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BIOPROS

Solutions for the safe application of wastewater and sludge for high efficient biomass production in Short-Rotation-Plantations

Collective Research Project

D1 – Report on Current Legislation related to SRP in Europe

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PREFACE

This report comprises the results from the work accomplished under task 1.1 of the Collective Research project BIOPROS “Solutions for the safe application of wastewater and sludge for high efficient biomass production in Short-Rotation-Plantations” which is co-financed by European Union’s the 6th Framework Programme. The report was elaborated under leadership of the European Biomass Industry Association (EUBIA) with assistance from the following partners:

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ABBREVIATIONS

BAP	Biomass Action Plan
BOD	Biochemical oxygen demand
CAP	Common Agricultural Policy
CHP	Cogeneration of Heat and Power
EAFRD	European Agricultural Fund for Rural Development
EAGGF	European Agricultural Guidance and Guarantee
EC	European Commission
EU	European Union
ha	Hectare
mg	Milligram
Mtoe	Million tons of oil equivalent
N	Nitrate
p.e.	Person equivalent
RES	Renewable Energy Sources
RES-E	Renewable Energy Source – Electricity
RES-H	Renewable Energy Source – Heating (and Cooling)
SAPS	Single Area Payment Scheme
SPS	Single Payment Scheme
SRC	Short Rotation Coppice
SRF	Short Rotation Forestry
SRP	Short Rotation Plantation
WTP	Wastewater Treatment Plant

1 EXECUTIVE SUMMARY

This report covers the legal framework of the BIOPROS project. This means that it discusses all supporting and limiting legislation related to Short Rotation Coppice (SRC) fertilised with wastewater and sludge, both at European and country level. For information, in this report we define the expression “Short Rotation Plantation” (SRP) as a plantation of Short Rotation Coppice, fertilised with wastewater and/or sludge.

The European legislation is treated in Chapters 3-6 and then the legislative framework for each partner country having a RTD partner, are discussed in chapters 7-14. The complete lists of legislation provided by each country, to which chapters 7-14 are referring, are included in Annex I of this report. Chapters 7-14 provide summaries of the legislation relevant to SRP found in the complete lists, with integration of the conclusions delivered and made by each country “partner group”. Thus, chapter 7 summarises the Bulgarian legislation related to SRP, chapter 8 summarises the legislation of the Czech Republic, Chapter 9 regards Estonia, chapter 10 Italy, chapter 11 Poland, chapter 12 the Slovak Republic, chapter 13 Spain and finally chapter 14 summarises the legislation for the United Kingdom-Northern Ireland.

As a general conclusion for the legislative reports of the participating countries, it can be said that the legislative framework applying to SRP’s is very different in the countries analysed. Therefore, the BIOPROS project has an important role to play in clarifying the different legislative systems in the different countries as well as by proposing improvements in this regard.

The following can be concluded regarding the European legislation:

Firstly, in chapter 3, legislation related to Energy Generation is explained. Here we can conclude that among the different renewable energy sources currently available, biomass has the largest growth potential in the near future but the use of biomass for energy purposes has not yet been developed to its full potential in the EU. Also, although almost all countries have plans and/or policies to raise the use of renewable energies, as required by the EU, often with specific targets for using biomass, work is continuing on the development of the EU policies and a legislative framework to be implemented within the Member States, which will encourage the use of sustainable energies.

Secondly, in chapter 4 agricultural regulations at European level are treated. As a summary of chapter 4 we can conclude that there is a wide range of biomass that could be used to produce the generation of electricity, heating and transport, deriving, among others, from agricultural and forestry products.

The CAP reform has increased market orientation by providing better opportunities for farmers to adapt production to increasing demand for biomass. The 2003 reform has decoupled the link between crop production and subsidies, which should have the effect of levelling the playing field for SRC and other crops. In addition, subsidies will be paid on a per hectare basis with the stipulation that farmers must maintain their land in good agricultural and environmental condition.

On the other hand, rural development measures are also to be taken into account for the development of energy crops such as SRC.

Thirdly, in chapter 5 legislation related to Wastewater and sludge are discussed. From this chapter, we can conclude that wastewater and sewage sludge from municipalities have proved suitable solutions to provide a well balanced nutrient solution that can be used for irrigation and fertilization of non-food crops such as SRC. Furthermore, the installation of source separation technologies such as urine diversion, separation of industrial from domestic wastewaters or grey water separation systems would redound in the effective implementation of SRP. Limiting requirements of legislation may then be met more easily or even could become obsolete in certain cases. At the same time, SRP best practices (including appropriate pre-treatment and application of suitable wastewater/sludge should be developed in such a way that the implementation of SRP could actually improve fresh and ground water quality to or even beyond required standards.

Finally, chapter 6 discusses limitations and missing legislation related to Short rotation plantations. It is clear that the use of biomass has fallen behind expectations, mainly because of the absence of clear objectives, complete legislative framework, cohesive policy, co-ordinated instruments and means for implementation. A legislative initiative should be outlined to address the heating and cooling sector. The lack of a regulatory framework within the heating and cooling sector prevents, among other things, the adoption of specific measures supporting the generation of energy in this sector, including the production of energy crops. In sum, a clear strategy, concerted policies and mandatory targets are needed in order to increase the use of biomass as a renewable energy source.

Compatibility between agricultural measures and forestry measures must be addressed. Afforestation of agricultural land is placed within a grey area. At the same time, there is a lack of communication across the farming sector and the power production sector which is critical to ensure the success of the supply of raw materials. Finally, it should also be noted the significant degree of ignorance about the potential of biomass as an energy source, mainly within the farming sector and the perception of high risk (food competition issue), which is often not justified. Both these issues need to be addressed at European and local level.

The improvement of all above situations would serve the common purpose of promoting the use of biomass by encouraging sustainable farming and forestry practices and offer new opportunities for sustainable rural development. Last but not least, it will help to create a new market with innovative energy agricultural crops.

In sum, successful integration of energy, environmental, agricultural and forestry policies conditions are a must if we aim at a successful development and management of SRP.

2 INTRODUCTION

RES have become a central element of EU energy policy, which aims to secure energy supply while reducing CO₂ emissions. Following the *White Paper*, the Commission has produced several policy documents and legislative measures that have implications for the Bioenergy sector, notably the Directive on electricity from renewable sources and the Directives on Biofuels and co-generation. Whilst the implementation of the first Directive in several Member States has begun to have significant measurable effects on the market, the two latter will take more time to have effect. Therefore, it is now for the Member States to provide the adequate framework to effectively adapt the European legislation to their systems.

The production of energy crops, like Short-rotation Forestry (SRF) using willow and poplar should increase significantly under the White Paper policy.

The legislative framework applying to SRP's is very different in the countries analysed in this report. Therefore, the BIOPROS project has an important role to play by clarifying the different legislative systems in the different countries as well as by proposing improvements in this regard.

3 EUROPEAN LEGISLATION ON ENERGY GENERATION

3.1 EC White Paper and Green Paper

“Energy for the future: renewable sources of energy” - White Paper for a Community Strategy and Action Plan (White Paper)
Commission Communication COM (97) 599 final (26/11/1997) and
Green Paper “Towards a European strategy for the security of supply”(Green Paper) Commission
Communication COM (2000) 769 final (29/11/2000)

The European Union (EU) began working towards a policy framework for renewable energies in the early 1990s, which culminated in the adoption of the *White Paper* and, shortly after, the *Green Paper*.

The main components of the *White Paper* were an overall goal of doubling the contribution of renewable energy sources (RES) in the gross EU energy consumption from 6% to 12% by 2010 and the establishment of an Action Plan for achieving this goal, including the Campaign for Take-Off, which ran from 1997 until the end of 2003.

The *White Paper* acknowledged the large unexploited potential of biomass and its potential to create a large number of jobs within the production of raw materials.

Further, the *White Paper* set targets for each renewable energy. Biomass should produce more than 80% of the additional contribution to RES by 2010 as seen below:

TABLE 1: White Paper targets for 2010 – Biomass (Source: EC, 1997)

(Mtoe - Million tonnes of oil equivalent)

Contribution in 1995	Contribution in 2010	Additional contribution
44.80	135	+ 90.20

Biomass resources

- Biogas exploitation (livestock production, sewage treatment, landfills): 15 Mtoe
- Agricultural and Forest Residues: 30 Mtoe
- Energy Crops: 45 Mtoe (18Mtoe of liquid Biofuels and 27 Mtoe of heat/power)

As shown within the table above, the production of energy crops is essential if the objective of doubling the renewable energies share by 2010 is to be achieved. Further, as far as the potential contribution of 27 Mtoe from solid cellulosic bioenergy crops is concerned, the *White Paper* specifically refers to short rotation forestry (ex: willow) as a relevant option for production.

On the other hand, the *Green Paper* forecasted that EU dependence on imported energy would rise to 70% by 2030 if no measures were taken. Further, the document confirmed the important role of renewable energies in the future EU energy economy and the need to accelerate the growth of renewable energy markets in order to diversify EU energy supplies and improve energy security.

Based on this policy framework, the Commission began to work in 1999 to put in place legislation, which was designed to achieve the agreed policy goals. Indeed, the biomass sector has benefited from a number of European legislative instruments as will be seen below.

3.2 RES-E Directive

Directive of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity produced from Renewable Energy Sources in the internal energy market and amending Directive 92/42/EEC (RES-E Directive). Commission Directive 2001/77/EC Official Journal of the European Communities L 283 (27/10/2001)

(Deadline for implementation: 27/10/2003)

The first pioneering EU legislation in the renewable energy sector was the Renewable Energy Sources – Electricity, the *RES-E directive*.

The purpose of this Directive is to promote an increase in the contribution of renewable energy sources to electricity production in the internal market for electricity. The *RES- E Directive* supports the overall 12% target established within the *White Paper* by establishing the EU obligation to increase the share of electricity produced from RES to gross electricity consumption from 13.9% in 1997 up to 22% in 2010.

Member States were required to take appropriate steps to encourage greater consumption of electricity produced from RES in conformity with the national indicative targets for a ten-year period set by the *RES-E Directive*. For the New Member States¹, the targets were established in the accession treaties.

The *RES-E Directive* clearly provides a complementary framework to encourage and support the production of biomass for energy uses and it is for the Member States to come with laws, policies, incentives, regulations and administrative provisions necessary to fully implement its goals.

¹ By New Member States we specifically refer to Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia and the Slovak Republic, which joined formally the EU on 1 May 2004. Prior to joining, the new members had to adopt the so-called *acquis communautaire* which meant applying 80 000 pages of EU law and are now running a process of fully integration to the EU. Therefore, these countries are also generally included in the term “Member State” when no specific reference/exception is made to them, since they are obliged to comply with all EU legislation.

Bulgaria and Romania, having completed negotiations, signed their Treaty of accession on 25 April 2005 and they should normally join the Union on 1 January 2007.

3.3 Communication on the share of renewable energy in the EU

Communication from the Commission to the council and the European Parliament: The share of renewable energy in the EU (Communication on the share of renewable energy in the EU) COM (2004) 366 final (26/5/2004)

In 2004, as required by the *RES-E directive*, the EU produced an assessment of Member States' progress towards the renewable energy targets and the implications for Europe. The assessment was published in May 2004 in the Communication on the share of renewable energy in the EU where the Commission also assessed the progress being made in achieving the general 2010 target of 12% in overall energy consumption.

This document emphasized that more had to be done for the production of electricity from bioenergy. The wide range of scale, raw materials and technologies of bioenergy sources were not still supported by the necessary measures to achieve relevant results and the defined targets.

3.4 Communication on the support of electricity from renewable energy sources

Communication from the Commission of December 7th 2005: The support of electricity from renewable energy sources COM (2005) 627

This document fulfils, among others, the requirement of Article 4 of *RES-E directive*; by presenting an inventory and the experience gained with the application and coexistence of the different mechanisms used in Member States for supporting electricity from renewable energy sources.

According to this report, more than half of the Member States are not giving enough support to green electricity. Therefore, the Commission considers that direct support measures will remain essential in the future to ensure sufficient market penetration of green electricity and calls on Member States to optimise their support schemes and remove barriers.

Concerning electricity produced from biomass resources, Annex III of the Communication (Costs of current support systems and effectiveness) shows the differences between support schemes and the effectiveness of RES support for electricity produced from solid biomass, laying down the following main conclusion:

“At EU-15 level, only a small part of the available potential was exploited on an annual basis during the period 1998-2003. The effectiveness indicator for solid biomass electricity is significantly lower compared with wind exploitation². This confirms the conclusion of the

² Countries with a high effectiveness in wind energy have an indicator around 6%. For biomass, the top figures are around 4%.

Communication of May 2004³ that the development of biomass electricity is lagging behind expectations at EU level.”

Finally, the same annex stress that “good management of agriculture and forest residues is an important factor for good biomass exploitation.”

3.5 Biofuels Directive

Directive of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport (Biofuels Directive). Commission Directive 2003/30/EC Official Journal of the European Communities L 123 (17/5/2003)

(Deadline for implementation: 31/12/2004)

The second Directive, which addressed the use of biomass in the EU, was the *Biofuels Directive*, which aims to foster the use of biofuels or other renewable fuels to replace diesel or petrol for transport purposes within the Member States.

According to the *Biofuels Directive*, Member States should ensure that a minimum proportion of biofuels and other renewable fuels is placed on their markets, and, to that effect, shall set national indicative targets. A reference value for these targets shall be 2% by 31 December 2005 and 5.75% by 31 December 2010, calculated on the basis of energy content, of all petrol and diesel for transport purposes placed on their markets. Any Member State setting lower objectives will have to justify this on the basis of objective criteria.

This Directive was complemented later in 2003, by an important fiscal directive on the taxation of energy products, Directive of the Council of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity Council Directive 2003/96/EC Official Journal of the European Communities L 283 (31/10/2003) Deadline for implementation: 31/12/2003, which allows member states to reduce or exempt under fiscal control biofuels from fuel taxes, or apply a lower rate of tax.

3.6 Cogeneration Directive

Directive of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market (Cogeneration directive). Commission Directive 2004/8/EC Official Journal of the European Communities L 522 (11/2/2004)

Taking one step forward on the biomass related legislative framework, there is the *Cogeneration Directive* to be mentioned.

The objective of this Directive is to create a framework for the promotion and development of high efficiency cogeneration of heat and power (CHP) based on useful heat demand and

³ Communication on the share of renewable energy in the EU, COM (2004) 366.

primary energy savings in the internal energy market, taking into account the specific national circumstances especially concerning climatic and economic conditions.

In order to fulfil these objectives and to remove current barriers, Member States should ensure that high efficiency CHP is taken into consideration whenever new capacity is planned; guarantee that electricity from cogeneration would be transmitted and distributed on the basis of objective, transparent and not discriminatory criteria and ensure that guarantees of origin of electricity from co-generation enables producers to demonstrate that electricity they sell is produced from high efficiency cogeneration.

With respect of RES, the Directive establish that the analysis of national potentials for high efficiency cogeneration foreseen in article 6 shall consider, among other aspects, the possibility of increasing the use of RES in the national heat markets via cogeneration. Therefore, this Directive also encourages the transformation of biomass resources into electricity and heat through the cogeneration.

3.7 Biomass Action Plan

Biomass Action Plan of 7th December 2005 Communication from the Commission COM (2005) 628 final

On December 7th 2005, the Commission officially adopted the Biomass Action Plan (BAP) as a step forward to increase the use of biomass as a renewable energy source and to contribute to the achievement of the EU's goal of doubling the share of renewable energy from 6% to 12% by 2010.

