005-08.
Poland	Environmental policy has been based on SD since 1990. The present policy is comparable to EU and advanced national programmes worldwide. Operational policy priorities are driven by the acquis to some degree, and include: municipal investments, mostly WWT and sewerage systems, advance waste treatment inc recycling and recovery, environmental safety, special environmental hazard monitoring and control systems, RES development, environmental improvement in business (eg support for companies in terms of environmental standards and technologies influencing competitiveness), biodiversity and nature conservation etc.
Malta	At EU-policy level, the main objective of the Maltese Single Programming Document (SPD) has been to strengthen the competitiveness of the economy whilst maintaining sustainable use of the environment. SPD gives attention to quality of drinking water,

	waste disposal, nature protection and renewable energy. National Strategy on SD considers following areas as main environmental challenges: air quality and climate change, energy efficiency and renewable resources; freshwater; biodiversity; waste; marine and coastal environment The 2005 budget also declares the environment as one of the administration's main concerns. Environment is placed high on reform agenda but there is no link shown between environmental policies and competitiveness National Reform Programme 2005-08 (Lisbon) sets out key environment issues: halting biodiversity loss, internalisation of environmental externalities, fighting climate change (despite no binding GG targets due to non-Annex I status). Priorities include: promoting use of non-conventional sources of water, promoting biological diversity, development of means of internalisation of external environmental costs and decoupling of economic growth from environmental degradations in line with existing Community legislation and ETAP, fight against climate change Major strategic objectives are identified in the State of the Environment Report (2005): environmental data collection and research; policy coordination between government ministries and agencies to increase coherence of policy; finding finance to fund environmental improvements across government and the private sector in line with the acquis, drawing on public environmental concern to gain support for public and private initiatives; focusing on impacts that have serious effect on human health; improving capacity for implementation and enforcement of acquis
Latvia	Main goals of environmental policy: significant improvement of environmental quality in territories that pose increased risk for human health, stability of ecosystems while sustaining environmental quality in the rest of the territory; protection of existing biodiversity and landscape; sustainable use of natural resources; integration of environmental policy into all branches and fields of life (national economy in general, strategic plans of its various branches, legislation and public awareness), establishing the basis for SD
Hungary	The National Environmental Programme II (NEP II) provides the environmental policy framework. NEP II contains the implementation of Hungarian environmental commitments made during the negotiations on accession to the EU, taking into account the principles of the 6th Community EAP. NEP II ensures the integration of environmental considerations into sectoral policies, thus promoting the achievement of SD.

ANNEX 2: QUALITATIVE AND QUANTITATIVE OVERVIEW OF NEEDS BY FIELD AND MEMBER STATE

Table 2: Qualitative Overview of Investment Needs by Field and Member State

BULGARIA	
Water Supply **already addressed by current initiatives e.g. existing plans/investment**	-Reservoirs to store surface water -**Renovation of existing DW production plants**
requiring further planning/investment	-**local DW network – mainly renovation and some extension** **-long distance DW network – mainly renovation and some extension** -Reservoirs to store surface water -**Renovation of existing DW production plants** -extra monitoring plants
Wastewater Treatment **already addressed by current initiatives e.g. existing plans/investment**	-New STPs -new sewerage -sewage pumping stations
requiring further planning/investment	-new STPs -new sewerage **renovation/upgrading of STPs** renovation/upgrading of sewerage -sludge treatment -**sludge disposal** -CSO upgrading
Municipal Solid Waste **already addressed by current initiatives e.g. existing plans/investment**	-waste collection facilities -manual/mechanical sorting facilities **Composting sites** ***Existing landfill close downs*** ***New landfills*** **Incinerators**
requiring further planning/investment	**Waste collection facilities** manual/mechanical sorting facilities **Composting** sites ***Existing landfill close downs*** ***New landfills*** Incinerators Further construction of regional landfills €250m Closure of existing landfills €60m Treatment of biodegradable waste facilities €40m (main invt needs listed in p30) See p81 for further details on types of invt (installations for recovery of wood waste; regional installations for composting)
Renewable Energy Sources **already addressed by current initiatives e.g. existing plans/investment**	Solid biomass
requiring further planning/investment	***Solid biomass*** **Liquid biofuels**

	Solar electric (PV) Geothermal Solar thermal Wind power
Natural Hazards **already addressed by current initiatives e.g. existing plans/investment**	***Flooding (embankments)*** drought
requiring further planning/investment	***Flooding (embankments)*** drought

CYPRUS	
Water Supply **already addressed by current initiatives e.g. existing plans/investment**	-no new production plants required due to recent major invt -existing plants are of good standard -new network largely in place -renovation of existing network not applicable
Wastewater Treatment **already addressed by current initiatives e.g. existing plans/investment**	-New Sewage Treatment Plants required for smaller, rural agglomerations (<2,000pe). Some being met by ongoing invts. -existing Sewage Treatment Plants of higher (tertiary) standard -further extension of sewage collection system needed; some met by ongoing investments -sludge treatment is of high standard with re-use of sludge requiring further treatment
requiring further planning/investment	-further facilities for sludge disposal -further assessments of groundwater recharge
Municipal Solid Waste **already addressed by current initiatives e.g. existing plans/investment**	**-**manual/mechanical sorting facilities need considerable extension- some already planned - recycling facilities being initiated -Existing landfill sites being upgraded, closed and new ones set up
requiring further planning/investment	-additional landfill -new incineration plants -further promotion on waste reduction Further construction of regional landfills €250m Closure of existing landfills €60m Treatment of biodegradable waste facilities €40m (main invt needs listed in p30) See p81 for further details on types of invt (installations for recovery of wood waste; regional installations for composting
Renewable Energy Sources **already addressed by current initiatives e.g. existing plans/investment**	-wind (partially) -Additional Solar thermal - solar electric (PV) (partially)
requiring further planning/investment	-wind extension -additional efforts on biofuels -additional solar electric (PV)
Natural Hazards **already addressed by current initiatives e.g. existing plans/investment**	-improvements in fire prevention and management – no major infrastructure -drought measures being tackled through dams, wastewater re-use etc
requiring further planning/investment	-extension of water storage might be required depending on drought developments No obvious infra requirement in relation to forest fire prevention (see p88); most of investment in forest fire prevention has focused on education, additional staffing for forest managers and additional equipment.

	No obvious major infra need in relation to earthquakes. Further investment required in drought management, although more on making better use of available water, since major water storage and supply plans already in place.

CZECH REPUBLIC	
Water Supply **already addressed by current initiatives e.g. existing plans/investment**	- **extension of current network to rural areas** **-renovation of existing plants** - renovation of existing network
requiring further planning/investment	Extension of current network to rural areas **- renovation of existing plants** -renovation of existing network Key issues: -protection of water sources -improvement if water treatment unit operations -replacement of old pipelines (especially lead and asbestos cement pipes) – see p62
Wastewater Treatment **already addressed by current initiatives e.g. existing plans/investment**	**-New Sewage Treatment Plants** **-new sewerage** **-sludge treatment** **renovation/upgrading of STPs**
requiring further planning/investment	**-New STPs** **renovation/upgrading of STPs** **renovation/upgrading of sewerage** **-new sewerage** Storm water detention tanks Reconstruction of trunk sewers Upgrade of CSO
Municipal Solid Waste **already addressed by current initiatives e.g. existing plans/investment**	**Remediation of old landfill sites** **RWMCs** **Training and public awareness**
requiring further planning/investment	**Remediation of old landfills** Waste collection (separate waste collection) **New RWMCs (including landfill, recycling yard, composting installation)** **Public awareness raising campaigns** **Incineration** Integrated systems for waste handling in all regions is element of infra most in need of expansion (p81) Also: -recultivation of old landfills -removal of old environment loads
Renewable Energy Sources **already addressed by current initiatives e.g. existing plans/investment**	biomass
Natural Hazards **already addressed by current initiatives e.g. existing plans/investment**	No detailed info on investment needs for Natural Risk Management available. Investment needs based on limited info: -increased number of designated flood territories along significant watercourses from current 51.4% to assumed approximately 75%; implementation of this programme requires investment of approximately €146m

ESTONIA	
Water Supply **already addressed by current initiatives e.g. existing plans/investment**	**-transport – local: renovation of existing network** - **DW production plants**
requiring further planning/investment	- **DW production plants: new and reconstruction** **- transport – local: renovation of existing network** -transport- local : network extension -house connections
Wastewater Treatment **already addressed by current initiatives e.g. existing plans/investment**	**-renovation/upgrade STPs** **renovation/upgrading sewerage** **-new sewerage**
requiring further planning/investment	New STPs **renovation/upgrading of STPs** **renovation/upgrading of sewerage** **-new sewerage** -pumping stations -sludge treatment
Municipal Solid Waste **already addressed by current initiatives e.g. existing plans/investment**	**Recovery: recycling yards, recovery of packaging** **Closure of existing landfills** **New regional landfills**
requiring further planning/investment	Waste collection Waste sorting Waste recovery **Closure of existing landfills** **New regional landfills**
Renewable Energy Sources **already addressed by current initiatives e.g. existing plans/investment**	Solid biomass (cut fuelwood and wood-processing waste) (mainly for heat production) **Wind power (electricity production)** Small hydropower (electricity production) Geothermal (heatpumps) (heat production)
requiring further planning/investment	**Wind power (electricity production)** Small hydropower (electricity production) Solid biomass (logging waste) (mainly for heat production)
Natural Hazards **already addressed by current initiatives e.g. existing plans/investment**	Forest fire (high risk): determination of fire risk levels and compilation of fire protection plans forest fire protection systems (public systems) make private forests compliant with “Estonian Forest Fire Protection Plan” International cooperation on rescue services (technical assistance and counselling)
requiring further planning/investment	Forest fire protection systems

GREECE	
WS	
WW	
MSW	
RES	
Natural Hazards	
Other Areas	

HUNGARY	
Water Supply **already addressed by current initiatives e.g. existing plans/investment**	**-improvement of existing plants** -Renovation of existing network -leakage control **-monitoring of water resources**
requiring further planning/investment	**-improvement of existing plants** -Renovation of existing network -leakage control **-monitoring of water resources**
Wastewater Treatment **already addressed by current initiatives e.g. existing plans/investment**	**-New STPs** **-new sewerage** **-sludge treatment** **renovation/upgrading of STPs**
requiring further planning/investment	**-new STPs** **-new sewerage** **-sludge treatment** **renovation/upgrading of STPs** **renovation/upgrading of sewerage**
Municipal Solid Waste **already addressed by current initiatives e.g. existing plans/investment**	-manual/mechanical sorting facilities Recycling yard Composting sites **Closure of existing landfills** **New landfills** **Incinerators**
requiring further planning/investment	Manual/mechanical sorting facilities recycling yard Composting sites **Closure of existing landfills** **New landfills** Incinerators
Renewable Energy Sources **already addressed by current initiatives e.g. existing plans/investment**	**Solid biomass** **Wind inshore** Solar electric (PV) Geothermal **Biogas**
requiring further planning/investment	**Solid biomass** **Wind inshore** Solar electric (PV) Geothermal **Biogas**
Natural Hazards **already addressed by current initiatives e.g. existing plans/investment**	**Flooding (reservoirs)** **drought**
requiring further planning/investment	**Flooding (reservoirs)** **drought**