The *BAP* contains a number of measures, to be implemented from 2006 onwards, to increase the development of biomass energy from wood, wastes and agricultural crops by creating market-based incentives to its use and removing barriers to the development of the market. Further, the *BAP* also establishes measures to promote biomass in heating, electricity and transport, followed by crosscutting measures affecting biomass supply, financing and research. This document is accompanied by a general impact assessment.

If the proposed actions are duly implemented, the Commission foresees an increase of the use of biomass to 150 Mtoe by 2010 (compared with 69 Mtoe in 2003). Further, the measures of the BAP would allow for a reduction of green house gas emissions by 209 million tons CO₂-equivalent per year, it would provide direct employment for up to 300,000 people and reduce reliance on imported energy from 48% to 42%.

The *BAP* has acknowledged the importance of promoting and supporting adequate policies supporting energy crops. According to the BAP, decisions about the appropriate energy crops to grow are best taken at a regional or local level. Therefore, the BAP has indicated that the EC would finance an information campaign about the properties of energy crops and the opportunities they offer (the campaign will also cover forestry).

Finally, the BAP specifically mentions fast-growing wood and indicates the need of a changed approach since farmers have to tie up land for several years and at least 4 years must pass before the first harvest.

3.8 Conclusions for European Legislation on Energy Generation

Among the different renewable energy sources currently available, biomass has the largest growth potential in the near future but the use of biomass for energy purposes has not yet been developed to its full potential in the EU.

Although almost all countries have plans and/or policies to raise the use of renewable energies, as required by the EU, often with specific targets for using biomass, work is continuing on the development of the EU policy and legislative framework, which will encourage the use of sustainable energies.

4 EUROPEAN AGRICULTURAL REGULATIONS

4.1 The Common Agricultural Policy – 2003 Reform

4.1.1 **Council Regulation establishing common rules for direct support schemes under the common agricultural policy**

Council Regulation of 29 September 2003 establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers and amending Regulations (EEC) No 2019/93, (EC) No 1452/2001, (EC) No 1453/2001, (EC) No 1454/2001, (EC) 1868/94, (EC) No 1251/1999, (EC) No 1254/1999, (EC) No 1673/2000, (EEC) No 2358/71 and (EC) No 2529/2001 Council Regulation No 1782/2003 Official Journal L 270/1, (21/10/1003)

4.1.2 **Commission Regulation laying down detailed for the implementation of the single payment scheme**

Commission Regulation of 21 April 2004 laying down detailed for the implementation of the single payment scheme provided for in Council Regulation (EC) No 1782/2003 establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers Commission Regulation No 795/2004 Official Journal of the European Communities L 141, (30/04/2004)

4.1.3 **Commission Regulation laying down detailed rules for the application of Council Regulation as regards the support schemes and the use of land set aside for the production of raw materials**

Commission Regulation of 29 October 2004 laying down detailed rules for the application of Council Regulation (EC) No 1782/2003 as regards the support schemes provided for in Titles IV and IVa of that Regulation and the use of land set aside for the production of raw materials Commission Regulation No 1973/2004 Official Journal of the European Communities L 345, (20/11/2004)

It is clear that the provision of biomass feedstock is crucial for the biomass energy system development. Therefore, potential of dedicated energy crops should be exploited, being one of the main drivers the given support to these crops by agricultural policies and regulations, notably the Common Agricultural Policy (CAP).

The Treaty of Rome defined the general objectives of a common agricultural policy. The principles of the CAP were set out at the Stresa Conference in July 1958. In 1960, the six founding Member States adopted the CAP mechanisms and two years later, in 1962, the CAP came into force.

The CAP is comprised of a set of rules and mechanisms, which regulate the production, trade and processing of agricultural products in the EU, with attention being focused increasingly on

rural development. Among the European Union's policies, the CAP is regarded as one of the most important policy areas.

The CAP is financed from the European Agricultural Guidance and Guarantee Fund (EAGGF), which accounts for a substantial part of the Community budget and includes, apart from agricultural expenditure, measures linked to the environment and structural and rural development measures.

In its four-decade existence, the CAP has undergone several reforms. Particularly, the reform of 1992 encouraged the use of agricultural land for non-food crop production. Set-aside land was an option for enlargement of land area under energy crops and additional source of income for farmers.

But the most important contribution made by the CAP towards the production of renewable energies from biomass resources such as energy crops came with the reform that took place in 2003.

The 2003 reform covered market-related support systems and direct aids for farmers through the Single Payment Scheme (SPS). Aids to farmers would not be linked to production but instead would be in a form of a single payment that is expected to guarantee to a certain degree stable income of farmers and freedom of choice to produce what consumers demand.

The 2003 CAP reform also established an annual payment for energy crops (available from 1 January 2004) and continued with the existing scheme for set-aside land to be used for the production of non-food crops such as energy crops.

Therefore, the CAP currently offers two systems to encourage the production of crops for energy use: energy crops aid and set-aside scheme for non-food uses, including energy production.

4.1.3.1 The energy crops aid

An aid of 45 € per hectare (ha) is available to farmers who produce energy crops. It will be applied on a maximum guaranteed area in the whole EU of 1,500,000 hectares. Penalties will be applied in the form of reductions of aid if the EU maximum guaranteed area is exceeded (the area per farmer for which aid is claimed is reduced proportionately in the year in question).

It must be ensured that crops are grown, delivered and processed into energy. Therefore, there are specific conditions to be fulfilled by the farmers and processors to qualify for the aid:

- The production of energy crops has to be covered by a contract between the farmer and the appropriate processing industry (processor). The contract must cover all details of the applicant, the crop, the processor and the intended end use of raw material. The farmer and processor do not have to be in the same Member State.
- Farmers may also process the crops into energy products for themselves. Where the processing occurs on the farm concerned, no contract is necessary. They might use their crops as fuel for heating, electricity or transport to be used within their agricultural holding, for the production.

- Farmers' obligations end once the total quantity of raw material harvested is delivered to the processors.
- The obligations of the processors start on delivery and end with the final processing of the raw materials into energy products.
- To ensure that the raw material is processed into the specified energy product, processors must lodge a security (high enough to prevent any risk that the raw materials are ultimately diverted from their destination).
- Processors must report what crops are delivered, specifying the species, the name and the address of the party delivered the raw materials, the place of delivery and the contract reference.
- Energy crops must be supplied essentially for the production of biofuels or other renewable fuels for transport and/or electricity and thermal energy produced from biomass.

All crops including perennial/multiannual crops such as Short Rotation Coppice (SRC) are eligible for aid, except for sugar beet. Eligibility is kept under review and Member States may seek the exclusion of other crops for justified reasons.

Penalties may be applied (reductions in aid for farmers, or loss of security in the case of processors) where the above-mentioned conditions/requirements are not met. These conditions are being kept under continual review in the light of experience. Member States must conduct spot-checks at the premises of at least 25% of processors, selected on the basis of a risk analysis, to ensure compliance. Checks must also be carried out on 10% of applicants for aid (farmers), also selected on the basis of a risk analysis.

By 31 December 2006, the Commission must submit a report to the Council on the implementation of the energy crops aid scheme, in light of the implementation of the EU biofuels initiative. Member States should report annually on application of the system.

4.1.3.2 Set aside scheme

Up until the 2003 reform, support for energy crops consisted of allowing the cultivation of crops for non-food uses, one of which is energy production.

With the 2003 CAP reform set-aside continues to operate. Farmers would qualify for payment of set-aside entitlements under the SPS. Set aside land may be subject to rotation and may continue to be used for non-food production, including energy crops such as SRC, reed canary grass (*Phalaris arundacea*) and *Miscanthus sinensis*.

Further, according to article 56.4 of the Council Regulation 1782/2003, Member States shall be authorized to pay national aid up to 50% of the costs associated with establish multi-annual crops (such as short rotation coppice) intended for biomass production on set-aside land.

The energy crops aid is additional to the SPS. However, if set-aside land is used for energy crops, the area is not eligible for additional aid for energy crops of 45 EUR/ha

Finally, it should be noted that all direct aids are subject to conditions introduced by the CAP reform, including cross-compliance, this is the linking of the SPS to the respect of environmental, food safety, animal and plant health and animal welfare standards, and to the

requirements to keep all farmland in good agricultural and environmental condition, including the prohibition of applying organic wastes and fertilisers in quantities in excess of those accepted as being in accordance with normal agricultural practice.

4.1.3.3 Implementation of the CAP within the New Member States

The implementation of the 2003 CAP reform differed from the EU-15 Member States and New Member States.

New Member States (NMS) had the choice, when signing the accession treaties, to be subject to the same general conditions as stated in the corresponding regulations or to operate special arrangements, notably the Single Area Payment Scheme⁴ (SAPS), involving payment of a flat rate (uniform amounts) per hectare of agricultural land in the New Member State concerned, including energy crops. The only requirement is that land be maintained in good agricultural condition. The amount is calculated by the total amount of direct payment funds available for a given member state in the calendar year, divided by the utilized agricultural area of the member state. This payment would be yearly increased until 2013 where full integration will take place. Further New Member States had also the possibility to “top-up” EU payments with additional funds.

4.2 Rural Development Policy

The future of agriculture is closely linked to the balanced development of the countryside, which accounts for 80% of the area of Europe. The European rural development policy plays a major role in economic, social and territorial cohesion. It is based on the principles of recognising the multifunctional role of agriculture, improving competitiveness, ensuring that environmental issues are taken into account, diversifying economic activity and conserving rural heritage.

4.2.1 EAGGF Regulation

Council Regulation of 17 May 1999 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF) and amending and repelling certain Regulations. (EAGGF Regulation) Council Directive 1257/1999 Official Journal of the European Communities

⁴ The SPS introduced in 2003 is based on direct payments that farmers received under certain support programs during a reference period from 2000 to 2002. As the NMS did not receive these direct payments during the reference period and due to the high administrative burden of implementing direct payments, the NMS may opt for SAPS through 2006, with the possibility of two one-year extensions after that, this is through 2008. Before the NMS can revert to the SPS used by the existing EU-15 for direct payments, they must demonstrate that they have the management and control systems in place to do so. If they do not have these systems in place by 2008, they will continue under the SAPS, but their aid percentage will be frozen at 50% of the EU level.

Amended by:

Council Regulation (EC) No 1783/2003 of 29 September 2003 amending Regulation (EC) No 1257/1999 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF) Official Journal L 270, 21/10/2003 P. 0070 - 0077)

Council Regulation (EC) No 567/2004 of 22 March 2004 amending Regulation (EC) No 1257/1999 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF) Official Journal L 090, 27/03/2004 P. 0001 - 0002

Council Regulation (EC) No 583/2004 of 22 March 2004 amending Regulations (EC) No 1782/2003 establishing common rules for direct support schemes under the common agricultural policy and establishing certain support schemes for farmers, (EC) No 1786/2003 on the common organisation of the market in dried fodder and (EC) No 1257/1999 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF) by reason of the accession of the Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia and Slovakia to the European Union. Official Journal L 091, 30/03/2004 P. 0001 - 0014

Related acts:

Commission Regulation (EC) No 445/2002 of 26 February 2002 laying down detailed rules for the application of Council Regulation (EC) No 1257/1999 on support for rural development from the European Agricultural Guidance and Guarantee Fund (EAGGF). Official Journal L 74 of 15.3.2002.

The *EAGGF Regulation* sets up the framework for Community support for sustainable rural development from 1 January 2000. It accompanies and complements other instruments of the CAP and the Community's structural policy.

The rural development measures eligible under this Regulation fall into two groups:

- Accompanying measures of the 1992 reform: early retirement, agro-environment and afforestation, as well as the less-favoured areas scheme;
- Measures to modernise and diversify agricultural holdings: farm investment, setting-up of young farmers, training, investment aid for processing and marketing facilities, additional assistance for forestry, promotion and conversion of agriculture.

Afforestation refers to measures encouraging new woodland development, including financial incentives for farmers who convert agricultural land to woodland and forest.

The afforestation of agricultural land involves an aid to cover the costs of planting and maintenance and to compensate farmers for income forgone, provided that such planting is adapted to local conditions and is compatible with the environment. The aid may amount to between 185€ and 725€ per hectare per year depending on the farmer's characteristics. In the case of fast growing species cultivated in the short term, support for afforestation shall be granted for planting costs only. According to article 27.2 of the Council Regulation No 445/2002, "*fast-growing species cultivated in the short term*" means species with a rotation time, namely the period between two harvest cuts on the same parcel, of less than 15 years. Therefore SRC would be eligible for afforestation and, consequently, for the financial support under this measure.

Rural development measures must be compatible with Community law and coherent with other Community policies. Such coherence is especially important in the case of the CAP provisions on the common market organisations and measures on quality and health in agriculture.

In addition, measures receiving financial assistance under the *EAGGF Regulation* may not receive aid under any other Community support scheme. Moreover, any measure which is incompatible with a specific condition laid down in this Regulation will not be eligible for support under other Community support schemes.

4.2.2 Rural development policy within New Member States

Chapter VII of the Accession Treaty completed by Commission Regulations (EC) No 27/2004 and (EC) No 141/2004 defines for the period 2004-2006 a special rural development regime for New Member States. This regime is mainly based on a new Temporary Rural Development Instrument, funded by the EAGGF Guarantee, to support the four so-called "accompanying measures" (agro-environment, early retirement, afforestation and compensatory payments for less favoured areas and areas subject to environmental constraint) and a number of specific rural development measures.

4.3 2007-2013 CAP REFORM

4.3.1 Strategic Guidelines on support for rural development by the European Agricultural Fund for Rural Development (EAFRD Regulation)

Proposal for a Council Decision on Community Strategic Guidelines for Rural Development - Programming period 2007-2013 (Strategic Guidelines) SEC (2005) 914 and Council Regulation of 20 September 2005 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD Regulation) Council Regulation no 1698/2005 Official Journal of the European Union L277/1

Following the fundamental reform of the first pillar of the CAP in 2003 and 2004, covering market-related CAP support systems and direct aids for farmers, the major focus for policy reform in the new financial period (2007 to 2013) will be rural development (known as the second pillar of the CAP).

The *EAFRD Regulation*, which will come into effect in January 2007, will replace the *EAGGF Regulation* and aims to increase the level of resources available for rural development from the CAP. In this regard, a new European Agricultural Fund for Rural Development (EAFRD) will be created with three "axes" for action:

1. The competitiveness of farming and forestry;
2. Land management and the environment; and
3. Diversification of the rural economy and the quality of life in rural areas.

The *Strategic Guidelines* adopted by the European Commission on the 5 July 2005 set out a strategic approach and a range of options, which Member States could use, in their national Rural Development programmes.

4.4 Conclusions for European Agricultural Regulations

There is a wide range of biomass that could be used to produce the generation of electricity, heating and transport, deriving, among others, from agricultural and forestry products.

The CAP reform has increased market orientation by providing better opportunities for farmers to adapt production to increasing demand for biomass. The 2003 reform has decoupled the link between crop production and subsidies, which should have the effect of levelling the playing field for SRC and other crops. In addition, subsidies will be paid on a per hectare basis with the stipulation that farmers must maintain their land in good agricultural and environmental condition. Therefore, what farmers would be producing in their holdings would be driven by the profitability and the impact of their activity thereby encouraging crops and practices that are environmentally favourable, like SRC.

The set-aside scheme applied to the cultivation of SRC would allow farmers to optimise the production. They would receive set aside payment while growing SRC in this land and, at the same time, they could grow food crops and qualify for the energy crop aid by growing SRC in other not set-aside areas.

Therefore, promoting the use of biomass by encouraging sustainable farming and forestry practices would offer new opportunities for sustainable rural development and would help create a new market with innovative energy agricultural crops.

On the other hand, rural development measures are also to be taken into account for the development of energy crops such as SRC, even though it is not clear if the aid granted under the afforestation measures is fully compatible with the energy crops aid and/or the SPFS for set-aside land which would be used for energy production. This is why successful integration of energy, environmental, agricultural and forestry policies conditions are a must if we aim at a successful development and management of SRP.

5 WASTEWATER AND SLUDGE RELATED EUROPEAN LEGISLATION

SRC, as any other energy crop, require nutrients and water to grow. In this respect, a number of municipal waste products that are rich in nutrients and/or water, such as wastewater and sewage sludge could partly or to a full extent replace the need of conventional fertilisation and enhance growth.

Urban wastewater contains nitrogen and phosphorus and is in most cases a well-balanced nutrient solution that can be used for fertilizing plants. For sanitary reasons, however, it is only suitable for use on non-food, non-fodder crops, such as SRC. Furthermore, the main part of the wastewater nutrients is still available in the wastewater after the biological treatment step.

Likewise, sewage sludge as a residue from municipal wastewater treatment plants has a long agricultural tradition as a starting fertiliser and soil conditioner on arable land.

There are several directives for the protection of water quality in the EU and to promote the safe use of sewage sludge in agriculture.

5.1 Drinking Water Directive

Directive of the Council of 16 June 1975 concerning the quality required of surface water intended for the abstraction of drinking water in the Member States (Drinking Water Directive). Council Directive 75/440/EC Official Journal of the European Communities L 194 (25/7/1975)

Amended by:

Council Directive 79/869/EEC of 9 October 1979

Council Directive 91/692/EEC of 23 December 1991

Deadline for implementation:

Directive 75/440/EEC – 16/06/1977

Directive 79/869/EEC – 09/10/1981

Directive 91/692/EEC – 01/01/1993

Follow up:

Directive 2000/60/EC Official Journal L 327 (22/12/2000)

The *Drinking Water Directive* helps ensure clean drinking water by protecting those rivers, lakes and reservoirs used as drinking water sources. All surface water intended for human consumption and supplied by distribution networks for public use is considered to be drinking water. Groundwater (covered by other Directive), brackish water and water intended to replenish water-bearing beds are not subject to this Directive.

Member States are requested to take a number of measures in order to fulfil the objectives of this Directive:

- Set, for all sampling points, or for each individual sampling point, the values applicable to surface water for all the parameters given in Table 2 below (parametric values for characteristics of surface water intended for the abstraction of drinking water).

Table 2: Key data relevant for sludge/ wastewater application:

Parameter	Category A1	Category A2	Category A3
Mandatory quality standards:			
Nitrate	50 mg/l	50 mg/l	50 mg/l
Sulphates	250 mg/l	250 mg/l	250 mg/l
Copper	0.05 mg/l	Not mandatory	Not mandatory
Cadmium	0.001 mg/l	0.001 mg/l	0.001 mg/l
Not mandatory quality standards, guidelines:			
Total Coliforms	50/100 ml	5,000/100 ml	50,000/100 ml
Faecal Coliforms	20/100 ml	2,000/100 ml	20,000/100 ml
BOD5	< 3 mg/l O ₂	< 5 mg/l O ₂	< 7 mg/l O ₂
Phosphate	0.4 mg/l	0.7 mg/l	0.7 mg/l

Table Copied from Annex II of the Drinking Water Directive.

- Limit values and guide values for the above-mentioned parameters.
- Take the necessary measures to ensure continuing improvement of the environment.
- Draw up a systematic plan of action for the improvement of surface water and especially that falling within category A3 as described in Table 2 above.

Category A1: Simple physical treatment and disinfection, e.g. rapid filtration and disinfection.

Category A2: Normal physical treatment, chemical treatment and disinfection, e.g. pre-chlorination, coagulation, flocculation, decantation, filtration, disinfection (final chlorination).

Category A3: Intensive physical and chemical treatment, extended treatment and disinfection e.g. chlorination to break point, coagulation, flocculation, decantation, filtration, adsorption (activated carbon), disinfection (ozone, final chlorination).

- Report every 3 years on the implementation of the Directive on the basis of a questionnaire or outline drafted by the Commission in accordance with the procedure laid down in Directive 91/692/EEC

There is no framework for the establishment of drinking water protection zones. The Member States may do this individually.

Member States may set more stringent requirements than laid down in the Directive.

The *Drinking Water Directive* should be applied when planning, designing and implementing Short Rotation Plantations (SRP) if the discharge of the system influences a surface water body used for drinking water abstraction. Further, Member states have to report every 3 years and should give indications/information about areas for drinking water abstraction and restricted uses therein. Good planning would avoid setting up any type of wastewater irrigation near drinking water abstraction areas.

5.2 Bathing Water Directive

Directive of the Council of 8 December 1975 concerning the quality of bathing water (Bathing Water Directive). Council Directive 76/160/EEC Official Journal of the European Communities L 031 (5/2/1976)

Amendments:

Council Directive 91/692/ECC of 23 December 1991 Official journal L377 (31/12/1991)

Deadline for implementation of MS:

Directive 76/160 EEC – 8/12/1985

Directive 91/692/EEC – 1/1/1993

This Directive concerns the quality of bathing water, with the exception of water intended for therapeutic purposes and water used in swimming pools.

The directive mainly refers to microbial parameters of the water body used for bathing as well as to algae blooms, oils, foams, and other matter visible on the surface of the water.

Member States are requested to set, monitor and report values to be applied to bathing water in accordance with the guidelines of the Directive. In this respect, its annex gives quality standards for bathing water, i.e.:

- Total coliformes: 500 (guide), 10 000 (mandatory)
- Faecal coliformes: 100 (guide), 2 000 (mandatory)
- Enteroviruses: 0 PFU/10 litres (mandatory)
- No standards for Ammonia, Total Nitrogen and Nitrates

Member States may fix more stringent values than those laid down in the Directive.

The Directive is relevant for planning/designing and implementation of SRP in case the discharge of the system influences any kind of bathing water.

5.3 Bathing Water Directive

Proposal for a Directive of the European Parliament and of the Council of 24 October 2002 concerning the quality of bathing water COM (2002) 581 final Official Journal C 45 E, (25/02/2003)

The proposed Directive would replace the *Bathing Water Directive* and it would bring, among other things, consistency with the European legislation on water, particularly the Water Framework Directive (which covers the quality of bathing water), integrated management of

water quality and a broader margin of manoeuvre for Member States to apply the Directive's provisions.

The annexes to the proposal set out the parameters to be used in determining water quality, the methods for assessing and classifying bathing water, the bathing water profile, its monitoring frequency and the standards for handling samples. In this respect, the Member States should:

- List, monitor and report all bathing waters.
- Ensure that all bathing waters respect a “*good quality*” status defined in Annex I:
 - Intestinal Enterococci: 200 cfu/100ml
 - Escherichia coli: 500 cfu/100ml
- Promote the achievement of “*excellent quality*” standards defined in Annex I:
 - Intestinal Enterococci: 100cfu/100ml
 - Escherichia coli: 250cfu/100ml

5.4 Groundwater Directive

Directive of the Council of 17 December 1979 on the protection of groundwater against pollution caused by certain dangerous substances (Groundwater Directive). Council Directive 80/692/EEC Official Journal of the European Communities L 020 (26/01/1980)

Amendments:

Council Directive 91/692/ECC of 23 December 1991 (Official journal L377 of 31/12/1991)

Deadline for implementation MS:

Directive 80/68-EEC- 19/12/1981 except for derogation

Directive 91/692/EEC -1/1/1993

The *Groundwater Directive* aims to control the pollution of surface water and groundwater, respectively, with dangerous substances from industrial installations or urban wastewater.

The purpose of this Directive is to prevent the pollution of groundwater by substances belonging to the families and groups of substances in Lists I or II in the Annex, and as far as possible to check or eliminate the consequences of pollution that has already occurred.

List I contains the individual substances that belong to the families and groups of substances enumerated below:

1. Organohalogen compounds and substances, which may form such compounds in the aquatic environment
2. Organophosphorus compounds
3. Organotin compounds
4. Substances which possess carcinogenic mutagenic or teratogenic properties in or via the aquatic environment
5. Mercury and its compounds
6. Cadmium and its compounds

7. Mineral oils and hydrocarbons

8. Cyanides

Excepted are those, which are considered inappropriate to list I on the basis of a low risk of toxicity, persistence and bioaccumulation, and are to be classed in list II.

List II contains the individual substances and the categories of substances belonging to the families and groups of substances listed below which could have a harmful effect on groundwater:

- The following metalloids and metals and their compounds: Zinc, Copper, Nickel, Chrome, Lead, Selenium, Arsenic, Antimony, Molybdenum, Titanium, Tin, Barium, Beryllium, Boron, Uranium, Vanadium, Cobalt, Thallium, Tellurium, Silver.
- Biocides and their derivatives not appearing in List I.
- Substances which have a deleterious effect on the taste and/or odour of groundwater, and compounds liable to cause the formation of such substances in such water and to render it unfit for human consumption.
- Toxic or persistent organic compounds of silicon, and substances which may cause the formation of such compounds in water, excluding those which are biologically harmless or are rapidly converted in water into harmless substances.
- Inorganic compounds of phosphorus and elemental phosphorus.
- Fluorides.
- Ammonia and nitrites.

Where certain substances in list II are carcinogenic, mutagenic or teratogenic, they are included in category 4 of List I.

All indirect discharges of substances in List I and all direct or indirect discharges of substances in List II are subject to prior authorisation. Such authorisation shall specify in particular:

- The place of discharge and the method of discharge.
- Essential precautions should be paid to the nature and concentration of the substances present in the effluents, the characteristics of the receiving environments and the proximity of water catchments areas, in particular those for drinking, thermal and mineral water
- The maximum quantity of a substance permissible in an effluent during one or more specified periods of time and the appropriate requirements as to the concentrations of these substances
- The arrangements enabling effluents discharged into groundwater to be monitored
- If necessary, measures for monitoring groundwater, and in particular its quality

Notwithstanding the above, the Directive does not apply to:

- Discharges of domestic effluents from isolated dwellings not connected to a sewage system and situated outside areas protected for the abstraction of water for human consumption;

- Discharges which are found by the competent authority of the Member State concerned to contain substances in lists I or II in a quantity and concentration so small as to obviate any present or future danger of deterioration in the quality of the receiving groundwater;
- Discharges of matter containing radioactive substances.

Member States are requested to take a number of measures in order to fulfil the objectives of this Directive, such as:

- Preventing the introduction into groundwater of substances in List I by prohibiting all direct (without percolation through ground) discharges of these substances, and taking all appropriate measures to prevent any indirect (after percolation through ground) discharges of these substances
- Limiting the introduction into groundwater of substances in List II so as to avoid pollution of this water by these substances, by limiting all direct discharges, limiting the disposal of these substances, which may lead to indirect discharge.
- Specific authorisations may be granted if all technical precautions have been taken to prevent groundwater pollution.
- The competent authorities of the Member States shall monitor compliance with the conditions laid down in the authorisations and the effects of discharges on groundwater (Article 12) and keep an inventory of these authorisations (Article 15).

The directive is highly relevant for planning/designing and implementation of SRP's. Direct or indirect discharge of treated water into the groundwater shall be avoided or has to cope with the Directive requirements.

5.5 Sewage sludge Directive

Directive of the Council of 12 June 1986 on the protection of the environment, and in particular of the soil, when sewage sludge is used in agriculture (Sewage sludge Directive).
Council Directive 86/278/EEC. Official Journal of the European Communities L 181, (04/07/1986)

Deadline for implementation: 18/06/1989

The *Sewage Sludge Directive* regulates the use of sewage sludge in agriculture in such a way as to prevent harmful effects on soil, vegetation, animals and man, thereby encouraging the correct use of such sewage sludge. The directive especially cares about heavy metal concentrations in soil and sludge.

The Directive lays down limit values for concentrations of heavy metals in the soil (Annex IA of the Directive), in sludge (Annex IB) and for the maximum annual quantities of heavy metals, which may be introduced into the soil (Annex IC).

Member States are requested to take a number of measures in order to fulfil the objectives of this Directive, such as:

- Prohibit use of sewage sludge where concentration of heavy metals in soils exceed limits set in Annex I A

- Regulate use of sewage sludge in a way that accumulation of heavy metals does not exceed limits set in Annex I A (methods laid out in Annex I B and I C)
- Keep up-to-date records, which register quantities of sludge produced and sludge used in agriculture, composition and properties of sludge, type of treatment, name and addresses of recipients of sludge and places of where sludge is used
- Report to the Commission every 4 years

Furthermore, there are a number of standards and conditions set up by the *Sewage Sludge Directive*, which need to be considered when applying sewage sludge:

- Sludge shall be treated before being used in agriculture, Member States may authorize exceptions, when sludge is injected or worked into soil. (Definition of sludge treatment, see Article 2).
- Sludge producers shall provide users with information about sludge constituents referred to in Annex II A
- Application of sludge shall be in accordance to nutrient need of plants, shall take into account that quality of soil, surface and ground water is not impaired
- Where pH is below 6 Member States shall consider to reduce limits due to increased mobility of heavy metals
- Sludge from sewage treatment plants with capacity below 300 kg BOD per day corresponding to 5000 p.e., designed for domestic wastewater, may be exempted from certain record keeping requirements

Note: the definition of agriculture in Article 2 of the directive only comprises food crops and crops for stock-rearing purposes, it does not include non-food crops such as energy crops. It needs to be clarified if non-food crop plantations are exempted from this directive (if not rotated with food crops on one area).

5.6 Urban Wastewater Treatment Directive

Directive of the Council of 21 May 1991 concerning urban wastewater treatment (Urban Wastewater Treatment Directive). Council Directive 91/271/EEC Official Journal of the European Communities L 135 (30/05/1991)

Amended by:

Commission Directive of 27 February 1998 amending Council Directive 91/271/EEC with respect to certain requirements established in Annex I thereof. Commission Directive 98/15/EC. Official journal L067 (7/3/1998)

Deadline for implementation :

Directive 91/271/ECC- 30-06-1996

Directive 98/15/1998 – 3/9/1998

This Directive clarifies the rules relating to discharges from urban wastewater treatment plants in order to put an end to differences in interpretation by the Member States.

The *Urban Wastewater Treatment Directive's* objective is to reduce the pollution of surface water with nutrients from urban wastewater and wastewater from certain industrial sectors, establishing conditions for their collection, treatment and disposal.

The Directive aims to protect the environment from adverse effects of the discharge of urban wastewater and the discharge of wastewater from certain industrial sectors. In this respect, Annex III of the directive lists industrial sectors producing biodegradable wastewater that do not discharge into urban treatment plants and are required to meet prior regulations/ specific authorisation by competent authorities.