LATVIA	
Water Supply **already addressed by current initiatives e.g. existing plans/investment**	**Local drinking water network – mainly renovation and some extension** **Renovation of existing WS infra in bigger cities** **Some extension of local and long distance network**
requiring further planning/investment	**Renovation of existing water production plants and some new plants. Focus on smaller towns and settlements** **Local Water Supply network: mainly renovation, some extension. Focus on smaller settlements and towns** Long distance Water Supply network: mainly renovation Installation of iron removal equipment Modernisation of monitoring system, data collection and analysis systems Extra monitoring points
Wastewater Treatment **already addressed by current initiatives e.g. existing plans/investment**	**New Sewage Treatment Plants** **renovation/upgrading of sewerage** **-new sewerage** **-sludge treatment** **renovation/upgrading of Sewage Treatment Plants**
requiring further planning/investment	**-new sewerage** **renovation/upgrading of Sewage Treatment Plants** **renovation/upgrading of sewerage** Renovation of pumping stations Sludge treatment
Municipal Solid Waste **already addressed by current initiatives e.g. existing plans/investment**	**Waste collection facilities** **Regional Waste Management Systems** **Expansion of waste collection, sorting and reuse** **Closure of old landfills** **New landfills** **Management of biodegradable waste, implementation techniques of biogas production and combustion of MSW**
requiring further planning/investment	**Regional landfills (as part of already established Regional Waste Management Strategy)** **Expansion of waste collection, sorting and reuse** **Regeneration of closed and closure of old landfills** **New landfills** **Management of biodegradable waste**
Renewable Energy Sources **already addressed by current initiatives e.g. existing plans/investment**	**Solid biomass: wood based boilers** **Biogass** **Windpower** **(small) Hydropower** **Demonstration projects: geothermal energy, wind, solar, landfill gas**
requiring further planning/investment	**Solid biomass** **Small hydropower** **Windpower**
Natural Hazards **already addressed by current initiatives e.g. existing plans/investment**	**Forest Fires** **Flooding** Flooding Forest Fires

LITHUANIA	
Water Supply **already addressed by current initiatives e.g. existing plans/investment**	**Renovation of existing Water Supply infrastructure in bigger cities** **Some extension of local and long distance network**
requiring further planning/investment	**Renovation of existing water production plants and some new plants. Focus on smaller towns and settlements** **Local Water Supply network: mainly renovation, some extension. Focus on smaller settlements and towns** Long distance Water Supply network: mainly renovation Installation of iron removal equipment Modernisation of monitoring system, data collection and analysis systems
Wastewater Treatment **already addressed by current initiatives e.g. existing plans/investment**	**renovation/upgrading of sewerage** **-new sewerage** **-sludge treatment** **renovation/upgrading of Sewage Treatment Plants**
requiring further planning/investment	**-new sewerage** **renovation/upgrading of Sewage Treatment Plants** **renovation/upgrading of sewerage** Renovation of pumping stations
Municipal Solid Waste **already addressed by current initiatives e.g. existing plans/investment**	**Regional Waste Management Systems** **Expansion of waste collection, sorting and reuse** **Closure of old landfills** **Management of biodegradable waste, implementation techniques of biogas production and combustion of Municipal Solid Waste**
requiring further planning/investment	**Regional landfills (as part of already established RWMS)** **Expansion of waste collection, sorting and reuse** **Regeneration of closed and closure of old landfills** **Management of biodegradable waste**
Renewable Energy Sources **already addressed by current initiatives e.g. existing plans/investment**	**Solid biomass: wood based boilers** Demonstration projects: geothermal energy, wind, solar, landfill gas
requiring further planning/investment	**Solid biomass** **Small hydropower**
Natural Hazards **already addressed by current initiatives e.g. existing plans/investment**	Flooding
requiring further planning/investment	Flooding

MALTA	
Water Supply **already addressed by current initiatives e.g. existing plans/investment**	**reservoir** **-Water capture devices** Illegal abstraction prevention Demand control Reduction of pesticides Water saving technologies Monitoring
requiring further planning/investment	**Improving of existing plans** **New network (pipes, pumps etc...)** **Renovation of existing network** **Leakage control**
Wastewater Treatment **already addressed by current initiatives e.g. existing plans/investment**	-One additions STP (Malta South) Renovation / upgrading of sewerage Sludge disposal or re-use Distribution of treated Sewage for secondary uses Metering
requiring further planning/investment	**New Sewerage** **Renovation / upgrading of sewerage** **Sewage pumping stations** **Sludge treatment**
Municipal Solid Waste **already addressed by current initiatives e.g. existing plans/investment**	Additional waste treatment plant New sanitary landfill (incl. storage for small hazardous waste)? Landfills remediation Illegal dumping prevention Waste production control reduction
requiring further planning/investment	Manual/mechanical sorting facilities Recycling yard Incineration plants Existing plants/landfills upgrade New landfills Gas capture devices
Renewable Energy Sources **already addressed by current initiatives e.g. existing plans/investment**	**Wind: Onshore** **Wind: Offshore** **Additional efforts on liquid biofuels** **Additional solar electric (PV)**
requiring further planning/investment	**Liquid biofuels**
Natural Hazards **already addressed by current initiatives e.g. existing plans/investment**	Storm water collectors Monitoring
requiring further planning/investment	Watercourses upgrading
Other Areas	Ecolabel/EMS for tourism Energy saving technologies Biodiversity – marine (links to waste water disposal) Biodiversity - birds protection Biomass Additional solar thermal and improving efficiency of the existing SWHs

POLAND	
Water Supply **already addressed by current initiatives e.g. existing plans/investment**	**Improvement of existing plants** **New connections**
requiring further planning/investment	**Improvement of existing plants** **New connections** New reservoirs **Renovation of existing network** Monitoring of water resources **Leakage control**
Wastewater Treatment **already addressed by current initiatives e.g. existing plans/investment**	**New STPs** **-new sewerage** **renovation/upgrading of STPs**
requiring further planning/investment	**New STPs** **-new sewerage** **renovation/upgrading of STPs** **renovation/upgrading of sewerage** sludge treatment individual treatment
Municipal Solid Waste **already addressed by current initiatives e.g. existing plans/investment**	**Existing landfill close downs** **New landfills** **Incinerators**
requiring further planning/investment	More focus on advanced approaches: inc recycling, recovery, combustion, incineration Waste management systems Composting sites **Existing landfill close downs** **New landfills** **Incinerators**
Renewable Energy Sources **already addressed by current initiatives e.g. existing plans/investment**	**Solid biomass** **Wind inshore** Geothermal hydro
requiring further planning/investment	**Wind inshore** **Geothermal** **hydro**
Natural Hazards **already addressed by current initiatives e.g. existing plans/investment**	**Flooding** **Drought** Forest fires
requiring further planning/investment	**Flooding** **Drought** Forest fires

PORTUGAL	
Water Supply **already addressed by current initiatives e.g. existing plans/investment**	-New reservoirs -New production plants (drinking water withdrawals) -New production plants (drinking water treatment plants) -New network (drinking water pumping stations) -New network (drinking water distribution)
requiring further planning/investment	-**new drinking water treatment plants** **-rehabilitation of existing water treatment plants** -new water distribution networks (bulk and retail) -rehabilitation of water distribution networks (bulk and retail)- leakage control -water pricing -water saving technologies
Wastewater Treatment **already addressed by current initiatives e.g. existing plans/investment**	New STPs -new sewerage -sewage pumping stations
requiring further planning/investment	-new STPs **renovation/upgrading of STP** New wastewater collection networks (bulk and retail) -rehabilitation of WW collection networks (bulk and retail water) -water pricing (financial sustainability of utilities) -sludge treatment -**sludge disposal or re-use**
Municipal Solid Waste **already addressed by current initiatives e.g. existing plans/investment**	-composting plants -additional sorting facilities -existing plant upgrade
requiring further planning/investment	-incineration (RDF/sludge) ***MBT development*** **Additional composting** **Selective collection improvements** Financial sustainability
Renewable Energy Sources **already addressed by current initiatives e.g. existing plans/investment**	Waves/tides Additional solar thermal and PV Additional biomass Additional wind Improved grid connections
requiring further planning/investment	Waves/tides Wind: equipment ***Additional wind*** Additional solar thermal and PV Additional geothermal Additional efforts on biogas ***Additional hydro*** Additional investment needed for regional grid weakness, improved licensing procedures
Natural Hazards **already addressed by current initiatives e.g. existing plans/investment**	Floods: Land planning, infrastructure security and emergency actions Erosion – some infrastructure + activity relocation Droughts- increasing water supply robustness (quantity and quality) Forest fires – combat performance and public sensitization Across fields – forestation plans
requiring further planning/investment	***Floods + erosion – relocation of activities*** **General – strict implementation of spatial plans** Droughts- inc. water supply robustness (quantity and quality) **Forest management** (+econ valuation) Coastal erosion (protective structures construction)
Other Areas	

ROMANIA	
Water Supply **already addressed by current initiatives e.g. existing plans/investment**	**County-wide monitoring of DW quality** **Investment in equipment for control monitoring performed by producers** **Improvement of technologies and extension of water treatment** **Rehab and extension of WS networks**
requiring further planning/investment	**Investment in equipment for control monitoring performed by producers** **Improvement of technologies and extension of water treatment**
Wastewater Treatment **already addressed by current initiatives e.g. existing plans/investment**	**New STPs** **New sewerage** **Renovation/upgrading of STPs**
requiring further planning/investment	**New STPs** **New sewerage** **Renovation/upgrading of STPs** Renovation/upgrading of sewerage **Sludge treatment** **Sludge disposal** CSO upgrading
Municipal Solid Waste **already addressed by current initiatives e.g. existing plans/investment**	**Waste collection facilities** Manual/mech sorting facilities **Composting sites** **Disposal**
requiring further planning/investment	**Waste collection facilities** Manual/mechanical sorting facilities **Composting sites** **Disposal**
Renewable Energy Sources **already addressed by current initiatives e.g. existing plans/investment**	**Solid biomass** **Hydro-electric**
requiring further planning/investment	**Solid biomass** **Hydro-electric** Geothermal Wind power
Natural Hazards **already addressed by current initiatives e.g. existing plans/investment**	**Flood protection measures** **Drought: repair of irrigation systems**
requiring further planning/investment	**Flood protection measures** **Drought: repair of irrigation systems**

SLOVAKIA	
Water Supply **already addressed by current initiatives e.g. existing plans/investment**	**-Renovation of existing network** **-renovation of existing plants** **-**extension of current network to rural areas
requiring further planning/investment	**-Renovation of existing network** **-renovation of existing plants** **-**extension of current network to rural areas
Wastewater Treatment **already addressed by current initiatives e.g. existing plans/investment**	**-New STPs** **-new sewerage** **renovation/upgrading of STPs**
requiring further planning/investment	**new STPs** **renovation/upgrading of STPs** **renovation/upgrading of sewerage** **-new sewerage** **Waste water collection systems (trunk sewers, CSO, storm water detention tanks)**
Municipal Solid Waste **already addressed by current initiatives e.g. existing plans/investment**	**Waste collection and separation systems** **Upgrading of existing landfill sites** **Training and public awareness**
requiring further planning/investment	**Waste collection (separate waste collection)** **New RWMCs (including landfill, recycling yard and composting installation)** **local composting installations** **public awareness raising campaigns** **remediation (recultivation and removal of old environmental load) of old landfills**
RES	
Natural Hazards	
Other Areas	

SLOVENIA	
Water Supply **already addressed by current initiatives e.g. existing plans/investment**	**- reservoir** **-building of 2 regional WS systems** -improvement of existing plants -renovation of existing network
requiring further planning/investment	**- reservoir** **-building of 2 regional WS systems** -improvement of existing plants **-renovation of existing network** -**monitoring of water resources** **-sensibilisation**
Wastewater Treatment **already addressed by current initiatives e.g. existing plans/investment**	-New STPs -new sewerage -renovation of sewerage **renovation/upgrading of STP**
requiring further planning/investment	**-New STPs** **-new sewerage** **-renovation of sewerage** **renovation/upgrading of STP** **-sludge treatment** **Monitoring of pollution and water quality**
Municipal Solid Waste **already addressed by current initiatives e.g. existing plans/investment**	-manual/mechanical sorting facilities -recycling yard -composting sites **-existing landfill close downs** **New landfills** **Incinerators**
requiring further planning/investment	-manual/mechanical sorting facilities -recycling yard -composting sites **-existing landfill close downs** **New landfills** **Incinerators** **Cooperation and capacity building municipalities**
Renewable Energy Sources **already addressed by current initiatives e.g. existing plans/investment**	**solid biomass** **hydropower** **wind energy** geothermal solar electric biogas
requiring further planning/investment	**solid biomass** **hydropower** **wind energy** geothermal solar electric biogas
Natural Hazards **already addressed by current initiatives e.g. existing plans/investment**	Drought Forest fires flooding
requiring further planning/investment	Drought Forest fires flooding
Other Areas	Landslides Hail Earthquakes Landslides Hail Earthquakes

SPAIN	
Water Supply **already addressed by current initiatives e.g. existing plans/investment**	Reservoirs/Transport (Including leakage) Desalinisation plants Drinking water production plants Increasing water supply
requiring further planning/investment	Strengthening water saving plans
Wastewater Treatment **already addressed by current initiatives e.g. existing plans/investment**	New Sewage Treatment Plants Renovation Upgrading of Sewage Treatment Plants Sewage pumping stations Sludge treatment
requiring further planning/investment	Strengthening water saving plans
Municipal Solid Waste **already addressed by current initiatives e.g. existing plans/investment**	Closure and remediation of uncontrolled landfills Prevention and minimisation Selective collection and composting of biological waste Dramatic increase on emphasis to reduce and minimise waste generation
requiring further planning/investment	Prevention and minimisation of organic waste Recovery or organic waste
Renewable Energy Sources **already addressed by current initiatives e.g. existing plans/investment**	Investment in wind and new technologies Investment in new Renewable Energy source technologies (photovoltaic, biomass)
requiring further planning/investment	Energy saving plans
Natural Hazards **already addressed by current initiatives e.g. existing plans/investment**	Support for forest fire management Strategic water resource planning especially in context of the Water Framework Directive

Table 3: Quantitative Overview of Investment Needs by Fields 1, 2, 3 and Member State

Bulgaria	
Water Supply	Average daily water consumption by population reduces from 101 l/h/d in 1998 to 90 l/h/d to 95 in 2003. Negative econ growth especially in water-intensive industry, led to decrease in industrial water consumption. Forecasted water consumption is constant. Other consumption (administration, commerce and agriculture) likely to increase by 4% per annum starting from 2004 due to trend of growth in tourism and services. Unit water consumption for household purposes decreased slightly to approximately 90 l/cap/day – no other detail Household growth decreasing – 2.95 per person per household in 1995 versus 2.57 per person per household in 2004. Average household monthly income forecasted to increase from €253 to 428 in 2013. Unit drinking water need will increase as income level rises to 121 l/cap/day in 2013, consistent with European consumption levels. (no data on total water consumption from industry – see p61) rehabilitation of water distribution network – 70% of network in very poor condition and likely to be non-compliant. 42 water treatment plants + 3500 pumping stations to be upgraded to ensure water supply and treatment. Dam construction to address water shortage in certain areas
Wastewater Treatment	Total amount of wastewater discharged into water bodies is 878 million m^3 per yr (2.4 million m^3 per day). Investment (2007-13) in upgrading existing sewage treatment plants in non-compliant agglomerations due to non-compliance with Urban Waste Water Treatment Directive requirements. 26% of 2007-13 investment aimed at rehabilitation of existing infrastructure - Less than for water supply because wastewater network more recent. 13% of total wastewater investment aimed at construction/rehabilitation of wastewater plants. Wastewater investment is a higher priority than water supply investment because of existing targets failing to meet connection and treatment rates and due to several agglomerations being non-Urban Waste Water Treatment Directive compliant
Municipal Solid Waste	1999-2003: annual municipal solid waste quantity collected and deposited on municipal landfills approx 3,230 thousand tons (500kg per capita) Rising urban population likely to result in increase in amount of biodegradable waste going to landfill. Landfill deposition still method of choice for final disposal – inappropriate current infra to fulfil existing deposition, recycling, recovery targets. Investment required to redress inadequate meeting of targets established by Landfill Directive (some expected from increased user charges) –compliance-driven

Cyprus	
Water Supply	Surface and groundwater resources threatened by sea water intrusion and overuse. Total annual water demand is 265.9m m^3, estimated to rise by 2020 to 313.7m^3 – mainly due to rise in use of domestic water and tourism development. Consumption in towns provisionally estimated to have risen by 4.4% in 2003. Population increase likely from 810,000 in 2010 to 850,000 in 2020. Number of households also likely to increase, especially in urban areas. Water consumption in tourism sector likely to be 8% of total consumption in 2010 and around 10% in 2020. Absolute water amount needed for tourism likely to double from 14.1m^3 to 30.8m^3. Drinking Water Directive implemented successfully. Most water infrastructure in Cyprus is quite new – e.g. desalination plants, wastewater plants, dams.
Wastewater Treatment	Summer – wastewater plants have insufficient capacity to deal with increase in sewage water. Amount of treated wastewater to rise to 30m m^3 per year by 2012. 2 primary needs relating to wastewater management: 1) completion of collection systems in urban areas – most is currently under construction or planned 2) improved collection of wastewater for smaller communities acquis compliance is factor although mainly development-driven, for communities' benefit – reducing risks to local health and environment
Municipal Solid Waste	Serious risk of groundwater pollution caused by uncontrolled waste disposal. Average annual per capita production of solid waste is 718kg in 2003 = increase of 12.7% from 1996 – one of highest in Europe. Tourism sector and biodegradable waste both responsible for large proportion of waste arisings; significant growth of arisings in absolute and p.c. terms reflects inc on tourist waste production (whose population not part of per capita calculation) Many Cypriot landfills are non-conforming to Directive 99/31/EC; challenge in meeting Landfill Directive targets.

Czech Republic	
Water Supply	2004: Domestic water consumption = 349.8m m^3 (102l/day/p.c). total specific water consumption (paid water) was 159l/day/p/c – lower than previous year. Population expected to decrease. Number of households to remain stable or slightly increase. Current water demand is very low (102l/cap/day compared to EU average of 150); no policy exists to reduce water demand. Industry water consumption has decreased since 1980 (1080m m^3). 2004 figure 410m m^3. Growth of industry not expected to lead to extra growth in demand. Growth in living standards and purchasing power may lead to growth in water consumption Total domestic annual water demand forecasted at 466.4m m^3 per yr (medium demand scenario) 25% of infrastructure is non-compliant. 30% of the population will benefit from improvement or replacement of infrastructure. 75% of infrastructure is worn-out. Drinking water quality improvements are more acquis compliance-driven; less development-driven especially as quality of drinking water in all regions is good.
Wastewater Treatment	Wastewater production expected to remain low or even decrease Volume of industrial wastewater requiring treatment will grow proportionately with inhabitants connected to sewage treatment plants Total forecasted wastewater volume discharged 1.7m m^3/day (average scenario) Upgrading of many sewage treatment plants necessary to comply with Urban Waste Water Treatment Directive standards (in sensitive areas); replacement of obsolete plants necessary 304 obsolete plants to be replaced (due to non-compliance with Urban Waste Water Treatment Directive). Up to 10000 Population Equivalent new plants necessary for small municipalities; 400 new plants to be built to meet Urban Waste Water Treatment Directive Building and upgrading of sewage treatment plants for compliance with Urban Waste Water Treatment Directive; less attention paid to compliance with fishing and bathing water Directives Existing sewers are in poor structural state (25%)
Municipal Solid Waste	Gradual downward tendency in waste production – particularly evident in hazardous waste production. Amount of produced waste in 2001 = 38.7m tonnes, in 2005 = 35.9m tonnes. Unit waste generation will slightly decrease. Present value is 455kg/yr/cap, which will drop to 425kg/yr/cap (see p87)