Member States are requested to take a number of measures in order to fulfil the objectives of this Directive, such as:

- Ensure that all agglomerations of between 2000 and 10000 p.e, which discharge water into sensitive areas, has a proper collection and treatment system by 31.12.2005.
- Ensure that industrial wastewater discharged into urban treatment facilities is subject to prior regulations and /or specific authorisation.
- Designate sensitive areas according to their level or potential of eutrophication and to the criteria laid down within the Directive. In designated sensitive zones treatment shall be more stringent than secondary treatment.
- In less sensitive areas treatment may be less stringent (at least primary treatment).
- Treatment for agglomerations < 2,000 p.e. (and agglomerations < 10,000 p.e. discharging into coastal water) shall be appropriate (any process or disposal system that allows waters to meet relevant quality objectives of this and other directives).
- Report to the commission every 2 years about disposal of urban wastewater and sludge and action programs

The Directive is relevant for SRP's. Therefore when planning/designing and implementing SRP's, a number of circumstances should be taken into account:

- The higher the connection degree to collection systems and treatment plants the greater is the mix of domestic wastewater with eventually contaminating industrial wastewater. Sludge from these systems may be less usable to SRP practices (see sewage sludge directive).
- Biodegradable wastewater from industries mentioned in Annex III shall be considered for SRP application (depending on additives and constituents).
- The Directive specifically encourages the reuse of treated wastewater as well as sludge on land prior to discharging to receiving waters. Competent authorities in Member States are responsible for prior regulations and/ or specific authorisation.
- The Directive also states that individual and appropriate systems, which provide the same level of environmental protection, can be used, when establishment of collection system involves excessive costs. Here lays the niche for well performing SRP's.
- Best chances for wastewater/ sludge reuse may be in agglomerations < 2000 p.e.

5.7 Nitrates Directive

Directive of the Council of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources (Nitrates Directive). Council Directive 91/676/EEC Official Journal of the European Communities L 375 (31/12/1991)

Deadline for implementation: 20/12/1993

The *Nitrates Directive* seeks to reduce and prevent the pollution of water caused by nitrates from agricultural sources. It is designed both to safeguard drinking water supplies and to prevent wider ecological damage in the form of the eutrophication of freshwater and marine waters generally.

Member States are requested to take a number of measures in order to fulfil the objectives of this Directive, such as:

- Identify vulnerable zones that contribute to pollution.
- Establish codes of good agricultural practice (applied by farmers on voluntary basis) as well as provisions and information/ training programs for such good practice.
- Establish action programs for designated vulnerable zones. These must include the measures prescribed in the codes of good agricultural practice and measures to limit the spreading on land of any fertiliser containing nitrogen and to set limits for the spreading of livestock effluent.
- Monitor water quality, applying standardized reference methods to measure the nitrogen compound element.
- Report to the commission every 4 years on implementation of the Directive.

The directive is relevant for SRP's since wastewater and sewage sludge as well as livestock manure intended for irrigating SRP's contain nitrogen compounds (ammonia, nitrites, nitrates) that may contribute to groundwater and surface water pollution if not applied properly. In particular, the *Nitrates Directive* establishes the following key standards and conditions to be considered when applying wastewater/sludge/manure.

- Groundwater < 50 mg/l nitrates (Annex I of the directive)
- Application of livestock manure limited to containing 170 kg N per hectare and year (exceptions possible i.e. for crops with high nitrogen uptake, soils with high denitrification capacity and other) (Annex III).
- Surface waters < 50 mg/l nitrates if water body used for the abstraction of drinking water (see drinking water directive, chapter 5.1).

Further, codes of good agricultural practice concerning SRP's and wastewater/ sludge application should be elaborated and reported codes and action programs of Member States (of BIOPROS regions) should also be researched and taken into consideration.

5.8 Water Framework Directive

Directive of the Council and of the European Parliament of 23 October 2000, establishing a framework for Community action in the field of water policy (Water Framework Directive)
Council Directive 2000/60/EC Official Journal of the European Communities L 327 (22/12/2001)

Amended by:

Decision No 2455/2001/EC of the European Parliament and of the Council of 20 November 2001. Official Journal L 331 (15.12.2001)

Deadline implementation : 22/12/2003

This Directive establishes a framework for the protection of inland surface waters, transitional waters, coastal waters and ground waters that prevents further deterioration, promotes sustainable water use etc.

The *Water Framework Directive* overall aim is to achieve a good ecological and chemical status for all bodies of water (as defined in Annex V of the Directive) as well as good ecological potential and good chemical status for all artificial and heavily modified bodies of water by 2015.

Member States are requested to take a number of measures in order to fulfil the objectives of this Directive, such as:

- Identify all the river basins lying within their national territory and assign them to individual river basin districts.
- Undertake for each river basin district an analysis of its characteristics, a review of the impact of human activity and an economic analysis of water use.
- Produce river basin management plans, taking into account the results of the analyses and studies provided for in the abovementioned point.

Annex V of the Directive gives a comprehensive table of quality indicators and criteria to be met. The criteria mainly refer to biological conditions (indicator organisms) and the functioning of the aquatic ecosystem. No overall chemical standards are set.

Best management practices for SRP's irrigated with wastewater/ sludge, need to fulfil the aims of this directive and quality indicators for good ecological and chemical status of water bodies set herein.

5.9 WHO guidelines for wastewater in agro- and aquaculture –1989

The overall objective of these Guidelines is to encourage the safe use of wastewater and excreta in agriculture and aquaculture in a manner that protects the health of the workers involved and of the public at large. The Guidelines are addressed primarily to senior professionals in the various sectors relevant to wastes reuse, and aim to prevent transmission of communicable diseases while optimizing resource conservation and waste recycling. Emphasis is therefore on control of microbiological contamination rather than on avoidance of the health hazards of chemical pollution, which is of only minor importance in the reuse of domestic wastes and is adequately covered in other publications.

“Wastewater” refers to domestic sewage and municipal wastewaters that do not contain substantial quantities of industrial effluent; “excreta” refers to night soil and to excreta derived products such as sludge and septage.

The Guidelines concentrate on the following three practices, which are the most common:

- use of wastewater for crop irrigation;
- use of excreta for soil fertilization and soil structure improvement;
- use of wastewater and excreta in aquaculture.

The agricultural or aqua cultural use of excreta and wastewater can result in an actual risk to public health only if all of the following occur:

- either an infective dose of an excreted pathogen reaches a field or pond, or the pathogen multiplies in the field or pond to form an infective dose;
- the infective dose reaches a human host;
- the host becomes infected; and
- the infection causes disease or further transmission.

Epidemiological Studies show that there is a high actual health risk, when untreated/ raw wastewater is used such as from intestinal nematodes and bacteria, but little from viruses.

Treatment of wastewater before reuse is a highly effective method for safeguarding public health.

Properly planned and managed excreta and wastewater use schemes can have a positive environmental impact, as well as increasing agricultural and aqua cultural yields. Several environmental advantages arising from wastewater/sludge reuse are given under environmental aspects.

5.10 Standards & Conditions

Microbiological quality criteria

- Crop irrigation: The guidelines recommend that treated wastewater should contain:
 - < 1 viable intestinal nematode egg per litre (on an arithmetic mean basis) for restricted or unrestricted irrigation; and
 - < 1000 faecal coliform bacteria per 100 millilitres (on a geometric mean basis) for unrestricted irrigation.
- Unrestricted irrigation refers to irrigation of trees, fodder and industrial crops, fruit trees and pasture, and restricted irrigation to irrigation of edible crops, sports fields and public parks.
- Technical options for health protection should cover:
 - treatment of waste;
 - crop restriction;
 - waste application methods;
 - control of human exposure.

It will often be desirable to apply a combination of several methods.

Human exposure control:

Four groups of people can be identified as being at potential risk from the agricultural use of wastewater and excreta:

- agricultural field workers and their families;
- crop handlers;
- consumers (not in case of SRP's);
- those living near the affected fields.

Wastewater and Sludge shall undergo appropriate pre-treatment before being reused in SRP's. Further, subsurface irrigation can give the greatest degree of health protection as well as using water more efficiently and often producing higher yields.

5.11 WHO guidelines for safe recreational environments - 2003

The primary aim of the Guidelines is the protection of public health. The Guidelines are intended to be used as the basis for the development of international and national approaches (including standards and regulations) to control the health risks from hazards that may be encountered in recreational water environments.

The purpose of the Guidelines is not to deter the use of recreational water environments but instead to ensure that they are operated as safely as possible in order that the largest possible population gets the maximum possible benefit.

Amongst many other health risks the Guidelines concern especially faecal pollution and water quality causing enteric illness and acute febrile respiratory illness (AFRI).

The Guidelines recommend annual sanitary inspections of potential pollution sources and a regular microbial water quality assessment to be performed by local authorities for public health with respect to faecal index bacteria and a statistically appropriate number of samples.

The Guidelines are relevant for planning/designing and implementation of SRP in case of direct or indirect discharge into recreational water environments. However this field is covered by the Bathing Water Directive (see chapter 5.2).

Vice Versa in areas where there still is direct discharge of sewage into receiving waters, SRP's (including appropriate pre-treatment) may be applicable to improve microbial water quality to bathing water standards of those receiving waters.

5.12 Conclusions for Wastewater and Sludge related European Legislation

Wastewater and sewage sludge from municipalities have proved suitable solutions to provide a well-balanced nutrient solution that can be used for irrigation and fertilization of non-food crops such as SRC.

Furthermore, the installation of source separation technologies such as urine diversion, separation of industrial from domestic wastewaters or grey water separation systems would

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redound in the effective implementation of SRP. Limiting requirements of legislation may then be met more easily or even could become obsolete in certain cases.

At the same time, SRP best practices (including appropriate pre-treatment and application of suitable wastewater/sludge should be developed in such a way that the implementation of SRP could actually improve fresh and ground water quality to or even beyond required standards.

6 LIMITATIONS AND MISSING EUROPEAN LEGISLATION

Among the different renewable energy sources currently available, biomass has the largest growth potential in the near future, but the use of biomass has fallen behind expectations, mainly because of the absence of clear objectives, complete legislative framework, cohesive policy, co-ordinated instruments and means for implementation.

A legislative initiative should be outlined to address the heating and cooling sector. In order to achieve the general target established within the White Paper of a share of 12% of renewables in gross inland energy consumption, different targets have been set at European and, later on, national level in the electricity and transport sector. Over 40% of the primary energy consumption in Europe is used for heating buildings, for domestic hot water production and for heating in industrial processes. Biomass heat applications contribute to a 98% of renewable heat production in Europe. The main part of this contribution comes from domestic heating with fuel wood, followed by large-scale use of biomass wastes for industrial process heat applications and biomass use in district heating plants. However, whereas EU Directives to promote electricity and transport already exist, the heating and cooling sector is missing in the European and national policy framework.

The Directive of promotion of cogeneration and the Directive on the Energy Performance of Buildings have a direct impact on efficient heat use. Further, the Building Directive will support the Renewable Energy Heating Sources (RES-H) development, but it is not focused enough. The Directive does not apply to existing buildings smaller than 1,000 m², where a large potential for RES-H lies.

The lack of a regulatory framework within the heating and cooling sector prevents, among other things, the adoption of specific measures supporting the generation of energy in this sector, including the production of energy crops.

A number of European policy documents have made a specific request for a regulatory framework of the heating and cooling sector such as the Communication on the share of renewables in the EU and the Biomass Action Plan (BAP).

In sum, a clear strategy, concerted policies and mandatory targets are needed in order to increase the use of biomass as a renewable energy source.

On the other hand, as noted in section 4 of this report, land growing energy crops, such as Short Rotation Coppice (SRC) and set aside land could be reverted/diverged for food crops uses, therefore, standards of good and safe/healthy practices (codes of best practices) are needed to ensure the healthy eventual growth of food crops after having used wastewater and sewage sludge.

Further, one of the barriers to the implementation of SRC has been a lack of communication across the farming sector and the power production sector that are critical to ensuring the success of the supply chain. Both sectors have different working environments and their approach has been proved difficult in some countries. Therefore, it would be desirable to have an integrated strategy from the local policy makers to enable all these key players to work together by presenting them the clear advantages for a joint work.

The use of wastewater and sewage sludge are contemplated and regulated within a number of European Instruments. However, the corresponding European Institutions should make clarifications regarding the applicability of the Sewage Sludge Directive for non-food crops.

In general the applications relevant to Short Rotation Plantation (SRP) may be allowed if proved that they meet the established quality standards and only a few regulations completely restrict certain applications affecting SRP (such as the Groundwater Directive). Therefore, it is the responsibility of the MS and NMS to fully and effectively implement the European regulations in order to provide a safe and favourable environment for SRP.

SRP are not being fully deployed and a considerable biomass feedstock resource is not being utilized. The reasons behind this lack of development might as well lie in the significant degree of ignorance about the potential of biomass as an energy source, mainly within the farming sector and the perception of high risk, which is often not justified. Both these issues need to be addressed at European and local level.

Energy planning, environmental and agricultural policies are all relevant for SRP and changes in one area can deeply affect others as it has been often the case.

7 SUMMARY AND CONCLUSIONS FOR BULGARIA

For the references mentioned, please refer to the List of Legislation for Bulgaria in Annex 1.

Agricultural related regulations

The frame of the present environmental legislation is the Law for the environment protection, see Reference 1. This Law is focused on the system of ecological standards, prevention of pollution and the right of society to be informed in case of pollution. According to this Law the farmers are obliged to provide an ecological estimation as well as the estimation on the environmental effect of their activity, see further in Reference 1.

Requirements for soil protection are outlined in Reference 4.

In reference 8 the rules for good agricultural practices are settled. It also defines the use of wastewater as fertiliser, see below.

Wastewater and sludge related regulations

Reference 2 treats the waste management as an aggregate of rights and duties, decisions, actions related to the production and treatment of waste as well as the control of these activities. According to this law the farmers are obliged to apply environmentally friendly production methods in order to decrease and limit the quantity of waste. The state supports the waste management by stimulating the programs for utilisation of the useful components of waste.

Reference 5 provides the framework for other legal acts concerning the preservation of waters.

In Reference 6 the requirements and standards for sediments destined for agricultural use are outlined. This ordinance is applicable for sediments of wastewater and it determines the soils and cultures for which the sediments could be used. The user of sediments is obliged to make a soil analyses for the following parameters:

1. pH
2. Content of heavy metals.
3. Content of nitrate, phosphorus, potassium
4. Organic matter

The objective of Reference 7 is the preservation of waters from nitrate pollution. The ordinance introduces the rules for:

- Identification of polluted water with nitrates
- Application of a “good agricultural practice”
- Training of farmers and dissemination of information on the application of good agricultural practice
- Preservation and elimination of pollution

Reference 7 also determines the measures for prevention of pollution with nitrates.

Reference 8 states that wastewater can be used as a fertiliser after a period for conservation of at least 4 months, which is the time necessary for the fermentation process.

Energy related legislation

A Strategy and Action plan for stimulation of biofuels in Bulgaria in order to stimulate the investments in this field is under development, see Reference 3.

Limitations & missing legislation for Bulgaria

The Directive 2003/30/EC (see Chapter 3.5) is not yet transposed into Bulgarian legislation. Bulgaria is still in a process of preparation for the EU adhesion, which is expected on 1 January 2007. The lack of the relevant legislation will not directly influence or impose any risk for the implementation of BIOPROS.

While the environmental legislation is almost harmonized with the European standards, programs or legal acts providing some financial support to the farmers for energy crop production is not yet available.

In this regard the BIOPROS project could provide a very important practical tool for farmers not only to fulfil their obligations in respect of the environmental legislation, but also to increase their incomes.

8 SUMMARY & CONCLUSIONS FOR THE CZECH REPUBLIC

For the references mentioned, please refer to the List of Legislation for the Czech Republic in Annex 1.

Agricultural related regulations

There is so far no clear answer to if SRP will be classified as agricultural land or not in the Czech Republic. Having spoken to different people experimenting with the use of sludge on Short Rotation Plantations (SRP), it turns out that their land is classified very differently – some declare it as agricultural land, some as forestland. People working with legislation have not been able to give a clear answer.