Estonia	
Water Supply	Continuous population decline expected due to low fertility rate and aging. Population may decrease by 4-5% by year 2015. No significant growth of industrial water demand expected. Water use decline in 1990s-early 2000s due to price rises and closing of industries likely to continue. Public water demand likely to rise if urban concentration continues to rise. Total water consumption will decrease but stabilise towards ends of programming period Total drinking water demand forecasted in 2013 = 90m m^3 per year. Gaps between Estonia and the EU relate to quality and coverage of municipal services provided to the people by environment infrastructure as well as to quality of drinking and bathing waters. Non-compliance with Drinking Water Directive explained by naturally high concentrations of iron, manganese, sulphates and chlorides in groundwater. In several areas the quality of raw water abstracted from surface and/or groundwater sources for drinking water does not meet EU standards. Most of the Estonian water treatment plants are worn out – need for building or reconstruction of water treatment plants (unclear whether these worn-out ones are compliant) (see p40) Main objective of planned projects is provision of compliant drinking water to all inhabitants. Mainly acquis compliance-driven. Estimations of physical investment needs only available for bigger settlements – physical needs therefore likely to be underestimated due to lack of information on smaller settlements (where situation likely worse) All needs (plants, new network, renovation) are included to meet EU Directives.
Wastewater Treatment	Water pollution load decreasing from 1990s due to decrease in discharges (reduction of industrial output) and inc in treatment efficiency. Forecasted total wastewater volume discharged = 326 m^3/day (see p50)
Municipal Solid Waste	Amount of municipal solid waste per capita continued increase in early 1990s due to rapid econ growth and subsequent increase in consumer consumption. Stabilisation from 1997 onwards (406kg of municipal solid waste generated per capita in 1996, decreasing to 378 per capita in 2000). Municipal solid waste generation expected to increase. Economic growth rate forecast to be 5-6% in long run. Municipal solid waste recycling target is 30-40% according to National Waste Management Plan Unit Municipal solid waste generation is 398.5kg per capita (2005) No data for total waste generated by households Priority of final disposal options goes to landfilling – Municipal solid waste generation in Estonia too small to secure economic viability of modern waste incineration facility All dumpsites must terminate landfilling activities by Sept 2009; dumpsites must be closed (recultivated, refurbished) by 2013.

Greece	
Water Supply	Anticipated population increase (estimated at 145,000 over 2007-13 period) + corresponding anticipated rate of increase in households not expected to critically impact on domestic water demand Continued growth of tourism sector likely to impact drinking water supply Brief analysis of 1990-97 trends show inc in annual per capita water demand from 780 to 830m^3 and forecasts upward annual trend. Demographic trend unlikely to put critical pressure on drinking water supply infrastructure. Economic trends are expected to increase water demand Expected that anticipated increase in per capita demand to year 2013 can be met. Key problem is water loss. Water loss well above EU-25 average of 25-30%.
Wastewater Treatment	Main objective is Urban Waste Water Treatment Directive compliance. 110 Sewage Treatment Plants in operation but do not serve entire population due to lack of sewerage network infrastructure
Municipal Solid Waste	Quantity of municipal solid waste in Greece reached 4.6m tonnes in 2001, having increased by 47% compared to 1990 levels- twice rate of in of GDP in same period- due to improvement of living standards and changing consumption patterns. Demographic upward trend and anticipated GDP growth rate (for 2007-13) expected to raise levels of waste generation. Geomorphology of country also challenging for solid waste management – high number of relatively small sanitary landfills increase both investment needs and subsequent operational costs Geomorphology and demographic factors drive need for continued high investment in urban solid waste management infrastructure – especially sorting and recovery facilities Plan for Management of Biodegradable Waste (independent study in 2003) forecasts 35% inc in total municipal solid waste generation over period 2001-20. Very high number of existing non-compliant landfills. Require investment for closure and recultivation Landfill deposition still method of choice for final disposal – inappropriate current infrastructure to fulfil existing deposition, recycling, recovery targets. Investment effort is most often in compliance with new legislation Legislative compliance with respect to disposal facilities can be ensured by end-2008 as per policy objective Strong public opposition over location of sanitary landfills has hindered improvements in infrastructure.

Hungary	
Water Supply	Total Drinking Water demand for households : 395.2m m^3 (2003) Drinking water demand likely to increase by 10% by 2015 Domestic water consumption likely to increase from 381m m^3/yr (2002) to 432m m^3/yr in 2015. Population level likely to decrease by 2.6% from its 2002 rate by 2015; specific water consumption will increase to 120l/cap/day by 2015.
Wastewater Treatment	60% of households not connected to any waste water treatment plants; population living without sewerage systems use septic tanks for waste water disposal – 90% of these utilities are inefficient and hazardous to the environment. No of Sewage Treatment Plants in compliance with Urban Wastewater Treatment Directive standard is 355; NO information is available on number of non-compliant Sewage Treatment Plants Wastewater collection and treatment fail to comply with EU norms. Investment (2007-13) is mainly upgrading existing Sewage Treatment Plants in non-compliant agglomerations due to non-compliance with Urban Waste Water Treatment Directive requirements. Many public utility network and wastewater treatment facilities are obsolete/worn-out and do not comply with basic criteria. Most facilities need refurbishment and many need complete replacement of infrastructure.
Municipal Solid Waste	Total waste generated: 4.73mt/year (2004). National Phare programme provided support particularly to procurement of missing assets required for adopting certain directives of EU legislation and implementation of other directives. Numerous investment projects helped to comply with acquis.

Latvia	
Water Supply	Water use (1990-2002) decreased more than 2 times from 600m m^3 to 256m m^3; decrease of water use in households (1991-2002) was from 200 to 62m m^3. Water supply generally corresponds to water demand. Total domestic drinking water demand forecast 83.1m m3/yr in 2013; total drinking water demand €119.4m m^3 in 2013
Wastewater Treatment	Fall in production intensity and increase in environment policy led to significant decrease in wastewater amounts. Increase in zinc and copper emissions in line with economic growth. Total volume of sewage dropped more than 2 times. Number of Sewage Treatment Plants in compliance with Urban Wastewater Treatment Plant standard is 7; 64 non-compliant (2004) Main deficiencies of Wastewater Treatment plants are failure of mechanical/electrical equipment, inefficient and unsafe systems, poor structural condition of treatment units Most of the 1100 Wastewater Treatment plants have technologies applied that do not comply with environment requirements and are creating water pollution. Poor condition of sewage networks creates leakages and collected sewerage may pollute groundwater.
Municipal Solid Waste	Total waste generated is 240 kg/cap/yr in Riga; 40 kg/per capita in small settlements less than 100 inhabitants. Waste is major issue in Latvia

Lithuania	
Water Supply	Total household drinking water demand is 98.5m m^3 (2004), forecasted to rise to 180.9m m^3 in 2013. Water demand per capita decreasing since 1999 due mainly to growing water prices. Average drinking water consumption was 70l/inh/day (2004). Water demand currently lower than existing water supply capacity. Some municipalities report very low water use in households; close to 50l/cap/day (minimal amount required to meet EU sanitary requirements) Approx 1 million inhabitants use water from own dug wells where water quality is often poor. Only 30% of capacity of water supply infrastructure is currently used Household water consumption likely to slowly grow in line with increase in per capita income
Wastewater Treatment	No of Sewage Treatment Plants in compliance with Urban Wastewater Treatment Plant standard is 95; 65 non-compliant (2004) Average amount of 73,000m^3 of wastewater/day in 2001 will increase to 140,000m^3 per day (not stated by when) 65 of the 95 Wastewater Treatment plants are compliant with Urban Waste Water Treatment Directive. Existing capacity sufficient but too big for future needs. 59 of 65 existing Wastewater Treatment plants need rehabilitation or complete replacement as they are not using most advanced tech that saves considerably on operation and maintenance costs. Unclear whether already compliant though. Lack of aggregated and summarised data on state of wastewater treatment collection and treatment infrastructure. Overall existing wastewater infrastructure in settlements between 2000-10000 PE are in poor conditions and need renovation. Smaller settlements need to meet Water Framework Directive objectives.
Municipal Solid Waste	Average amount of waste generated per yr is 196kg per capita (less in rural areas and smaller towns than cities) Forecasted waste generation for 2005 was 257-316kg/cap/yr Municipal solid waste in OECD countries forecasted to increase to 640kg per capita per year by 2020.

Malta	
Water Supply	Water shortage common due to local hydro-climatological conditions, long dry season etc. Malta is considered highly water-stressed. No rivers and low average rainfall. Total drinking water demand in households (Aug 04-Jul 05) was 31.4m m^3/yr Tourism increases pressure on water resources and affects seasonal variation (results in frequent sewage overflows following storms). Water demand per capita is 193l/inh/day –likely to remain stable as expected demand increases will be cancelled out by leakage reduction. 2005 – water demand was reduced by > 2.5m m^3 (10% of total system demand) due to water conservation programmes, leakage reduction and water control programme.
Wastewater Treatment	Overall quantity of waste rising rapidly.
Municipal Solid Waste	1996-2004 – approximate 50% increase in waste arriving at facilities due mainly to increases in quantity of construction and demolition waste and municipal solid waste. Increase in quantity of construction + demolition waste likely to be due to excavations for major development projects Municipal solid waste per capita generated in Malta is relatively high (€625kg per capita – well above EU-25 average of 534); rising at average yearly rate of 3%. Quantity of Municipal solid waste generated increased by 53% from 1996-2004 due most likely to increase in use of packaging; 37% of municipal solid waste is packaging – due to economic growth and consumption patterns. Ongoing development of waste recovery and disposal facilities required to ensure compliance with agreed deadlines. Still need for expansion of wastewater infrastructure and need to build wastewater treatment plants.

Poland	
Water Supply	Unit water consumption from HH is 134l/inh/day. Limited capacity for further decrease of unit household consumption. Total economy demand for drinking water per capita is lower than EU – expected to rise. Consumption of water considerably lower than 1990s due mainly to change in size/structure of industries, introduction of water meters for individual consumers and enforcing water charges. Current unit household water demand fluctuates between 110 and 180 l inh/day. Most households expected to achieve level of 110-120 l/inh/day over programming period. Further decrease unlikely as already very close to minimum water demand for human needs. Slight increase anticipated.
Wastewater Treatment	Wastewater treatment plants = highest priority in terms of scale of financial needs. Attention needed for smaller agglomerations. Municipal wastewater emission decreasing for last decade by 30% (since 1990 by 44%). Emission of untreated wastewater decreased by 72% (since 1990 by 85%). 190m m^3 per year still emitted without treatment; more than 75% from municipal sewage systems.
Municipal Solid Waste	Unit municipal solid waste generation is 256kg/yr/cap. Slight decrease in population expected over programming period (0.8% between 2007-13). Urban population will decrease by 1.9%; rural population likely to increase by 1%. No of households likely to grow by 5%; decrease in average number of persons per household. According to National Waste Management Plan – general amount of hazardous municipal waste will become stable at 117,000 tonnes/yr, and its share will decrease. Total amount of municipal solid waste will increase by 3 – 3.2% yearly.

Portugal	
Water Supply	Demand increase most likely from street washing and garden sprinkling - 40% of 2007-13 investment aimed at rehabilitation of existing infrastructure. - 9% of total investment aimed at improvement of water quality through construction/rehabilitation of water treatment plants. Forecasted demand increase in water consumption not seen as problematic - population growth also very low – likely new infrastructure is compliance-based
Wastewater Treatment	Expected increase in per capita water consumption and future increase in number of connections to sewage system likely to drive increase in water demand and domestic wastewater. Amount of wastewater requiring treatment also likely to increase. National Water Plan indicates per capita demand for wastewater treatment of 240 l/inh/day in 2006 and 2012 (above worse-case scenario of 230 l/inh/day). Investment (2007-13) is in upgrading existing Urban Wastewater Treatment Plants to meet Directive requirements. 26% of 2007-13 investment aimed at rehabilitation of existing infrastructure. Less than for water supply because wastewater network is more recent 13% of total wastewater treatment investment aimed at construction/rehabilitation of wastewater treatment plants wastewater treatment investment higher priority than water supply investment because of existing targets failing to meet connection and treatment rates and due to several agglomerations being non-Urban Waste Water Treatment Directive compliant
Municipal Solid Waste	Acquis compliance is significant part of municipal solid waste target definition. Landfill deposition still method of choice for final disposal – inappropriate current infra to fulfil existing deposition, recycling, recovery targets. Investment required to redress inadequate meeting of targets established by Landfill Directive (some expected from increase in user charges)

Romania	
Water Supply	Demand not met by supply- some small cities lack 24 hour drinking water supply, due to: water deficit at certain periods, lack of necessary infra, loss of large quantities of water, non-connection of the population to the centralized water intake system Decrease in consumption has taken place from approximately 300-400l/inh/day to 100-150l/inh/day
Wastewater Treatment	Modernisation and upgrading of existing wastewater sewage systems for cities with 20000-50000 inhabitants necessary All 340 existing Sewage Treatment Plants require expansion/rehabilitation New infrastructure likely to connect rural areas to a water infrastructure Implementation of sewage systems and wastewater treatment to cities with water intake systems New Sewage Treatment Plants should be constructed to cover all agglomerations in order to cover Urban Waste Water Treatment Directive. Weak infrastructure mainly due inefficient treatment technology, incomplete sludge treatment, inadequate maintenance of installations. General poor status of wastewater sewage systems and demands of European Framework Directive both drivers behind investment. Projects very much acquis-driven and likely to be continuation of previous programming period.
Municipal Solid Waste	Municipal solid waste generation remained fairly stable since 1993, but 40% of household waste is not recovered but disposed into landfills together with urban waste. National Waste Management Plan estimates average increase of 0.8%/year of municipal solid waste quantity generated by 2013. Construction and demolition waste expected to increase with further economic development of the country.

Slovakia	
Water Supply	Current household water demand is slightly above 100l/cap/day; lower than EU average. Demand met by sources and supply systems. Total household drinking water demand 165.746m m^3; forecast to rise to 214m m^3 per yr in 2013 Specific water consumption is 101.1 l/inh/day (2004) Population likely to stagnate; no of households will slowly grow but no significant increase expected. Price of drinking water has been main factor in limiting water demand e.g. tariffs have led to increase in use of rainwater
Wastewater Treatment	No of Sewage Treatment Plants in compliance with Urban Waste Water Treatment Directive standard is 102; 95 non-compliant (2002) Share of population/households connected to Sewage Treatment Plants – 97.3% of water discharged to network Estimated 25% of existing sewers are in poor structural status, causing operational and environmental problems. 95 Sewage Treatment Plants were not fully compliant with Urban Waste Water Treatment Directive in 2002. Obsolete plants have to be replaced; quality of old plants frequently bad and quality of operation sometimes bad. Sewage Treatment Plants to be upgraded in sensitive areas to comply with Urban Waste Water Treatment Directive Missing Sewage Treatment Plants still to be built Most Combined Sewer Overflows assumed to be non-compliant. Insufficient attention given to Combined Sewer Overflows in past; significant investment needed for them
Municipal Solid Waste	Declining trend in generation of waste caused by reduction in quantity of special waste. Offset slightly by small increase in household waste. Total waste generated 294kg/cap/yr (2004). Likely to drop to 260-280kg/cap/yr Expected that municipal solid waste production will be proportional to changes in population Changing consumption patterns not likely to influence significantly unit waste generation volumes; higher income can lead to higher consumption but could also result in decrease of consumption as higher income groups tend to be more educated on environmental matters

Slovenia	
Water Supply	Population has been constant and may decrease from 2014 onwards Standard water consumption per inhabitant is 110-120l/inh/day and likely to remain at same level Reduction in daily water demand from households expected up to 120l/inh/day, as result of installation of new in-house technologies. Daily household water consumption = 146l/day; household drinking water consumption constantly increasing. Last 10 years has seen 20-40% drop in water supplied due to high ecological senses, higher water prices, low water consumption in industry, more efficient use of water in agriculture, water pollution tax.
Wastewater Treatment	Sewage pipes not watertight – results in groundwater pollution. Sewage systems insufficiently flood-protected, leading to inflow of wastewater from hinterland areas. Sludge disposal likely to become increasing problem. 25% of all sewage treatment plants are still non-compliant Collecting, discharging and treatment of urban wastewater – intensive implementation pursued to comply with Urban Waste Water Treatment Directive
Municipal Solid Waste	Expected growth rate of waste in Slovenia is 1.7%/year by the end of 2008 and onward (end of 2015). Total amount of waste likely to stabilise until 2015 Total amount of separate collected fraction is increasing Total amount of hazardous waste is increasing 450kg/inh of municipal solid waste produced per year. Amount of waste per inhabitant is decreasing. Existing landfill available capacity is very scarce. Landfill deposition still method of choice for final disposal – inappropriate current infrastructure to fulfil existing deposition, recycling, recovery targets. No municipal solid waste incineration facility.

Spain	
Water Supply	Household water demand relatively stable over the past few years (181 – 190 m^3 per household per year). Increase in water consumption of 2.4% during 2004 – reaching 171 litres per inhabitant per day (compared to 163 in 2003). Number of households is expected to continue to increase. Household and tourism demand expected to increase from 3078 million to 3602 million m^3 per year – an overall increase of 17% (all regions to see an increase except Asturias)
Wastewater Treatment	Population projected to rise from 41 million (2002) to 46 million (2013). Investment focus is on full compliance with the Waste Water Treatment Directive. 11% of 73 million population equivalents is non-compliant
Municipal Solid Waste	Average growth in per capita municipal solid waste generation between 1995-2004 has been 3.7% Major drivers of increasing waste volumes have been consumption patterns, increasing quantities of materials demanded by consumers, excessive use of packaging by manufacturers, cultural lack of awareness in reuse and separation pf materials at home, combined with lack of incentives and economic instruments for producers. Tourism also responsible for generation of average waste per capita above Spanish average.

Table 4: Overview of Physical Requirements for RES Investment

RES	Targets	Comment
Bulgaria	Targets: Wind energy – Amount of produced energy for period 2005-15 is twice 0.120 GWh (2004) Liquid biofuels – 2010 production – planned quantity = 300 GWh comprising bioethanol, biodiesel, biogas Indicative target of RES as percentage of electricity production = 11%	Final energy consumption (FEC) forecasted to inc by over 4%, with forecasted GDP growth of 5-5.3%/y for period 2004-15 (see p89) 1997-2004: mass of wood for heating inc 3.4 times while HH consumption of all other fuels decreased. % of wooden waste utilization likely to inc; price of €20 per m3 unchanged over last few yrs. Biomass and solar have greatest RES potential.
Cyprus	Aim: to double RES contribution from 4.5% in 1995 to 9% by 2010 and to inc RES contribution to electricity production from present zero-level to 6% by 2010. Aim to have following contributions to electricity generation: - approx 4.5% from wind - approx 1.5% from biomass -small contributions from other sources	Good Practice e.g. targets + support mechanisms for renewables investment incentives, guaranteed purchase, price guarantee, VAT exemption, support through electricity consumption Other RES issues: water scarcity is barrier for biomass & biofuels; motivation to use RE is not environmental but economic. Need to improve public awareness for using RE. Need for more RES and energy efficiency driven by CYP high CO2 emissions and desire to follow SD strategy. CYP has no quantified reduction targets acc to Kyoto but has committed itself to CO2 reduction.
Estonia	Targets: -Proportion of renewable electricity to increase to 5.1% of gross consumption by 2010. -by 2020 electricity produced in CHP prod stations forms 20% of gross consumption -Ensure power network is completely modernised in approx every 30 yrs -until 2010, maintain volume of primary energy consumption at level of year 2003	Share of RE is only 0.3% due to huge and cheap supply of electricity from oil shale. Utilization of RE fuels not drastically changed in 1999-2004 period. Share of energy production based on RE resources forecasted + presented in Development plan for electricity sector set to rise from 1.0% in 2005 to 4.5% in 2015 (wind) and 0.2% (2005) to 3% (2015) for biofuel. Cross-consumption of electricity increasing 2-3.5% per yr due to overall rise in living standards and econ growth RES used mainly for heating and end-use; non-existent share in electricity production. Biomass of plant origin most widely used. Energy policy heavily fossil-fuel oriented; lack of support for alternative sources in electricity production.
Greece	GR fully subscribed to indicative target of 20.1% renewable share of total electricity consumption in the yr 2010 (contribution in 2003 was 9.6%) Electricity consumption in 2005 estimated to reach 57.8 TWh. Share of total RES in this	2010 target most likely to fall short by 2 percentage units. Wind energy, solid biomass and PV sectors have had significant growth potential