Reference 10 defines the agrochemical characteristics of agricultural land and the way the samples are taken. Agrochemical testing needs to be applied for all agricultural land. The results of the tests (nutrition values) need to be submitted if somebody wants to apply sludge. Thus, this will also concern SRP.

Reference 18 describes the subsidies for SRP and also declares that a farmer must deregister the SRP land as agricultural land. If the farmer later on wants to go back to agricultural crops on the deregistered land he must register again. To start a SRP, the farmer also needs, before starting the plantation, to find a buyer for the crop that will be produced (see also Chapter 4.1.3.1). All this creates administrative burdens and extra costs for the farmers. The status “Deregistered” land means that the land is “temporarily taken out of the Agricultural Fond” (see Reference 18 for the definition of the Agricultural Fond). No Act or Regulation later refers to this special status, which takes us back to the problem of finding what exact conditions may apply on land on which SRP is cultivated.

It is important to clarify that no regulation has been found that states that the farmer is obliged to deregister as long as he does not want to apply for the subsidy. There are examples of farmers in the Czech Republic that cultivate Short Rotation Coppice (SRC) but still have not deregistered.

Reference 19 defines pollution limits for agricultural land, which might be to a certain extent a guideline for the fertilising with sludge on non-agricultural land.

Wastewater and sludge related regulations

The Act on Waste (Reference 1) applies to all kind of wastes, including liquid waste (including sludge). However, it does not apply to waste defined under Article 2, like for example, wastewater. Wastewater is covered by the Act on Water.

Sludge from municipal wastewater treatment plants belongs to the category of waste. According to Czech law sludge is defined as waste (Ref 1).

It is allowed to use only treated sludge taking into account the nutritional requirements of plants under the conditions stipulated in Reference 1 as well as in Reference 5, and in

accordance with the sludge use programme so that the quality of soil and the quality of surface waters and groundwater is not deteriorated. The Act on Waste also defines cases in which the use of sludge is prohibited. This limits the area that SRC fertilised with sludge can be grown on. However, if assuming that SRP will not be grown on areas listed under a)-k), in Reference 1, then these limitations do not apply for BIOPROS.

According to Reference 5 the producer of sludge must provide the analysis of the sludge sample.

The Act on Water defines the term of „wastewater“, but does not deal with it any further except for forbidding the use of contaminated wastewater (Reference 2). The Act does not specify the case of sludge application in the case of SRP but it is likely that also in the case of SRP a pollution analysis will have to be conducted.

Reference 3 defines conditions for the use of sludge and cases, where sludge is prohibited to use. The Act also defines the obligation to register the use of sludge. More on this registration can be found in reference 9. Whether the registration will concern SRP will depend on if land with SRP will be classified as agricultural land or not. Reference 3 furthermore defines the agrochemical testing of soil and the way it is carried out. This testing is only relevant to BIOPROS if we will also include non-wooden energetic plants.

Reference 4 defines the catalogue of wastes. If sludge from wastewater treatment plants is classified as dangerous waste, it may not be applied on agricultural land, even if this is for SRP production.

Reference 5 is the most important regulation regarding the application of sludge on agricultural land. It does not contain any specific reference to SRP. The ordinance defines the technical requirements/conditions for the use of treated sludge on agricultural soil including the allowed amount and the way of application, the concentration limits of chosen risky substances in the soil etc. Furthermore the method of taking sludge and soil samples and carrying out analysis of soil and sludge is defined.

Note that Reference 5 deals with the use of sludge on agricultural land. If SRP's are not cultivated on agricultural land then this ordinance is not relevant anymore. In that case “normal” environmental law that prohibits the pollution of the environment deals with the use of sludge. If on such land sludge is applied, this needs to be approved by the district authority, which it self establishes the maximum pollution limits. The use of sludge is therefore possible, but there is no unified standard or procedure for the approval of such use, and the application of the regulations seem to vary from case to case.

Reference 8 defines the technical requirements and conditions for the usage of waste on surface territory (related to Reference 1, above). Biological degradable wastes as carrier of nutrients (e.g. sludge from municipal wastewater plants) must be proven to be treated (removal of dangerous substances etc.). If sludge from WTP fulfils the requirements defined in this ordinance, the sludge could be used on recultivation land, which can be used for the cultivation of SRC.

Reference 11 refers to sludge from wastewater treatment plants, which are used to produce industrial compost. This indirect use of sludge might be applicable for SRP on land of worse quality. The adding of this industrial compost could improve soil quality. However, from a cost point of view, the direct application of sludge might be more advantageous.

The governmental order Reference 12, defines measures that prevent and limit the production of waste, and defines measures for the removal of dangerous substances from waste. This means that the use of sludge on agricultural land or as compost is preferred to other ways of disposing sludge and might therefore support the use of sludge on SRP.

Energy related legislation

The purpose of Reference 14, is to create appropriate framework conditions for the Czech Republic to fulfil its indicative target of providing 8% of its electricity (gross consumption) from renewable energy sources by 2010. It provides support in two manners and if SRP wood is used for the production of electricity, it benefits from this support. This improves the economics of a project based on SRP and therefore encourages the use of SRP (and any other biomass). Following on reference 14, there will soon also be an ordinance (December 05?) that will define biomass entitled to obtaining support as biomass and classify biomass according to its purpose of use, anaerobic digestion, co-firing etc. (Reference 15).

There are also regulations for Guaranteed feed in prices and Green bonus, see Reference 14 and 16.

Reference 17 makes clear that biomass used in co-firing is financially rewarded.

Finally, Reference 20 consists of a number of additional ordinances defining technical requirements for the combustion of biomass, which however is only indirectly linked to BIOPROS.

Limitations & missing legislation for the Czech Republic

In the Czech Republic an ordinance on biological methods of biodegradable waste treatment is missing. The Act on fertilisers has only one quality class for composts and digestates (the limits corresponds to classes for compost for ecological agriculture in other European countries). The Act on fertilisers does not cover the requirements for the technologies for biological treatment of wastes. The act on fertilisers does not contain the microbiological criteria to insure that composts and digestates do not contain pathogenous organisms. There are also other reasons why the non-existence of an ordinance on biological methods of biodegradable waste treatment causes problems in utilisation of biodegradable wastes on recultivations, for industrial and energy crops, in forestry, etc.

At the moment, no legislation in the Czech Republic covers in detail the application of wastewater on agricultural land. Insufficient legislation prevents the wider use of wastewater, e.g. as fertilisation alternative for SRP.

The use of sludge is not prohibited, but there is also no legislation specifically describing conditions for the use of wastewater on agricultural land. In small municipalities, where there are no WTP, the content from septic tanks is very often just taken to the fields (see ref. 2).

It seems to be beneficial to use wastewater on SRP for recultivation purposes. Apart from the fact that this land has low nutrition values, the ground water is very deeply situated so the contamination risk is low.

For the application of wastewater on agricultural land it would be necessary to define exact limits of hazardous substances and microbiological characteristics. Moreover, it would be necessary to define areas, in which the application is allowed and in which not (with regard to surface and groundwater).

The assessment of hazardous substances is inconsistent among the individual regulations for the usage of sludge (composting, usage on agricultural land, recultivation).

Due to the fact there are strict limits for sludge that is used on agricultural soil (defined by ordinance No. 294/2005 Coll.), less and less sludge has been used for this purpose, whereas the share of composting (for which there are less strict limits regarding heavy metals and for which microbiological criteria are not defined) have risen. The compost is then very often used on agricultural land anyway. This can be seen as a kind of “discrimination” for sludge, because it has to fulfil stricter norms. It is necessary to unify the regulations on hazardous material and to simplify the requirements for the use of sludge.

The examination of dangerous infectious characteristics is not covered very well in current legislation. The legislation does not establish any technology guaranteeing hygienic treatment, which would be sufficient for the treatment of infectious substances.

No sufficient technology for the hygienic treatment and the lacking definition of microbiological criteria makes people sceptical regarding the use of sludge on agricultural land. It will thus get yet more difficult to convince the public to use sludge, even if it will be legally allowed. This makes the BIOPROS project dissemination activities even more important.

Appropriate waste regulation should be changed, and there should be better cooperation between the Ministry of Environment and the Ministry of Health. For example, the introduction of a definition and the specification of particularly hazardous waste – infectious substances, microbiological examination etc. – into the definition of dangerous infectious characteristics.

Finally, as in most European countries, there is no financial support for the generation of heat from renewable energy resources (comparable to the support of electricity, e.g. through a feed-in-law).

9 SUMMARY AND CONCLUSIONS FOR ESTONIA

For the references mentioned, please refer to the List of Legislation for Estonia in Annex 1.

Agricultural related regulations

A bit more than half of the agricultural land in Estonia is drained. The Ministry of Agriculture of Estonia has doubts about planting Short rotation Plantations (SRP) to drained areas (see Reference 1). BIOPROS therefore have to

- Choose the farmer's site into not-drained area and
- Convince with our scientific materials the Ministry that willow SRP does not cause any harm to drainage system (the fine roots do not reach the depth of pipes).

Almost half of the Estonian cultivation area is still state land and this land is supplied by the land reform act to be used as agricultural land by using usufruct (Reference 2). However, the land reform Act also states a 10-year use period for usufruct. Since the lifetime of SRP can be up to 25 years, willow plantations are not allowed on the land by usufruct. These limits of possible SRP locations should be kept in mind while disseminating the methods of SRP among Estonian farmers.

It is forbidden to plant foreign species in Estonia and the only native poplar is the *Populus tremula*. There is also one type of SRP species that is allowed to be used for afforestation; the *Populus tremula* x *P tremuloides* (Reference 3). There are also hard regulations on nature protection. This regulation is important to keep in mind while choosing planting material to BIOPROS field sites.

Reference 4 specifies the possible areas for farmer's test site in BIOPROS.

There is no special supportive legislation for SRP in Estonia.

Wastewater and sludge related regulations

The Water act sets requirements for using fertilisers, sets limitations on spreading wastewater etc, as well as limitations on crop demands and on regions. A special licence for water usage is needed for wastewater purification systems (Reference 5). As wastewater is not included in the list of fertilisers and SRP is not included on the list of crops, we will probably need active discussions with the local authorities to convince them of the environmental safety of trials.

Reference 6 sets requirements (= quality demands and its control methods) for wastewater leading to ground or water bodies. These requirements will be specified in the licence for water usage (as described in Reference 5).

Reference 7 states that any wastewater treatment plant (including vegetation filter) has to be built for at least 15 year. Biomembran has to be used on areas where groundwater is endangered. These limitations should be kept in mind while disseminating the idea of vegetation filters with SRP's among local authorities and farmers.

Sludge is not regarded as a fertiliser, and therefore the fertilisers Act is not valid for sludge (Reference 8). One aim of the BIOPROS project is to prove the benefits of sludge usage for non-food crop fertilising. In the long run this should end with the including sludge to the list of fertilisers in legislation acts.

Sludge is regarded as a waste (Reference 9). The positive results of the BIOPROS project should lead to a legislative mechanism that supports the utilisation of sludge as a fertiliser in SRP's.

Reuse of untreated sludge is not allowed. Reuse of pre-treated sludge in SRP's is possible under certain conditions (Reference 10). A special licence is not needed, but soil analyses have to be done for using sludge. If the farmer wants to use the farm sludge, he has to analyse the sludge composition.

Energy related legislation

The possessors of sources of pollution shall take additional measures to reduce the emission levels of carbon dioxide and other greenhouse gases (Reference 11).

5,1 % of electricity should be renewable in 2010. About 2.6% of that is predicted to be based on biomass, but the type of biomass is not specified (Reference 12).

Limitations & missing legislation for Estonia

By the EU Commission regulation 1444/2002, willow plantations are described in statistics as forest areas (I Annex H/2).

From the Council regulation (EC) No 1782/2003 and its implementing regulation 1973/2004, there can be understood that the willow plantation should not receive CAP SAPS payments, as the regular agricultural crops does. This needs to be clarified.

It should also be clarified if it is possible to receive less favoured areas support and environmental friendly production support for willow plantations. All the CAP accompanied measures are related with agricultural lands and grasslands, but are they also possible to use for willow plantations?

In Estonia the aid for energy crops is not implemented yet, as is made possible by the Council regulation No 1782/2003. (According to plans this supporting system will be opened in 2007, but it is not sure yet.)

Requirements for reuse of sludge in agriculture, greenery and recultivation are missing.

Untreated sludge can be reused in greeneries and for recultivation but not in agriculture. Perhaps an exception can be made concerning usage of sludge in SRP's to allow use both untreated and pre-treated sludge there. Since SRC's are not determined as agricultural crops, this should be possible.

Wastewater is not determined as fertiliser. Using it for such a purpose has not been taken into account nor regulated. The BIOPROS project should lead to the improved usage of wastewater and sludge and the dissemination activities should convince the decision-makers of the demand

to include wastewater to the list of possible fertilisers with the possibilities to get support to utilise it in an environmentally sustainable way.

There should be a regime of wastewater disposal to natural water body or ground. The possibility that wastewater is evapotranspired in a SRP without any outlet points is not considered so far. (Reliability of wastewater purification plants is controlled by analysing samples from outlet points; which in the case of SRP's is complicated.)

10 SUMMARY AND CONCLUSIONS FOR ITALY

For the references mentioned, please refer to the List of Legislation for Italy in Annex 1.

Agricultural related regulations

Reference 3 implements mechanisms that provide grants for planting of trees for biomass production with a minimum duration of 15 years and extension of at least of 1 hectare and at least 1.100 plants per hectare. Single farmers or an association, cooperative, consortium etc., local administration or any other private law person are eligible. It is relevant to BIOPROS that in this Region the next Regional Development Plan will include other measures like these, which intend to promote and stabilise the wood supply chain for energy purpose.

Reference 6 approves the national greenhouse gas emission reduction targets at 95-112 Mtoe CO₂, by the years 2008-2012. Among other things it foresees the production of dedicated biomass and foresees the “National Program for the development of agricultural and forestry biomass”. It sets important objectives like protection and extension of forests for CO₂ absorption, sustainable agricultural and forestry schemes, etc. In practise no specific financial source for the emission reduction had been implemented and short rotation forestry had not been promoted.

The resolution in Reference 8 underlines the need to introduce new afforestation measures to reach the objectives of GHG emission reduction. It foresees a recognition and reorganisation of the legislation on forestry for this purpose. The resolution is a national plan for emissions reduction; it shows the limits of the emission that must be respected. It is related to the framework of BIOPROS in an indirect way since it promotes renewable energy production.

Reference 10 provides an aid scheme for farms for energy cost reduction and incentives for renewable energy sources utilisation. According to the art 2 paragraph 4: “...*the incentives support the realization of renewable energy plant and systems that reduce pollution and energetic consumption...*”. Thus, the decree supports the framework of BIOPROS: it promotes biomass plants but it could also promote systems that reuse wastewater and sewage sludge.

Reference 14 describes strategies for afforestation in the Molise Region. In this regulation afforestation for energy purpose were not supported and promoted properly. In the next regulation, for 2006-2013, this must be clearly set as a priority, supported and promoted consequently, involving also wastewater and sludge utilisation in view of the farm multifunction objectives foreseen.