	figure is estimated at 11% (6.36 TWh)	
Hungary	RES in the total use of primary energy resources should be increased to 6% by 2010 (present proportion in 3.6%); obligation to increase use of biofuels in transport to 4% by 2010	Energy Conservation and Energy Efficiency Improvement Action Program targets: -reduce energy intensity by 3.5% per yr, assuming an annual growth of GDP of 5% and growth rate of energy consumption of 1.5% per yr -save 75PJ per yr (1.8Mtoe) pf primary energy Inc RE production from 28 PJ to 50 PJ per yr (1.2 Mtoe per yr)
Latvia	49.3% of total consumed energy has to be produced from RES by 2010 (national statement for development of the energy sector, Ministry of Economics): -total capacity of cogeneration power plants operated with biomass + biogas should be 70-80 MWel -wind energy capacity should reach 135 MW -reasonable development of small hydropower stations	Public attitude towards hydropower stations/windmills usually neutral/negative due to negative impact on hydrological regime of small rivers and impact of windmills on landscape and birds LV RE Strategy 2006-2016 still under development.
Lithuania	National indicative target for RES-E by 2010 is 7%. Energy production is now currently only 3.7%. Objectives of National Energy Strategy include striving for a share of RES of up to 12% in the total primary energy balance by 2010.	Most viable energy sources: wind and hydropower; however wind energy potential limited. Most realistic energy production method is biofuel – burning of wooden waste in thermal power plants RES in primary energy supply is to form 12% b Biggest energy potential: by 2010 and 20% by 2025. No of barriers to RE national objectives – environmentalist opposition to hydropower plants; some public opposition to wind power generation (noise, landscape)
Malta	During accession process: 5% of electricity to be produced from RES by 2010. Latest national target for consumption of electricity in terms of total consumption: 0.5-1% for wind and solar sources and 3% from waste by 2010	Potential for electricity produced from RES is much lower than expected. National indicative target for electricity generated from RES by 2010 is expected to be 1.37% of gross electricity consumption if land-based farm constructed; 0.31% without wind farm.
Poland	*Development Strategy of RE Sector (2000)* set objective to inc share of RE in PL's primary energy balance to 7.5% in 2010 and 14% in 2020. *Power Purchase Obligation Ordinance of the Minister of Economy and Labour* stipulated indicative targets for green electricity up to 2014 (inc from 3.1% in 2005 to 9% in 2010) Annual invt in RES in PL is €270m but total	Liquid biofuels production driven by directive 2003/30/EC and expected influence on agricultural production and reduction of high unemployment rates in agriculture. Biomass energy is most promising and most important RES. Co-firing has biggest development potential; official statements claim 4% of electricity production should be covered by co-firing in 2010.

	capital costs for new RES installations between 1999-2010 estimated at €3.6 - 4.4bn – suggests 7.5% indicative target will not be easily achieved and is too ambitious (although there is sufficient potential) Indicative target for RES as share of electricity consumption (3.1%) in 2005 has not been achieved.	
Portugal	Indicative target of Directive 2001/77/CE is 39% of gross national consumption of electricity production from RES by 2010. National targets for electricity production from RES established in RCM 63/2003	New legal framework for energy efficiency in buildings likely to drive RES growth (esp through installation of solar panels)
Romania	Main ROM targets include: % of RE has to reach 12% of national energy production – to be realised through inc of hydro-electrical potential and extra power of min 20% from the installed power.	Hydro and biomass are possible RES. Wind and geothermal also have some potential.
Slovakia	National indicative target of gross electricity consumption from RES by 2010 set at 19% (24% by 2020, 27% by 2030) Present share of renewable electricity remains too low to achieve this.	Biggest energy potential: biomass hydro power, geothermal. Only current RES is hydro power. No definite policy targets and lack of policy framework; RES not considered high public priority.
Slovenia	2010 Targets set by NEP (National Energy Plan): -inc efficiency of final energy use by 2010 compared to 2004: in industry, services and transport (by 10%), in buildings (by 10%), in public sector (by 15%). -double share of electricity from co-generation from 800 GWh in 2000 to 1,600 GWh in 2010 -inc share of electricity from RES from 32% in 2002 to 33.6% in 2010 Trend of Inc usage of end energy	SI expected to meet target of providing 12% of its energy from RES by 2010. High use of wood biomass and wind power.
Spain		

ANNEX 3: APPROACH TO THE MULTI-CRITERIA ASSESSMENT (MCA) AND DEFAULT SCORES

Priority Assessment Methods

The approach to priority assessment distinguishes between priorities within a particular field, and across fields. In both cases the judgement of the evaluator is required based on the review of the scale and types of needs, the views of stakeholders and the stated MS and EU objectives. The assessment of priorities within fields is expressed as a simple ranking, and provides an indicative view, in each MS, of the balance of investment that should be achieved.

The assessment of priorities across fields is more difficult, and needs to take into account the relative contribution of investment in the different fields to policy objectives (or the framework factors). Two complementary approaches have been used to inform a considered judgement by the evaluator, both based on expressing the strategic policy objectives as criteria against which investment choices are made.

Indicative Point Allocation

This approach asks the evaluator to consider in each of the fields the types of regional and economic development rationales and benefits, as described in Section 5.2, of the required investments, and to reflect this in the allocation of 100 points across the fields.

The guidance to evaluators asked them to consider a table similar to the one below (Table 1), which references potential investment rationales in each field – with an initial allocation as a possible guide, but which evaluators were free to revise according to national circumstances. The suggestion was that scoring should take place at the start of the assessment, and then be revised after the more detailed consideration of specific criteria below.

Table 1: Priority Assessment: Indicative Points Allocation

Field of Investment	Main Investment Rationales	Indicative Points Allocation	
Water Supply	Response to increasing water demands, alleviation of migratory forces and social costs, benefits to health	35-55	45
Waste Water Treatment	Response to health effects and essential environmental quality improvements. Responses related to increased water use	10-20	15
MSW	Response to improve management of material resources as a result of increased use and to avoid health effects	10-20	15
RES (including energy efficiency)	Response to wider climate change effects and to the need for improved energy efficiency	10-15	13
Natural Hazards	Response to EU wide threats	5-15	10

Other: Strategic Planning	Response to ensure adequate strategic management and planning	<5	2
All Fields		100	100

Multi-Criteria Assessment

The strategic objectives and framework factors were reflected more formally as the basis of a series of specified criteria, against which to judge the contribution of particular types of investment.

The approach has been intended either as a stand alone approach or as an analysis to inform the indicative points allocation.

The approach requires:

- The definition of criteria
- The definition of a scoring system for each of the different types of investment
- The adoption of an approach to the weighting of criteria and aggregation of subsequent scores.

We briefly describe the approach below:

Assessment Criteria

Eight criteria were identified (Box 1) to reflect the strategic objectives and driving forces.

Box 1: Criteria for Scoring the Potential Impact of Different Types of Investment

Contribution of investment to:

9. securing compliance with the acquis (e.g. because of replacement of non-compliant treatment plant)
10. avoiding economic and social damages (e.g. because of reduced natural risks of flooding, fire or because of improved environmental quality, or because of increased security of supply)
11. encouraging new technology and market development (e.g. priming the development of local PV or passive solar market) with the potential to replace imports or generate exports
12. generating employment opportunities in line with national and regional employment goals (e.g. for employment in lagging regions, or in particular cities or in rural areas - because of improvements in environmental quality in particular areas or because of the location of utilities and construction firms)
13. providing employment and training opportunities for low skilled workers or 'hard to reach' groups (e.g. ethnic minorities, women, older workers)

14. promoting cross-border co-operation (e.g. management of cross-border flooding)

15. delivering national and regional environmental strategies and plans which are well integrated with wider development strategies and plans (e.g. where environmental priorities are well linked to economic or social objectives)

16. promoting more cost-effective programme design and delivery (e.g. encouraging the use of public-private partnerships, or more effective procurement, or through use of well developed technologies which take account of subsequent maintenance arrangements).

Scoring System

The scoring system was based on the evaluator's judgement, supported by detailed guidance. In this approach the evaluator has considered the contribution of 1 million euro invested in each of the different types of investment against each criterion, on the following scale:

- Very Strong Contribution: Score 10
- Strong Contribution: Score 7
- Limited Contribution: Score 3
- Negligible Contribution: Score 0

To assist the national evaluators, a default scoring of the different types of investment against each of the criteria has been developed to provide guidance. The default scoring, and the supporting rationales for the scoring, is set out in the Guidance Report.

Weighting and Aggregation

The overall weighting of investment by field, has been calculated by multiplying the score (10, 7, 3, 0) by the weight given to the criterion, summing the score for each type of investment and taking the average score for each field. The weighting of criteria was based on allocating 80 points across the 8 criteria. Two sets of weightings have been used in the assessment – one to reflect the direct requirement to secure compliance with the acquis, a second to reflect a broader interest in contributing to regional development benefits.

These two sets of weightings are summarised in Table 2.

Table 2: Weightings Applied to the Assessment Criteria

Criteria	Compliance with the Acquis	Regional Development
Securing Compliance	60	10
Avoiding Economic & Social Damage	3	15
Encouraging New Technology & Markets	3	15
Generating Employment Opportunities	3	15
Generating Opportunities for Groups	3	10

Cross-Border Co-operation	3	5
Integrating Environmental Strategies	3	5
Improving Project Cost-effectiveness	2	5
Total Points	80	80

The overall weighting has then been applied to the identified financial requirements by field to adjust the balance of requirements by field to reflect the priority assessment. Since alternative weightings have been used, the analysis generates a range in the proposed share of any national financial allocation for each of the five fields.

Table 3: Default MCA Results

		Contribution of each type of investment to each criterion							
Field	Type of investment	1	2	3	4	5	6	7	8
Water Supply	Reservoirs	3	7	3	3	3	7	7	10
	Drinking water production plant	10	7	3	3	3	0	7	10
	Transport (inc leakage) – long	10	7	3	3	3	7	7	0
	Transport (inc leakage) – local	10	7	7	3	3	0	7	0
	Metering	0	3	7	3	3	0	7	7
Waste Water Treatment	New STPs	7	7	3	3	3	3	7	3
	Renovation / upgrade STPs	7	10	7	7	3	0	7	3
	New Sewerage	7	7	3	3	3	3	7	3
	Renovation / upgrade sewerage	3	7	3	3	3	3	7	3
	Sewage pumping stations	7	7	3	3	0	0	7	3
	CSO upgrading	3	7	3	3	0	0	7	3
	Sludge treatment	7	7	7	3	0	0	7	3
	Sludge disposal	7	7	0	3	0	0	7	3
MSW	Waste collection	7	7	7	7	7	0	7	7
	Waste sorting	3	3	7	7	7	0	3	7
	Recovery	7	3	7	3	3	0	3	7
	Disposal - new disposal facilities	10	7	7	3	0	0	7	7
	Disposal - remediation of existing	7	10	3	3	3	0	3	3