Reference 15 and 16 are regional laws for the Veneto Region. Ref 16 promotes and fosters the agro-forestry-energy production chain by providing specific contribution for wooden plantation for energy purposes, or for dedicated biomass plantation within a range of minimum 0.3 and maximum 4 hectares. This law intends to, like the BIOPROS environmental and social long term effects objectives, increase the production of CO₂-neutral wooden biomass with Short Rotation Forestry as a renewable raw material for energy purpose, contribute to soil improvement on agricultural land by humus and nutrient enrichment, to create employment in

especially rural areas and throughout the whole biomass sector, to strengthen general sustainable development in rural areas etc.

Reference 16 intends to promote the SRF system development supporting the production, harvesting, transformation and use of woody biomass for energy production. Contributions are previewed for the plantation and mechanisation costs and also for the promotion of biomass heating systems of low and medium power.

Wastewater and sludge related regulations

Reference 17 assigns to the Regions a central role in water protection policies by means of the enactment of regional Water Protection Plans. This decree has been conceived in order to adopt into Italian legislation the European Directives 91/271 on urban wastewater treatment and 91/676 on protection of water from agricultural pollution. The treated water can be used for irrigation, civil (street washing, cooling or heating plants feeding) or industrial purposes (process water). The decree states the minimum requirement for some chemical-physical and microbiological parameters.

Reference 18, the so-called “Galli Law” contains “new provisions relating to water resources”. Through this legal framework, the Italian Parliament approved new regulations concerning water resources, bringing about a move from a fragmented and uncoordinated system to one based on market principles (Integrated system). There is a brief explanation of the general procedures for the use of refluent water but in technical terms and without stressing the role of the agricultural sector. Later on it is explained that the regions have to adapt programmes for the use of water by means of incentives and facilities for companies needing equipments for the reuse and recycling of treated refluent water.

Reference 19 regards the reuse of purified wastewater, which aims to reduce the pollution of water bodies due to discharges. It contains measure regulating the technical standards for the reutilisation of wastewater. Interesting for the project is the use of wastewater for the irrigation of food and non-food crops. For further details about irrigation the decree refers to the code of agricultural good practices (Decree 86 of the Ministry of Agriculture and Forestry 19 April 1999.) This decree indicates that sludge fertilizers from wastewater purification processes can be used if they have the right characteristics.

Reference 21 implements Directive 86/278/EEC and regulates treated sludge utilisation in agriculture. It sets the rules and conditions for the correct use of purification sludge in order to avoid harmful consequences for the land, the vegetation, the animals and human beings. Before use in agriculture, sludge must be treated, must have fertilising or amending effects on the soil, and must not contain hazardous substances. More detailed rules are set for sludge application, exclusion and the competences of the state, the regions and the districts. It sets conditions for sludge handling, distribution etc. in agriculture and in what case the distribution is forbidden. Italian legislation addresses mostly urban sewage sludge; mixed and industrial sludge can be used on land as long as they have similar characteristics to sludge from urban wastewater treatment.

Energy related legislation

Reference 1 promotes high yield cogeneration pilot plants, with an installed capacity of less than 5 MWe, exploiting the produced heat for cooling system. Among the priorities agricultural and forestry sector is foreseen and beneficiaries are also agricultural and forestry enterprises.

Reference 2 sets compensative measures to stimulate the reduction of polluting emissions, increase energy efficiency and use of renewable energy as well as the management of heating network systems with biomass energy resources.

Reference 4 introduces biomass among the other combustibles for industrial and civil purposes. Dedicated vegetable materials are considered as biomass combustibles. Reference 5 provides a classification of solid and liquid biofuels from a technical and commodity point of view.

Reference 7 approves the “National Program for the development of agricultural and forestry biomass”, which points out the main actions to carry out in order to stimulate the production and the utilisation of biomass for energy purposes.

The aim of Reference 9 is to improve the energy transformation processes, reduce energy consumption and improve the environmental compatibility conditions of energy use. The use of renewable energy sources is among the norms prescribed by the law.

Reference 10 provides an aid scheme for farms for energy cost reduction and incentives for renewable energy sources utilisation.

Reference 11 obliges all energy users or producers to insert, by the year 2002, into the national circuits at least 2% of the total amount of energy used the previous year in the form of renewable energy. In order to meet this annual threshold, interested operators are required to file Green Certificates.

Reference 12 aims to foster the renewable energy sources contribution for the electricity production at Italian and community market level.

Limitations & missing legislation for Italy

Green certificates do not distinguish between renewables. Biomass is a primary energy cost, while solar, wind, water, etc are not. This represents a disadvantage for biomass utilisation for energy production compared to the other renewable energy sources.

There is also a lack of specific agricultural aid or provision for Short Rotation Plantations (SRP), particularly within regional developments plans.

11 SUMMARY AND CONCLUSIONS FOR POLAND

For the references mentioned, please refer to the List of Legislation for Poland in Annex 1.

Agricultural related regulations

Reference 1 states that all farmlands should be kept in good agricultural culture. Arable lands used for perennial plantations should be treated in a specific way. The Regulation contains the information that farm lands cannot be planted with trees and bushes, except for bushes and trees protected against cutting, with influence on the protection of the water and ground, having no influence on the plant production, as well as lands with established plantations of basket willows (*Salix* sp.) used for weaving.

Reference 13 precise the principles of spatial politics realised by local authorities especially with regard to allocation of the areas for the purposes and principles of land adaptation that follows a land development plan.

The act for the protection of arable lands and forest areas (Reference 14) regulates principles of arable and forest areas protection as well as their rehabilitation and improving of soil utility. The BIOPROS Project is in conformity with the act. Besides, the main goal of the project, as the use of wastewater in the energetic willow fertilizing, concerns the protection, rehabilitation and improvement of arable lands. The increase in soil productive value, changes in spatial structure of soil and removing of stones and bushes seems a very important factor in terms of arable lands protection.

Reference 22 concerns requirements for activities aimed at the limitation of nitrogen outflow from agricultural sources (further described in chapter 0 below). What regards water erosion, attention should also be paid to the other aspect of willow production: Production of energetic willow may succeed in decreasing water erosion especially in autumn when the plant cover in weak. It may be considered as one of the basic methods in the erosion decrease. Willow plays other roles:

- Protects soil against degradation caused by rain drops,
- Retains snow cover,
- Limits the surface outwash of soil in spring

Willow may therefore be an important component of so called “green fields”. Green fields have been consisted so far of multi-annual plants, great diversity of winter varieties of plants. Similarly to other plant species, willow may decrease the amount of Nitrogen leached to the deeper layers of the ground. On the lowlands about 60% of arable lands area, and on the hilly areas in a danger of erosion at least 75% of the area should be plant covered permanently.

Wastewater and sludge related regulations

The Water Law (Reference 9) is one of the basic legislations on water quality and quantity protection. The act concerns water management according to the rule of sustainable

development, particularly protection of water environment, use of water and water resources management (see further Reference 9). The act implements several EU directives. The most important what regards BIOPROS and the water law are the following points (A-B):

A) The input of wastewater to soil or water requires the “water-law permission” from local authorities. It is required also for agricultural use of sewage as well as wastewater/sludge storage. The application form for the “water-law permission” is to be prepared both in graphic and descriptive forms. It should contain:

- 1) Amount, forms, state and composition of wastewater as well as expected way of its purification.
- 2) Description of installations and devices for wastewater storage, purification and transportation.
- 3) Range and frequency of the required analyses for sewage introduced to soil or surface or ground water beneath and below the place of the sewage dump.
- 4) Description of the installation system for the measurements of sewage properties (amount, form, condition, composition)
- 5) Quality of the water being the receiver of the wastewater
- 6) Information regarding the sludge management/utilisation

To obtain the “water-law permission” for the utilisation of agricultural wastewater/sludge, the application should contain as well:

- 1) Amount, composition and type of wastewater,
- 2) Unit doses of wastewater and terms of their application,
- 3) Areas and characteristics of the ground where the wastewater of agricultural origin would be applied.

B) Everyone who introduces wastewater to ground or water is obliged to assure the water protection against pollution, in particular through the installation or building of the devices or exploitation of the other methods for water protection.

Selection of the place and the method of wastewater utilisation should minimize the negative influence on the environment.

Domestic sewage/wastewater, municipal, industrial of a composition similar to the domestic wastewater may be purified when agriculturally used.

The agricultural use of wastewater means: the application of wastewater to irrigation and fertilizing of arable lands as well as fishponds.

Reference 10, with changes to the Water Law (Reference 9) gives a more detailed description of the Water Law.

The Law on Environmental Protection, Reference 11, is one the basic legislations on Environmental protection. Most important to what regards BIOPROS, is that the owner of the ground, where the pollution of soil or water happen, is obliged to rehabilitate the soil/water. Standards of water/soil quality are determined by the content of some substances in soil/water, beneath of which, any of the soil/water functions cannot be fulfilled.

Basic rules on counteraction for pollution allow for the input of some portion of substances but only at amounts indispensable for conducted activity. Substances, particularly hazardous for the environment are not permitted to be introduced to water or soil. These are: 1) asbestos, 2) PCB.

To introduce wastewater to soil or water, relevant authorities have to issue “the water-law permission” for the introduction of wastewater to water or soil. An introduction of wastewater to soil and water is charged.

Reference 12, the Act on waste materials, respects the rules of proceeding with waste materials. Having in mind the targets of the BIOPROS project, useful is chapter 5 (Detailed principles of management of some waste materials especially wastewater and sludge), in which article 43 concerns municipal sludge. Municipal sludge may be used when stabilized and prepared suitably towards elimination any hazard for human health and environmental conditions. Before usage, both municipal sludge and the ground on which the sludge is going to be used, have to be examined. The areas where the use of municipal sludge is forbidden are also listed in Reference 12. Categories of sludge are listed as well.

The Act on Fertilisers and Fertilizing, Reference 15, regulates the affairs in the field of: 1) the fertilisers’ turnover and application; 2) preventing from people’s and animals’ health problems, environmental hazards which may results from transportation, storage and use of fertilisers; 3) agrichemical service for agriculture. According to the act, a fertiliser means each product intended for supply plants with nutrients, or to the increase in soil fertility or fishpond fertility. When natural fertilisers are applied, an annual dose is not allowed to contain more than 170 kg of nitrogen (N) in pure component per 1 ha of arable lands. Reference 15 also explains when fertilising is forbidden.

Reference 16 determines conditions to be fulfilled when wastewater is applied to the ground of water as well as towards agricultural use of wastewater. The place and frequency of the uptake of wastewater samples as well as reference methods of analyses and assessment are also presented in the regulation. Substances particularly harmful (which should be taken into account even if domestic or municipal sludge is applied) for the water environment that cause water pollution are also presented.

What regards BIOPROS, the main rule is that the wastewater/sludge introduced to water/soil should not bring about any physical, chemical and biological changes of water and in this way that disturb water quality and a proper functioning of water ecosystems. Requirements concerning wastewater purification are depended on the “RLM index” which means the load of wastewater treatment plant calculated over relevant number of inhabitants. The rules for the RLM index are outlined in Reference 16.

Reference 17, Regulation of the Ministry of Agriculture and Rural Development, concerns the method of water, reclamation devices and reclaimed ground records. The regulation seems to be useful in case of willow irrigation with treated wastewater. When the ground is irrigated with wastewater and the soil properties may change, and especially when “water-law” permission is required, the local authorities keep a record of the area.

Reference 18 concerns the classification for presenting quantity and quality of surface and ground water, methods of monitoring performance and methods of the results interpretation and presentation. The main value of the regulation – although it is already expired– is 5-degree

surface water classification. This 5-scale is still used in some publication due to the lack of the newer classification. Besides, one may find a 3-scale classification, which is the most common water quality classification in Poland.

Having in mind possible changes in water quality towards its deterioration, as the result of willow irrigation with wastewater, the classification of surface water quality is the reference point in any comparisons that will be made.

Reference 19, Regulation of the Ministry of Environment concerning municipal sludge is one of the most important legislation for the BIOPROS project. The regulation determines the conditions need to be fulfilled when the sludge of municipal origin is going to be used. It precise the doses of sludge that may be applied to the ground and contains the range, frequency and methods of the reference research sludge and ground on which the sludge is going to be used, see further the tables in Reference 19.

Reference 20 concerns fines for the limit exceed of the sewage discharge into water or ground as well as the exceeding of an allowed limit for the noise, in 2006. The proclamation is composed of a table containing upper limits of fares for the exceeding of limit amounts of wastewater discharged to water or ground. What regards BIOPROS, in case of exceeding the conditions of the input of sludge to soil or water; one should have in mind how much the fare is. When the allowed levels of pollutants in sludge are exceeded, the fare for 1kg of the sludge introduced to soil/water amounts to 1018.44 PLN \approx 250 €!

Reference 21 concerns criteria for the defining of water sensitive to pollution with nitrogen compounds from agricultural sources. It is relevant to BIOPROS to note in this regulation what water polluted with nitrogen compounds means, se descriptions and tables in reference 21.

Reference 22 concerns the detailed requirements for activities aimed at the limitation of nitrogen outflow from agricultural sources. It indicates special programmes where the preventive means are worked out for obligatory use (nitrogen balance, a plan of fertilisers use in a farm), determined in the attachment 1 to the regulation. What regards BIOPROS, for the areas particularly endangered with nitrogen (which should be taken into account within the experiments conducted within the BIOPROS project - whatever is the origin of sludge!), for which the nitrogen outflow has to be reduced, some programs for the reducing of the nitrogen outflow from agricultural sources are obligatory. Any sludge application to soil or ground may be controlled by relevant services. Monitoring of the Nitrogen outflow requires two documents made by relevant monitoring or control service:

- 1) Nitrogen balance calculated per unit area of e.g. arable land
- 2) Fertilisation plan in the farm (here: the experiment).

Reference 22 also precise the means of the reduction of Nitrogen from agriculture; see the list in Ref 22.

Finally, Reference 23 concerns the criteria and procedures permitting for waste material deposition in waste lagoons. This is not directly connected to the BIOPROS project. However, in some cases storage of the sludge or wastewater may be needed. We have to be prepared that the sludge is not neutral for the environment and it requires special storage and so called “basic characteristics”. The basic characteristics contain information on changes, which may occur during storage, properties and susceptibility for leaching.

Energy related legislation

Reference 2, which has now been abolished, illustrates the development of Polish legislation what regards Energy. This legislation was replaced by Reference 3 which provides different types of renewable energy sources, technical and technological standards of renewable sources, demands for specific parameters, registrations, amounts of energy or heat obligatory in renewable sources, a way and amount of energy that is obligatory to be purchased by the energy industries in the following 10 years and a way of including in the costs of energy and heat (based on tariffs) the costs of purchasing and generation. Additionally, Reference 3 also includes the information that energy and heat from biomass is a renewable energy sources, which bring this regulation closer to the demands of the European legislation.

The Energy Law (Reference 4) is the most important energy act in Poland. But it is very general and has no direct implications for BIOPROS project. It provides the rules of energy policy in Poland, the rules of energy, fuels, heat generation and supply, the institutions responsible for this policy, different types of concessions and tariffs. It describes also the definition of renewable energy sources.

Reference 5 defines the main aim that the growth of utilisation of energy from renewable sources should be an integral part of sustainable development of the country. It describes the targets in the energy policy of Poland for the nearest future. It is an act that does not provide any obligations for BIOPROS project.

Reference 6 describes the main aims of the Polish energy policy for next twenty years. It is an act that does not provide any obligations for BIOPROS project.