		Contribution of each type of investment to each criterion							
Field	Type of investment	1	2	3	4	5	6	7	8
RES	Wind	3	7	7	3	3	0	7	7
	Hydro (>15 MW)	3	3	3	3	3	7	3	7
	Hydro (<15 MW)	3	7	7	7	3	3	7	3
	Solid biomass	3	7	7	7	3	3	7	7
	Liquid biofuels	3	7	7	3	3	3	7	7
	Geothermal	3	7	3	3	3	0	7	3
	Solar thermal	3	7	7	0	3	0	7	7
	Solar electric (PV)	3	7	10	0	3	0	7	3
Natural Hazards	Drought	3	10	3	3	3	7	7	10
	Fire	0	10	3	3	3	7	7	10
	Flood	7	10	3	7	3	10	7	10
	Heat wave	0	10	3	3	3	3	7	7
	Storm	0	7	3	3	3	3	7	7

Scoring:

- Very Strong Contribution: Score 10
- Strong Contribution: Score 7
- Limited Contribution: Score 3
- Negligible Contribution: Score 0

ANNEX 4: FIELD PRIORITIES IN EACH OF THE FIELDS

Water supply

	Reservoirs	Drinking water production plant	Transport (inc leakage) - long	Transport (inc leakage) - local	Metering	Other
Bulgaria	2	4	3	1	5	
Cyprus	0	0	0	0	1	
Greece	6	7	1	2	-	Recharging and improving quality of groundwater source: 3 Technical capacity building of river basin administrative authorities: 4 Monitoring (including testing) of drinking water resources quality: 5
Hungary	5	1	2	3	6	Monitoring: 4
Malta	1	3	2	2	3	Monitoring: 1 Illegal abstraction prevention: 1
Poland	4	1	2	3	5	
Portugal	4	3	2	1	5	
Romania	-	3	2	1	4	
Slovenia	2	1	3	4	5	
Spain	5	2	3	1	4	

Waste water treatment

	New STPs	Renovation / upgrade STPs	New Sewerage	Renovation / upgrade sewerage	Sewage pumping stations	CSO upgrading	Sludge treatment	Sludge disposal	Other
Bulgaria	2	3	1	4	1	7	5	6	
Cyprus	2	-	1	-	1	3	2	2	
Greece	1	2	1	2	-	-	3	4	
Hungary	1	1	1	4	5	6	2	3	
Malta	1	2	3	3	4	4	1	1	Metering: 2
Poland	1	3	2	4	7	8	5	6	
Portugal	1	2	3	4	5	8	6	7	
Romania	1	3	2	4	2	7	5	6	
Slovenia	1	5	2	6	7	8	4	3	
Spain	1	2	5	6	4	7	3	8	

Municipal solid waste

	Waste collection	Waste sorting	Recovery	Disposal - new disposal facilities	Disposal - remediation of existing	Other
Bulgaria	4	3	5	1	2	
Cyprus	3	2	2	1	1	
Greece	1	4	Biological treatment plants: 3 Recycling yards: 5	2	2	Closure and remediation of incontrolled (illegal) disposal sites: 1
Hungary	3	4	1	5	2	
Malta	2	2	1	3	1	Illegal dump prevention: 1
Poland	5	3	4	1	2	
Portugal	4	3	1	2	-	Publicity Campaigns: 5
Romania	3	4	5	1	2	
Slovenia	3	4	5	1	2	Incineration facility construction: 6
Spain	6	3	1	5	4	Waste prevention and minimlisation: 2 Improve quality and quantity data/statistics on waste: 1

Renewable energy

	Wind	Hydro (>15 MW)	Hydro (<15 MW)	Solid biomass	Liquid biofuels	Geothermal	Solar thermal	Solar electric (PV)	Other
Bulgaria	6	8	7	1	2	3	4	5	Biogass: 9 (not discussed)
Cyprus	1	4	4	2	3	4	3	1	
Greece	1	2	5	3	4	7	8	6	
Hungary	6	7	5	1	1	3	4	8	Biogass: 2
Malta	1	-	-	3	2	-	2	1	
Poland	2	4	5	1	-	3	6	7	
Portugal	1	5	2	3	4	9	6	8	Waves/Tides: 7
Romania	5	2	3	1	9	4	6	7	Biogass: 8 (not discussed)
Slovenia	3	6	7	1	9	4	8	5	Biogass: 2

Natural risk management

	Drought	Fire	Flood	Heat wave	Storm	Other
Bulgaria	2	3	1	-	-	
Cyprus	2	2	-	-	-	Earthquake: 4
Greece	4	5	Administrative: 2 Physical Infrastructure: 3	5	6	Risk assessment: 1
Hungary	2	-	1	-	-	
Malta	-	-	1	-	1	
Poland	2	3	1			Landslides & coastal erosion: 4
Portugal	3	1	4	-	-	Erosion: 2
Romania	2	4	1	-	-	Earthquake: 3
Slovenia	1	2	3	-	-	Landslides,earthquakes: 4
Spain	1	2	4	3	5	

ANNEX 5: OVERVIEW OF THE APPLICATION OF PUBLIC-PRIVATE PARTNERSHIPS

The following table summarises the experiences of individual MS with the introduction of public-private partnership provisions and their contribution to-date.

In summary PPPs are:

- an evolving concept
- a partnership between the public sector and the private sector for the purpose of delivering a project or a service traditionally provided by the public sector.
- based on the idea that the individual interest and mission of different partners, from the public and from the private sector, can be brought together for the common benefit
- a division of tasks and effective cooperation: the private partners take the responsibility for an effective achievement of their own mission and the public partners take the responsibility for the respect of objectives of the general interest. By allowing each sector to do what it does best, public services and infrastructure can be provided in the most economically efficient manner.

PPP are characterised by

- long term of the contract
- funding of the project completely/partly by the private partner
- risk transfer from the public authority to the private partner
- transfer of important tasks from the public authority to the private partner

Advantages of PPP

- Cost advantages because of the specific knowledge and experience of the private partner
- Synergies from using the private partner's company structure
- Cost reductions and earlier refinancing due to reduced construction time
- Lack of financial and/or personnel resources in the public authority leads to longer construction times and higher costs
- Synergies resulting from water supply and waste water disposal from one hand
- Optimisation of total costs because of the consideration of operational needs already during the construction phase

- Low total costs as a result of design, construction and operation from one hand

Disadvantages of PPP

- Because of the environmental importance water supply and WWT it is an essential public authority responsibility. PPP constitutes an intervention in the authorities' abilities to directly control this sector.
- Public authorities abandon their development possibilities which might result in a monopoly situation that weakens the authorities' position.
- PPP often entails rationalisation measures and reductions in the work force that might cause higher social benefits to be provided by the authority.
- If the private partner goes bankrupt the public entity has to take over the assets without having financial, staff or technical resources.
- PPP might give less consideration to ecological aspects.
- Since the public authority remains liable for water supply and waste water disposal, the administrative and monitoring costs might increase.

Summary Table of MS Experience

Member State	MS Policy	WS	WWT	MSW
Bulgaria	Ministry of Finance created task force to promote PPP	Low private involvement due to inadequate cash generated through operations and lack of clarity in asset ownership in regional WSSC. Despite normally promoting PPPs in the water sector, World Bank sees few possibilities for MS due to drawbacks mentioned above.		PPP encouraged but MS has had less substantial role for PPP in waste sector than other E European MS.
Cyprus	Little development in PPP; no evident use of PPP in environmental infrastructure – some private investment in energy	PPP promoted but not yet applied; water board still in state ownership.	Interest expressed for some infrastructure development but no investment as yet, with little scope for PPP because future needs are largely related to collection systems for rural communities.	1999. Household Recycling Partnership focused on collection of paper, glass, aluminium and plastic for recycling – pilot project intended to be model project for PPPs. Further development still to occur
Czech Republic	Govt policy is to support introduction and application of PPP anywhere that brings advantage to public sector in provision of public services and infrastructure. New Act setting the rules for PPP was signed by Czech President in	Private investment is not developed. Majority of infrastructure owned by municipalities either directly or through joint stock operation companies.	WWT sector not suited to PPP construction; few successful examples.	Some potential for PPP particularly in landfill activities. Private sector waste management is well-developed with competition between companies for the supply of their services to municipalities. PPP is a common practice in this field.

Member State	MS Policy	WS	WWT	MSW
	April 2006. Focus of Act mainly on transport, education and health. Environment sector not considered to be attractive for PPP due to limited possibility of increasing water tariffs to an economic level. Public acceptance of PPP low as basic human needs seen as inappropriate source of revenue for private companies.			
Greece	Legislative framework for PPP was established in Sept 2005 – institutional prerequisite to proceed with and promote PPPs. Expected to have a structural impact in Greek public sector investment policy.	General awareness of PPP as a broad policy objective for all sectors of the economy but no explicit strategy as to its implementation in water sector.		Ministry of Environment, Planning and Public Works (YPEHODE) has proposed that PPP schemes should be specifically explored and identified by operators. Recommended that option of PPPs be an explicit strategic direction in the new National Strategic Reference Framework. PPP schemes seen as critical to cover the investment requirement in MSW sector, esp w r t recovery/treatment of biodegradable/organic waste
Hungary	No separate law for PPP; no political decision in relation to applying PPP to any area of environmental protection. Widespread use of PPP is not expected.	Very limited interest in PPP. 8 examples of PPPs in the water sector. Municipalities have experienced the use of BOT schemes in WWT. The results were mixtures of success and failure. In general terms municipalities of bigger size, more stable sources of revenue and with highly skilled and knowledgeable public sector procurement officers in contract negotiation and management have carried out better deals than smaller municipalities lacking such skills.		Private sector has investments in PPP construction but PPP not yet widespread.
Latvia		Private investment currently used for individual connections to the centralised water and sewerage systems. Other forms of PPP could be considered at later date.		Use of private companies for collection, transportation and recycling of HH solid waste by municipalities becoming more common. No proof of PPP structures reducing public sector infrastructure investment need.
Lithuania		No PPPs envisaged in the water sector.		Forms of PPP could be considered at later date e.g. privatisation of municipal waste utilities and waste enterprises, although no evidence this will reduce public sector costs.
Malta	Little development of PPP so far. Govt motivated to pursue more collaboration and burden sharing with private sector inc the environment sector. Separate unit on PPP	No developments		Some potential for PPP being investigated in the waste sector e.g. separate waste collection