Reference 7 summarises all previous acts concerning the Polish energy policy from the beginning of 1989. It also provides the rules of future energy policy in Poland with respect to energy security, long-term general activities (until 2025) and executives activities (until 2008) in the energy sector, as well as the growth of the renewable energy sources, like biomass, which is very important for the BIOPROS project. According to this act and all energy regulations, it is necessary to note that Polish legislation is going to be closer to the European legislation demands. In the present it is very hard to find any specific regulations on these matters, except the general ideas and aims for the future. Hopefully in the near future Poland will have a sufficient legislation on what regards renewable energy sources.

Reference 8 is a non-obligatory proclamation but never the less of big interest for BIOPROS. It gives recommendations for the next 10 years (with no obligations for BIOPROS). In Poland the amount of renewable energy sources in total balance of energy generation in 1999/2000 was 2.35 TWh (1.6%). The target for 2010 is 7.5%. It is also planned to implement the subsidies to the willows plantations (*Salix* sp.) and roses (*Rosa multiphora* var.) like as in the other European Union Member States (EU-15), which may be useful for BIOPROS. In 2006 the farmers will probably get the first payments. The farmers should fill all necessary forms and send them to the 'Agencja Restrukturyzacji i Modernizacji Rolnictwa' (Agency of the Restructuration and Modernization of Agriculture). However, in 2005 the government did not accept those direct payments. The Proclamation (Reference 8) also describes the role of biomass in the national policy in the near future. Currently there is a limited supply of Biomass in Poland, not proper utilisation of forest biomass (processing aims only), unfavourable conditions of the weather and law of nature protection, and limited use of biomass (heating

aims, liquid fuels). However, the Polish Parliament works on harmonisation national legislation to the EU demands.

Limitations & missing legislation for Poland

There is no official statement of the Ministry of Environment regarding the classification of surface water quality.

In Poland, at present there is no clear situation concerning surface water quality classification. Since February 2005 the Act (see reference 18) has not been obligatory any more. Some researchers use this 5-scale classification and some other use previously obligatory 3-scale class of water quality. A solution would be that WHO/EU classification of water quality could be commonly used over the countries since it is representative enough.

Recommendations of the most efficient methods for ecologically suitable sludge application (irrigation, sprinkling, reclamation ditches and channels etc.) are needed. There are no legislations on the methods of sludge application in presently binding regulations. There is a need for reflection regarding the methods of willow fertilization. Sludge application depends not only on a season (what is underlined in polish legislation) and hill-slopes, but also on many other factors e.g.:

- Type of soil and its nutritional values before fertilizing,
- Substrate,
- The fertilizing area
- Frequency
- Plant species (seasonal, annual or multi-annual ones) and their requirement for water and nutrients
- Weather conditions etc.

The last factor may highly differentiate the results of the willow production between countries.

12 SUMMARY AND CONCLUSIONS FOR THE SLOVAK REPUBLIC

For the references mentioned, please refer to the List of Legislation for the Slovak Republic in Annex 1.

Agricultural related regulations

Reference 5 formulates details on soil sampling, testing, characteristics, on agriculture plot and record keeping of fertilisers use and disposal and on the way of annual balance comparison of nutrients and soil organic mass on agriculture land. It concerns also energy coppice, whereby the basic parameters are analyzed regularly, at least every 4 years.

Reference 7-9 regulates the case of land afforestation of protected areas, changes in the land use and the need for afforestation of land that is not suitable for agricultural practices and unused soil etc. Reference 11 regards permission for afforestation of agricultural land and reference 12 the disposal of land of unknown owners.

In the discussion about afforestation, the most important regulation is Reference 10, which aims to afforest 1700 ha of agricultural lands (in long term, the aim within the state conception is 23 000 ha) and on 10 % of afforested land to realise short rotation coppice (SRC). The conditions for obtaining grants for afforestation are also outlined in Reference 10.

Wastewater and sludge related regulations

Reference 2 regulates the conditions of the use of sewage sludge and bottom sediments for soil applications. There are conditions for the amount of sludge used and their application.

On agricultural lands, or on forest soils, it is forbidden to apply sludge, from septic tanks and from other similar equipments aimed at wastewater and sludge treatment from sewage treatment plant, which treats industrial wastewater. Only wastewater from households or communal wastewater is allowed to be used.

Reference 2 describes in details the conditions under which sludge and sediments can be used for application to the soil, e.g. only treated, with minimum 18 % content of dry matters. Sludge with lower content can be used only from water treatment plant under 5000 inhabitants, soil characteristics, where application is forbidden, etc.

Reference 3 sets the details on the project content and process of certification on sewage sludge and bottom sediments application into agricultural or forest land.

It needs to be noted that in Reference 4, the fertilisers' act, wastewater is not determined as fertiliser and using it for such purpose has not been taken into account nor regulated. However, application of sludge and sediments is regulated in Reference 2.

Restrictions on fertilisers' application with nitrogen content (among them also sewage sludge and bottom sediments) in vulnerable areas are regulated by Reference 6.

Reference 14, The Water Act, has indirect relation through Reference 2.

Energy related legislation

The legislations described in Reference 1 are the only ones regulating in some way the use of energy from renewables. Reference to energy crops is missing, which could be seen as limiting for the BIOPROS project. Currently, a discussion is ongoing in Slovakia regarding if this should be implemented by revising the current acts or if a new separate act dealing only with Renewable energy systems should be elaborated.

Limitations & missing legislation for Slovak Republic

In the Slovak Republic, the specific law for energy crops is not implemented yet. A supporting system for energy crops within the program of afforestation will start to be implemented from spring 2006.

Untreated sludge can be reused in greenery and for recultivation but not in agriculture. Perhaps an exception can be made concerning usage of sludge in Short Rotation Plantations (SRP's) to allow use of both untreated and pre-treated sludge there, especially since SRP's are not determined as agricultural crop.

In the Fertiliser Act and the Water Act, wastewater is not determined as fertiliser, as mentioned earlier. Using it for such purpose has not been taken into account nor regulated. The BIOPROS projects should lead to the improved usage of wastewater and sludge. It is important to have dissemination activities to convince the decision-makers to include wastewater to the list of possible fertilisers with the possibilities to get support to utilise it in an environmentally sustainable way.

There is no regime of wastewater disposal to natural water-body or ground. The possibility that wastewater is evapotranspirated in a SRP without any outlet points is not considered so far. However the reliability of wastewater purification plants is controlled regularly by analysing samples from outlet point, but it is complicated to apply this with regard to BIOPROS.

Appropriate distribution of increased Renewable Energy Sources Electricity (RES-E) purchase costs can be assigned by the obligation to purchase RES-E, which is however missing in the new energy legislative framework of Slovakia.

Currently customers have the possibility to choose the electricity supplier for their own real production costs of RES-E. However, real RES-E prices are not interesting for them since those are higher than the regular cost. Green electricity is interesting for the purchasers, e.g. in case of own electricity production (e.g. small hydro power plants) to cover own consumption. A new National Energy Policy is under preparation.

What regards feed-in tariffs, it is currently not clear how they will be implemented in practice, since this is a new mechanism, which has not been tested in Slovakia yet. The Main problem is how the impact of differences between renewable and regular electricity sources production costs will be reflected in electricity prices for the final customers.

Feed-in tariff support scheme is probably the best solution for a small country like the Slovak Republic, but fixed RES-E prices should be long-term guaranteed. The fixed RES-E prices are set for only 1 year at the time and there is no certainty for the future regarding their change.

Two main barriers to wide “green electricity” production use in the Slovak Republic can be identified. The first problem is in fact that political and legislative state support is considered only as formal and it still didn't take any effect in practice. The second is that there is no study comparing each individual RES-E support scheme feasibility in Slovakia and there are no studies evaluating the costs of support scheme implementation and the impacts of each support scheme.

The following is a short assessment of the available support schemes applicable in the Slovak Republic:

- RES-E plant investment support is reduced to EU Structural funds only. Measurements under EU Structural funds focusing on Renewable Energy Sources (RES) support and their budget items are depleted. It will probably only be available in the next EU budget period 2007-2013.
- No tax allowances are available in Slovakia and there is low possibility to adopt some in the near future while Slovakia has adopted flat tax (19%).
- Fixed RES-E feed-in tariffs support scheme is actually being implemented in Slovakia but prices are not long-term guaranteed.
- Green certificates support scheme is currently not considered for implementation.
- State orders to supply RES-E had only a low impact in France therefore there is no intent to adopt this kind of support in Slovakia.
- Considering the experiences with different support schemes implementation among different EU countries, it rates the system of RES-E feed-in tariffs as the best solution for Slovakia.

What regards research focusing on RES utilisation in Slovakia it could be said that:

- While the area for basic research is limited at this time future research projects should be focused on application research, e.g. integration of wind parks into power systems.
- Most of the large-scale RES-E production technologies are already highly developed but there is still a possibility of partial improvements, mainly in biomass utilisation.
- In the field of basic research, the Slovak University of Technology is preparing project proposals dealing with fuel cells research.

13 SUMMARY AND CONCLUSIONS FOR SPAIN

For the references mentioned, please refer to the List of Legislation for Spain in Annex 1.

Agricultural related regulations

The environmental impact assessments have been identified as the most adequate instrument for conservation of the natural resources and the environment defence, and it is specifically regulated by the European Directive 85/377/CEE.

The Water Act of 2nd of August of 1985 (reference 11) imposes that the authorisations of actions affecting the public hydraulic domain and involving risks for the environment require an assessment of its effects. Thus, every project or action consisting in the realisation of works, facilities or any other activity that could affect the environment, must develop the mentioned assessment.

According to the Royal Legislative Decree 1302/1986 (Reference 5), only the projects regarding water resources management for the agriculture, which affect a larger area than 100 Hectares, must develop an environmental impact assessment and projects affecting an area of 10 Hectares or more are obliged to the assessment only in case the corresponding environmental body decides it. Regional regulations can demand an assessment of a project not included in the mentioned groups.

The regional normative in Andalusia (Act 7/1994 of Environmental Protection, Reference 6), the region of Spain where the field test of BIOPROS will be carried out, exempts the same projects as the national regulation from the environmental impact assessment, but adds two more possibilities of reporting the environmental effects of the project: environmental report and environmental qualification. According to the features of the projects that must inform about their environmental effects, BIOPROS is not obliged to present any kind of environmental impact assessment, report or qualification for its implementation at experimental scale attending its agricultural nature. Nevertheless, in the annex II of the mentioned Act (point 33), it is stated that the wastewater treatment plants and the sludge deposits must present an environmental report. From this point of view, the term of wastewater treatment plant should be clarified with the competent organisms in order to discard a possible consideration of the wastewater land application as a treatment plant.

For future commercial experiences the normative must be read carefully, paying attention to the plantation features, since depending on that the environmental assessment, report or qualification (in the case of Andalusia) could be required.

The Royal Decrees in Reference 21 and Reference 22 are both positive for the BIOPROS project. They refer to the Council Regulation (EC) 1782/2003. Reference 21 states that the surface area that forms the object of an application for aid for energy crops is not eligible to justify withdrawal rights under the single payment scheme. It lays down compatibilities for aid to energy crops provided in EC Regulation CE 1782/2003 and states that the minimum surface area per application shall be 0.3 hectares. It also lays down criteria for sales contracts for energy crop production.

Reference 22 states that the surface area that forms the object of an application for aid for energy crops is not eligible to fulfil the obligation to withdraw land. The compatibilities between the application for aid for energy crops and payment of arable crops are also presented in Reference 22.

Reference 23 governs aid to energy crops in Andalusia.

The Mountain Law in Reference 24 offers guidelines for the management of forestry mass and crops, plant quality used in reforestation, forestry-usable waste, etc, but makes no specific mention of energy crops.

Wastewater and sludge related regulations

Reference 4 is based on the European Directive (86/278/CEE) and establishes that only treated sludge can be used. The decree also outlines conditions that need to be met. Apart from this, the Decree establishes the necessity to accompany every sludge load with the corresponding documents certifying its origin, composition and other information. . It is not stated the sludge use as for agricultural uses, but in any case, the mentioned requirement must be fulfilled by the soil and the sludge (see tables in Reference 4).

Reference 8 transposes the Directive 91/676/EEC, determining the kind of treatment that must be applied to the urban wastewater before the discharge, according to the area (sensitive or not).

Reference 9 develops what is determined in Reference 8 by establishing the requirements that must be met for discharges of treated wastewater (this would be the case for the effluent of the BIOPROS field tests if we consider it as a kind of wastewater treatment). Reference 10 modifies table 10.2 of Reference 9 regarding the Norms Applicable to the Urban Wastewater Treatment (see Ref 10 for the norms).

Reference 11 states that reuse of wastewaters was considered in the original and the rewritten texts of the Water Act and in the Regulation of the Public Hydraulic Domain, which establishes the basis for a later development on the issue of urban wastewaters reuse. It is also laid down that in order to be able to reuse wastewaters, the following authorisations are required: Health Report (Health Department of the Regional Government), Discharge Permission (Basin authority) and Administrative Permission (River Basin authority).

In reference 12 it is said that the Government will establish the basic conditions for the reuse of water, describing the required quality of the treated water on the basis of the foreseen use, but such guidelines have not been developed yet.

However, it must be taken into account that the mentioned premises are designed for a commercial reuse of wastewater, which is not the case of BIOPROS. Possibly, such a special permission will not be necessary in a small-scale experimental test. In a previous experience of wastewater reuse (WACOSYS project), carried out in the same location than the future BIOPROS field tests (Granada, Spain), such permissions and reports were not required, after conversations with the provincial authorities of Granada.

Reference 13 determines that the discharges of wastewaters to the public hydraulic domain (including surface and groundwater, rivers and streams, lakes and ponds) are subjected to the

concession of an authorisation and to emission limits established based on the receiving media and its sensitivity (therefore, submitted to the decision by local or autonomic authorities). However, if proper measures are undertaken, BIOPROS wastewaters should not reach any of the elements of the public hydraulic domain. Moreover, previous experiences with wastewater land application in Spain (at least at research level) did not face difficulties from this point of view. Reference 14 includes amendments to reference 5 and 13.

Reference 15 is the resolution approving the National Plan of the Drainage and Wastewater Treatment for 1995-2005. The basic objective of this plan is to guarantee the quality of the treatment and the discharging of the urban wastewater according to the European criteria by promoting the finalization of the wastewater infrastructures according to the European Directive 91/271 and reutilisation of wastewater. Additionally it promotes the sludge reutilisation and tries to minimize the environmental impact of the sludge treatment or deposit. Although a specific use for wastewater and sewage sludge is not determined, the reuse of both is one of the objectives of the public Hydraulic Domain management. BIOPROS tries to promote the wastewater and sludge reuse by means of irrigation of Short Rotation Plantations and any plan or regulation that supports the same idea will help to the implementation of this practice not only in an experimental scale, but also at commercial level.

The Royal Decree Act, Reference 16, modifies the former Act 10/2001 about the National Hydrological Plan, modifying the National plan itself and promoting the wastewater reuse coming from the wastewater treatment plants in order to increase the availability of water in Spain. Although it is not specifically determined in the text, one of the uses of the treated wastewater could be the irrigation of energy crops, which will benefit the BIOPROS objectives. The double purpose of the practice promoted by BIOPROS (reusing wastewater and sewage and the obtaining of biomass as a renewable energy source) could be possibly considered in future regulations as one the best ways to reuse the wastewater and sludge. The reuse actions purposed by the National Hydrological Plan affects several wastewater treatment plants of different basins so far, but in future texts the application of the purposed measures could also be suggested for a higher number of plants in Spain.