Member State	MS Policy	WS	WWT	MSW
	in the Ministry of Finance currently exists.			
Poland	Regulation for PPP was implemented in a new Act in July 2005, creating framework for official PPP ventures, to provide infrastructure. Main interest is in the water sector. Too early to tell whether PPP will provide capacity to deliver programme and absorb CF/SF.	Regulations allow local authorities to develop PPPs. The proposal is not popular with very few individual cases where private operators provide servcies		Most waste collecting companies are municipal with some private investment. Due to recent development of private companies dealing with waste. Formal PPP is a possible future option in this sector but too early to assess potential role of PPP
Portugal	PPPs have become useful tools for the government to develop public infrastructure. At the local level, PPPs have been used by Portuguese Municipalities for the provision of water supply, and waste treatment. The decision making is entirely carried out by Municipalities who have full freedom by Law toenter into PPP agreement with a private partner, as long as no Central Government contribution is required. The only restriction is on direct borrowing or guaranteeing loans on behalf of the private partner. These are regulated by rules provided in the Budget Law which issues a yearly ceiling on maximum borrowing as a function of the municipality previous year budget and the expected revenue streams for that year.			
Romania		Sectoral Operational Programme views PPP as a solution to maintaining affordability of investment in the WS system, but PPP is considered to be unlikely to contribute significantly	PPP still debated in MS, but not seen as having a significant potential to meet the need for WWT investment	
Spain		In 2000, private management of water supply (and sanitation) accounted for 36% of the served population, public-private management accounted for 11%, whilst public management accounted for 52%. Private sector involvement is organized in the framework of concessions (legally,		

Member State	MS Policy	WS	WWT	MSW
		water is a public resource, and the relevant public authority always retains property). 85% of the private sector market share is controlled by two multinational companies (AGBAR / Suez-Lyonnais and FCC / Vivendi). There is no conclusive evidence that cost recovery is optimized by the growing private involvement in the supply of water. Indeed there are examples of cost-efficient management in both the public sector and the private sector. Existing research concludes that cost-efficient management depends mainly on management capacities (for public sector operation) and oversight mechanisms (in the case of private sector operation).		

Source: National Evaluation Reports

Overview

Some governments have established legislative frameworks/laws in order to promote greater application of PPP (e.g. GR and PL both created Acts/frameworks for existence of official PPP ventures in 2005) and others have created specific units/task forces on PPP (e.g. BUL and MAL both have separate units in Ministry of Finance). There appears to be a general policy awareness of PPP as a potential aid to the public sector in the provision of services and infrastructure but despite this awareness of PPP as a broad stated policy objective, there is little MS development of PPP and a lack of explicit strategy in terms of its implementation in the environmental sector across most of the MS. This lack of specific policy development tends to reflect an appreciation that in the fields of environmental protection the opportunity for major private sector participation is limited. Experience in Spain, which has perhaps the most extensive knowledge of PPP, has failed to provide a compelling case for the greater use of PPP in the environmental sector.

In the case of water supply inadequate cash generation through operation and the state ownership of infrastructure is seen as a constraint on private sector participation. One example is the use of private investment to provide individual connections to the centralised water and sewerage systems in Latvia. Other forms of PPP mentioned include possibilities in the provision of drinking water production plants but there is little development to-date.

In the case of waste water treatment the general assessment is that the high investment costs and limited returns make the sector unsuited to PPPs; with additional difficulties and costs for private investors posed by the decentralised operation through municipalities, and a focus of investment in collection systems, increasingly in rural areas.

In the case of municipal solid waste, opportunities for a more substantial role for PPP is recognised, especially in the provision of contracted services for landfill and other disposal capacity. In the Czech Republic for example, the private sector investment in waste management services is well-developed with competition between companies to

supply their services to municipalities. Poland has also seen the recent development of private companies dealing with waste although legislation on PPP is still very new. In Greece the development of PPP is seen as important to assist in the provision of MSW services, especially in recovery / treatment of organic / biodegradable waste. In Cyprus the use of Household Recycling Partnerships (for the collection of paper, glass, plastics) is considered to provide a possible model for PPPs in the recycling sector. PPPs are also being encouraged in Bulgaria and Estonia for the provision of MSW services but with little progress at the current time.

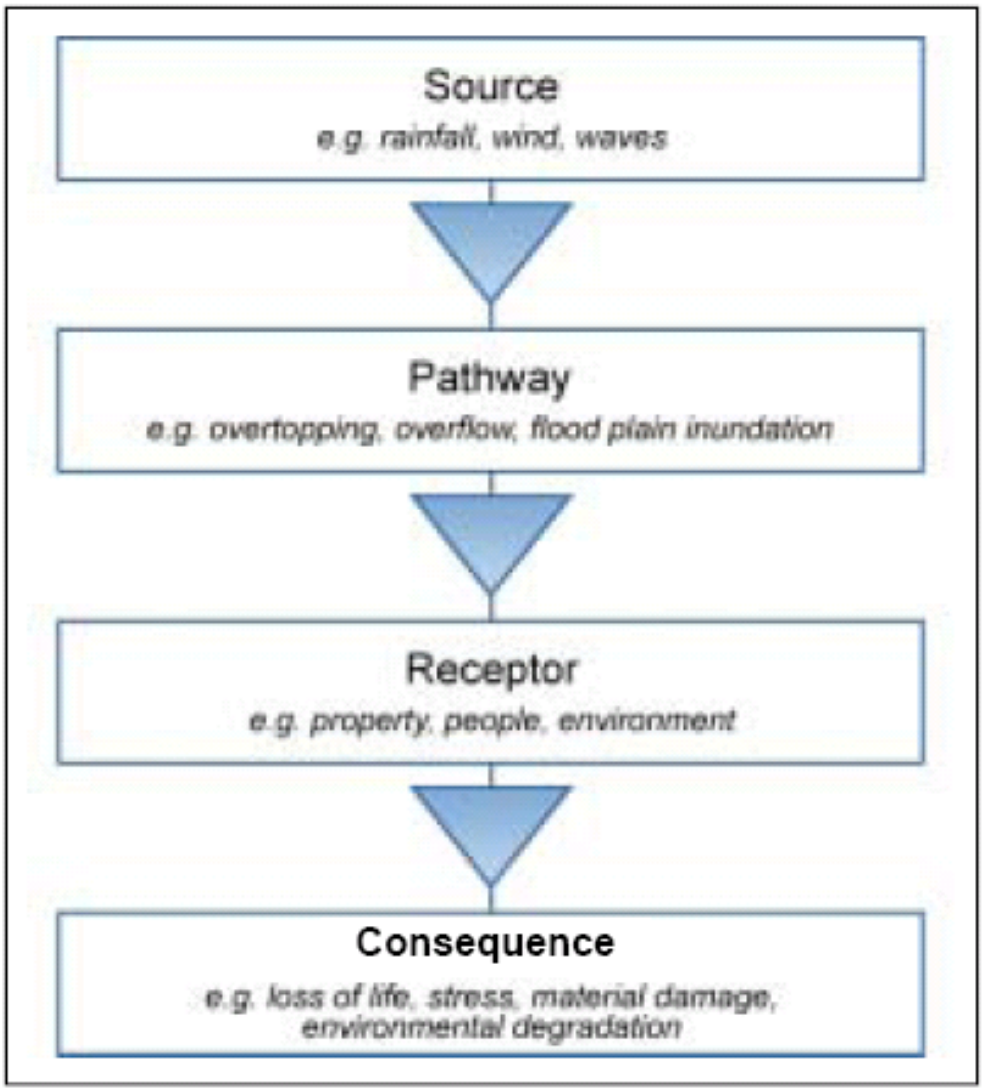
In the case of RES the use of guaranteed prices is acting as a catalyst for private sector investment, at least in the case of the more developed technologies. The direct investment of private sector operators means that the role for PPP is largely redundant.

In the case of NRM, the investment is made largely by the public sector. In the case of flood risks the general lack of private sector activity means that there is little scope to extend activity into flood defence. In the case of forest fires, the largely public sector ownership of forested areas, again means that there is little scope for private sector investment.

ANNEX 6: AN APPROACH TO THE ASSESSMENT AND MANAGEMENT OF NATURAL RISKS

This annex introduces a basic approach to assessing the risks arising from 'natural' events such as flooding and drought.

Firstly, for a risk to arise there must be hazard that consists of a 'source' or initiator event (i.e. high rainfall); a 'receptor' (e.g. flood plain properties); and a pathway between the source and the receptor (i.e. flood routes including defences, overland flow or landslide). Actual harm depends upon the exposure to the hazard - which can be reduced by suitable investment in source reduction or pathway management - and the characteristics of the receptor – which can also be affected (eg limit planning rights for new house constructions in hazard areas. See the figure below.



Risk has a range of meanings and multiple dimensions relating to safety, economic, environmental and social issues. To evaluate the risk, consideration needs to be given to:

- the nature and probability of the hazard (p)
- the degree of exposure of the Receptors (numbers of people and property) to the hazard (e)
- the susceptibility of the Receptors to the hazard (s)
- the value of the Receptors (v).

Therefore: Risk = function (p, e, s, v) or more simply: Risk = (Probability) x (Consequence).

To reduce risk and harm/damage a number of options are available.

Source - Reduce the source of the problem. For example:

- do not withdraw waters from aquifers below the level at which salt intrusion inevitable
- do not deforest in areas of high rainfall (which might lead to increased danger of flash flood and can also lead to soil erosion/loss, mudslides, avalanches)

Pathway - Invest in the pathway to avoid problems. For example:

- higher banks of rivers, use of flood plains, fire barriers

Receptor – reduce the population or size of economy potentially affected. For example:

- Do not build houses in high risk areas – use local planning controls, Seveso, planning, risk maps, building permits)
- Build suitably robust receptors (eg buildings able to withstand earthquakes, water barriers)
- Identify response early so as to allow early action (fire towers, flood risk warnings/communications, tsunami warning system)
- Invest in & plan for appropriate response (fire control, evacuation plans)

Examining the steps taken to address flooding helps illustrate the range of measures, at three different stages: ‘pre-flood’ (planning, investments etc); ‘during’ (detection, forecasting, warning, response) and ‘post flood’ (relief, reconstruction, lesson learning etc).

The types of investment include engineering based (ie physical investments), administrative (planning, legal) and personal responsibility (training, publicity). Examples include:

Source reduction:

- Household cisterns for water retention – requirements in new buildings, investment support
- Flood reservoirs'

Pathways issues:

- Barriers / sluice gates etc (e.g. Prague, London)
- Dredging / cleansing works: (e.g. Malta)
- Building of water courses (e.g. Qormi-Marsa watercourse, Malta)
- Open areas for flooding – fields + wetlands (e.g. Prague)
- Temporary wall risers along key areas (e.g. Prague)

Receptor issues

- Special barriers (e.g. for the metro in Prague)
- Some infrastructural works: replacement of bridges and demolition of structures shackling watercourses
- Risk maps and their application – eg to inform housing decisions
- Communication of risks – eg television/radio announcements.
- Training for emergency response