Reference 17 refers to a decree published by the government of the Balearic Islands, regulating the use of treated urban wastewaters for irrigation. This decree divides the reuse irrigation applications in two categories: "restricted" and "unrestricted". Whereas for restricted applications a microbiological limit is established, for unrestricted applications (such as the one proposed in BIOPROS) no limits are set. In case of a future irrigation practice in this region the mentioned required characteristics should be taken into account in order to fulfil the legal requirements.

Reference 18 is the plan of drainage and treatment of wastewaters of the region of Madrid and explains that the huge amount of treated wastewater generated by the plants in Madrid and the scarce of water resources have led to the consideration of wastewater reuse as a feasible option. The use of sludge for agricultural ends is also considered an important alternative. Due to the lack of legislation and the economic importance of the subject, the Hydrographical Confederation of Tajo developed a survey about this issue in 1990 that proposes basic rules for a regulation on water reuse. At the moment, the mentioned survey is the most reliable document regarding water reuse. It divides the kind of irrigations into three (general, controlled and restricted) and identifies three types of crops.

Reference 19 regulates the Sludge Utilisation in the Agrarian Sector, and states the norms about the information to be received by the central government from the controls carried out by the autonomous regions regarding the monitoring of the reuse of sewage sludge for agriculture and the National Register of Sewage sludge. Regarding the reuse of sludge, Madrid presents special characteristics that justify the auto-regulation of the region. According to this Decree, the high sludge generation coming from the urban wastewater in Madrid is a brilliant opportunity to enrich the agricultural soil, always avoiding affecting the soil with an inadequate dosage and keeping the conditions of public healthiness. For the requisites, see in Reference 19. The plan does not mention the irrigation of energy crops, although they are not included within the forbidden ones.

Again, the regulations developed in the regions of Balearic Islands and Madrid and the guidelines developed in Andalusia and Catalonia, see table 13.1 in chapter 13.4 "*Limitations and missing legislation for Spain*", are an attempt of showing the general situation in the regions of Spain that, despite the lack of national regulations concerning the wastewater reuse, define most probably the tendency of future national legislation in this matter.

Reference 25 permits the use of wastewater in forestry plantations and industrial crops (minimum treatment: primary sedimentation), adopting protective measures for workers and to avoid the water coming into contact with the population. This needs to be taken into consideration in BIOPROS experimental plots.

Reference 26 considers the use of wastewater in the creation of forestry masses in urban settings, which is positive for BIOPROS.

Reference 27 stresses that the use of waste water for irrigation purposes and waste water supply pipes should be marked by means of signs. This needs to be taken into consideration in BIOPROS experimental plots.

Energy related legislation

Reference 1, The Plan for Renewable Energies Promotion in Spain, encourages the practice promoted by BIOPROS (in terms of biomass production for energetic ends), by stimulating the renewable energy use. For this reason, the mentioned Plan is an important instrument for the promotion of the renewable energies use in Spain, that is one of the aims of BIOPROS, in terms of biomass. This plan substitutes the one agreed for the period 2000-2010, as the results achieved by the previous were not enough. There is no mention to Short Rotation Plantation practice for biomass production, but in general the biomass use as a renewable energy source is strongly encouraged

Reference 2 is the Energetic plan for the region of Madrid. Because of the demographic, economic and energetic development in Madrid in the last years, it seems like a stronger supply of energetic products will be necessary in the future. One of the basis of the energetic policy is the promotion of the use of renewable energy sources, duplicating the energy generated by renewable sources and then representing the 3.4% of the total energy consumption.

In order to achieve the mentioned aim the plan foresees actions on several renewable sources: biomass, wind, solid residues, solar photovoltaic energy and solar thermal. For biomass, the

energetic plan purposes a research and technological development programme focused in the three main exploitation branches: direct thermal use, biofuels and agrarian electricity.

The use of Short Rotation Plantations is not mentioned in the Plan, although a strong support to the use of renewable energies and especially the biomass (by means of thermal use, biofuels and agrarian electricity) is established. It is supposed that, in a future, more detailed plans are developed and could take into account different ways of biomass generation to be supported, like the case of Short Rotation Plantations that, combined with the reuse of wastewater for its irrigation, could mean a double profit for the environment.

Reference 3, the Energetic plan for Andalusia, shows that biomass covers around 90% of the total renewable energies in Andalusia. In the field of electric energy, an achievement of 250 MW of total installed biomass power in 2010 (reaching 164 MW in 2006) is one of the objectives of the Energetic Plan. Due to the outstanding value of the energetic agriculture for the development of the biomass as a renewable energy, an investment in this culture in Andalusia is very convenient. As the costs of the obtaining of the energetic crops (0.009 euros/toe) are higher than for the rest of biomass sources, greater subsidies will be required.

The Plan (Reference 3) does not mention Short Rotation Plantations, but it shows an intention of supporting and improving the biomass use as energy source and, in special, the energy crops. The regional environmental plans quoted, corresponding to the region of Madrid and Andalusia (References 2 and 3) are a sample to show the general tendency of the regional government of Spain, supporting alternative ways of energy generation and specially focused in the renewable energies.

Reference 4 is an order that explains that the Regional Ministry awards SME's with subsidies for the promotion and enhancement of renewable energy installations, bio-fuels production and logistics of biomass in order to contribute to the sustainable development of Andalusia.

One of the aims of BIOPROS consists in promoting Short Rotation Plantation (SRP) biomass production throughout Europe and strengthening general sustainable development in rural areas. The existence of a law promoting some of the main aspects of BIOPROS will make the implementation of a sustainable development culture in Spain easier. The training activities planned to be carried out within the BIOPROS framework, will be an important tool to inform potential end-users like SME's about legal aspects that may enhance the renewable energy installations in a future.

AENOR approves the norm "UNE 164001:2005 EX: Solid Bio-fuels: Procedure for the determination of the calorific power" in this Resolution, Reference 20. The norm means an important impact in the national market of solid biofuels, since it involves a reliable tool for the determination of the biofuels features and behaviour regarding important parameters that also take part in the design of the equipment for the biomass energetic conversion. This also means a step further for BIOPROS and future commercial experiences implementation, since the calorific potential of the biomass coming from SRP's or any other solid biomass source will be possible to estimate.

Reference 28 lists the subsidies for making briquettes and pellets for energy purposes. It is indirectly related to BIOPROS, because it encourages the creation of an industry to receive products generated from energy crops.

Limitations & missing legislation for Spain

There is a lack of legislation on wastewater use for agricultural ends. As mentioned in some of the references above, there are no specific regulations on wastewater reuse for irrigation, although some information affecting BIOPROS can be extracted from the listed legislation.

After checking the existing legislation, it is not possible to determine the legal position of a practice for crop irrigation with wastewater. Nevertheless, the listed regulations must be taken into account in order to fulfil the legal requirements that could affect BIOPROS, for the experimental tests and for future commercial practices.

The regional regulation and guidelines shown are a representative sample of the current legal situation in Spain, where specific legislation for this practice has not been developed until now.

What regards Energy crops and Short Rotation Plantations practice, some comments and provisions can be found in the energetic plans analysed. In most of the cases, the subsidies foreseen and provisions are focused on generation of biofuels, while the solid biomass generation does not receive, possibly, the same support. In any case, Short Rotation Plantations are not mentioned in any of the energy plans, possibly due to the lack of knowledge about this profitable practice in the generation of solid biomass.

As can be seen in the table below, technical standards for wastewater irrigation were not found (the ones shown are for clear water). Most probably, clear water technology will have to be used for irrigation with wastewater in the field test of BIOPROS.

For future commercial experiences, a development of specific technology for wastewater irrigation should be performed in order to avoid the damage of the irrigation material due to the special characteristics of the wastewater.

Table 13.1: Missing technical standards for wastewater irrigation

Type of info	“Title”	Description
E [▲]	Andalusian and Catalonian guidelines for irrigation with wastewater	<p>Although it does not exist a specific regulation on the wastewater reuse, some of the regions of Spain have developed certain guidelines that possibly will be the basis for a future legislation. In the case of Andalusia, the regional government has established health guidelines following the recommendations of the WHO, which can be found in the website of the Andalusian government, in the health section. Those are detailed in the table 21.1</p> <p>Catalonia has also developed similar guidelines, shown in the table 21.2</p> <p>These two guidelines together with the mentioned legislation from Madrid and Balearic Islands regarding the wastewater reuse give an overview of the current situation at regional level and show, somehow, the way how the future national legislation could be developed.</p>
T	Standardisation of Irrigation Systems according to the National Centre or Irrigation Technologies (CENTER)	<p>In the CENTER (belonging to the Ministry of Agriculture, Fishing and Feeding), standardization activities related to irrigation materials and equipments are coordinated in a national and international level, within the organizations AENOR (Spanish Association of Standardization and Certification), CEN (European Center of Standardization) and ISO (International Standardization Organization).</p> <p>The standards shown in the mentioned annexes are related to irrigation with clear water, but not specific reference to wastewater irrigation was found. That means a lack of prevision for a future use of the irrigation system with wastewater that possibly will lead in material maintenance problems due to the special characteristics of the wastewater.</p>

Further, in the Guadalquivir Basin, where the BIOPROS experimental plots are located, there are no limitations like those imposed on other basins in Spain (Tagus, Iberus, Southern). It is however expected that similar limitations will be introduced soon. It is recommended to clearly mark the BIOPROS experimentation plots and their water supply pipes, in order to prevent the general public from entering. It is also recommended to adopt protective measures for workers.

Finally, No law states whether SRP should be considered as agricultural or forestry crops.

It is the point of view of the Spanish BIOPROS partners that SRP are forestry crops within the scope of intensive forestry farming, regardless of whether they are grown on forestry or agricultural land.

14 SUMMARY AND CONCLUSIONS FOR THE UK (NORTHERN IRELAND)

For the references mentioned, please refer to the List of Legislation for the UK, Northern Ireland, in Annex 1.

Agricultural related regulations

Reference 7 is set up to minimise the environmental impact caused by large-scale development on Uncultivated land and Semi Natural Areas. Therefore an environmental impact assessment must be carried out on any large-scale development planned for the BIOPROS project in Northern Ireland. This legislation will be indirectly applied to BIOPROS whereby it only applies if large-scale development work is required for any aspect of the project. If this is the case then an environmental impact assessment is required and will need to be approved by the regulators.

Reference 8 provides a high level of environmental protection and also contributes to the adoption and preparation of plans and programmes which will promote sustainable development. This is achieved through environmental assessment. The environmental effects of plans or programmes must be monitored to identify any potential adverse effects and carry out appropriate remedies. This legislation in effect may require participants of the BIOPROS project to gather supporting data, which may require significant time to accumulate such as long-term studies of environmental impacts.

Reference 10 aims to contribute towards ensuring biodiversity in Northern Ireland through the conservation of natural habitats and wild flora and fauna. A number of specially protect areas have been established in Northern Ireland as a result and a number of species of animals are protected under this legislation. Protected species and their habitats cannot be harmed or disturbed. Therefore should a protected species migrate to a BIOPROS site, then the site area will become automatically protected and no disturbance can occur to the species or the habitat. So previously unprotected sites, suitable for the BIOPROS project can very quickly become protected unsuitable sites, resulting in significant loss of land and as a result crop.

Also to be considered are the Codes of Good Agricultural Practice for the Protection of Water, Air and Soil. Although failure to comply with the Codes is not an offence, it would be taken into account in any legal action taken as a result of a pollution incident. Furthermore, Many Farm Assurance Schemes for both crops and livestock include compliance with the codes as part of their protocols. All the Water Operators have also signed up to complying with these codes. The Codes also detail the limits to application rates for organic materials.

Wastewater and sludge related regulations

Reference 1 regulates the use of sewage sludge in agriculture in Northern Ireland *‘to prevent the harmful effects on soil, vegetation, animals and man, thereby encouraging the correct use of such sludge’*. As the use of sewage sludge is a major part of the BIOPROS project, the key

points of this piece of legislation must be adhered to. Trace metal concentrations and nutrient budgets must be a known factor for the application of the sludge to the land. Regular monitoring of sewage sludge trace metal concentrations and regular assessment of nutrient budgets may be required to satisfy the government regulators.

Reference 2 seeks to curb water pollution caused by nitrate coming in the main from agricultural use of fertilisers and manure in Northern Ireland. Nitrate vulnerable zones (NVZ's) are to be identified where concentrations of nitrate in groundwater exceed or is approaching 50 mg/l. The application of sewage sludge to land will ultimately fall under these regulations whereby the concentration of nitrates from the sludge will limit its application to land under the codes of practise. This will mean that no winter application of sludge will be allowed and that weather conditions will determine suitable periods of application.

Reference 3 was established to protect groundwater from pollution and to reduce current pollution by prohibiting the discharge of dangerous substances. This regulation adopts two lists of prescribed substances from the parent Directive, which are to be controlled. As sewage sludge and wastewater will be indirectly discharged onto the receiving area some levels of both List I & II may be present in the sludge and water. This means that authorisation from the regulators will be required and may result in limited application of sludge or water. This problem may be resolved by some form of removal of certain contaminants from sludge or water prior to discharge.

Reference 4 is intended to control water pollution in waters capable of supporting freshwater fish. Watercourses have been identified as being suitable for salmonids and cypinids. The aim of this regulation is to assess chemical water quality and achieve water quality standards in accordance with mandatory and guide values laid down. Run-off from land treated with sewage sludge and wastewater may be of concern if watercourses are in close proximity to the land being treated. This runoff may contain elevated levels of chemical parameters, which may prove harmful to fish. Application of sewage sludge and wastewater may be restricted therefore to proximity to a watercourse to minimise any potential effects.

Reference 5 are concerned with the collection, treatment and discharge of urban wastewater. It provides the guidelines for operators by setting out the minimum standards for treatment of urban wastewater. Both treated wastewater and sewage sludge arising from wastewater treatment must be re-used wherever appropriate. However, these disposal routes are to minimise the effects on the environment. As a requirement of this regulation is the waste generated from urban wastewater treatment (sewage sludge and wastewater) is to be reused where appropriate. From a BIOPROS perspective if it can be proved that minimal effects on the environment are caused from the application of sewage sludge and wastewater, then the BIOPROS project could offer operators with an extremely useful service by using a percentage of the waste generated from urban wastewater treatments. At present only a very small percentage of sewage sludge and wastewater is actually being used in Northern Ireland. This legislation also stipulates that dumping of sewage sludge by the operators to sea is to cease, which will require the operators and regulators to look for alternative routes of disposal, which the BIOPROS project at present can offer.

The aim of Reference 6 is to protect inland surface water, estuaries, coastal and groundwater. This legislation should be brought into full effect by 2013. At present the regulators (EHS) have began the process of implementing this legislation in Northern Ireland. Although at

present this legislation is not fully implemented, it will supersede the following legislation: SR2004/419, SR1998/401 and SR 1997/488. As a result in the long term this legislation will govern the disposal of sewage sludge and wastewater on agricultural land. This must be taken into account at the early implementation stages of the BIOPROS project in Northern Ireland.

Energy related legislation

The Sustainable Energy Act 2004, Reference 9, applies to the whole of the UK, so is therefore relevant to Northern Ireland. The act requires that the UK cuts its carbon emissions and promotes competitive energy markets. This is to be achieved in the UK by developing and bringing into use any energy sources or technologies. The energy sources and technologies referred to include biomass fuel. This act promotes the use of biomass fuels, which is the end result of the BIOPROS project. Therefore there should be substantial government support for the BIOPROS project as a result of this act within Northern Ireland.

Limitations & missing legislation for the UK, Northern Ireland

No limitations or missing legislation have been identified for the United Kingdom, Northern Ireland.