

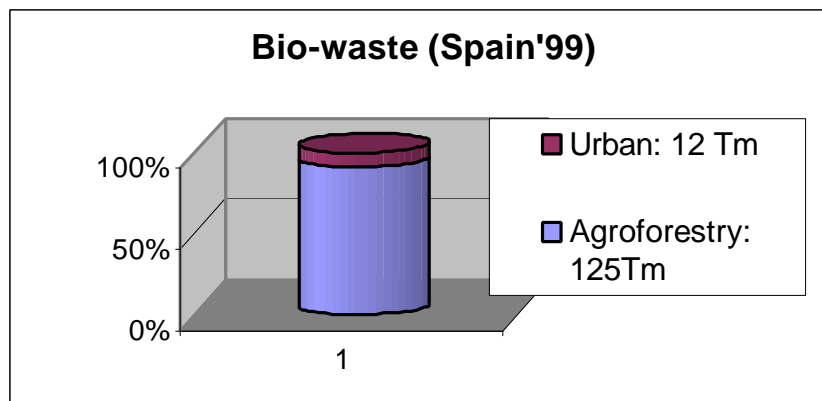
Compost: a burden on local authorities or an opportunity for sustainable agriculture?

Soil & biowaste in Southern Europe

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Biowaste (sludge, manure, etc.) is a waste rich in organic matter, once the potentially hazardous elements (metals, some organic compounds, pathogens) are prevented it becomes a valuable input to Mediterranean soils. The over exploitation and advance of desertification and loss of environmental quality due to poor soil conditions is a severe risk in many areas of the EU. Mineral fertilizers can restore nitrogen and phosphorous but are unable to supply organic matter which is essential to the adequate soil biomass environment. On the other hand stricter norms on sludge and biowaste from the EU Directives will imply a higher cost to city waste management, we will try to explain the impact of the new compost norms in cities.



Generation bio-waste 1996:(000 t/y)

Sludge

Spain: 528

UE-15: 6.500

Solid waste

Spain: 6.600

UE-15: 60.000

Manure

Spain: 80.000

UE-15: 1.020.000

There is a continuous increase in organic waste generation. In Spain sludge in 1998 was around 668.000 t, and is estimated by Ministry for 2006 in 1.300.000 t/y (150% increase above 96 data).

Biowaste Urban vs Rural

- ◆ Urban: 12 Tm/y
 - ◆ Organic waste
 - ◆ Yard 'green' waste
 - ◆ Sludge
- ◆ Rural: 125 Tm/y
 - ◆ Agricultural and livestock extensive
 - ◆ Intensive farming
 - ◆ Processing plants for food, fibres and forestry.

Balance between use of organic waste in agriculture implies a compromise of two criteria:

- pollution of soil and water
- avoid exhaustion of mineral resources (phosphate rock)

Additionally use of sludge and other organic waste on soil implies:

- landfilling waste diversion
- mineral nutrients savings
- fossil fuel saving and Kioto goals
- erosion control
- nature protection through reduced mineral fertilizer.

Environmental instruments (gen)

- ◆ **NORMATIVE:** Stricter norms in (Hg, As, contain, ban on CFC, landfill norms, etc.
- ◆ **ECONOMICS:** Market and prices, ECOTAX.
- ◆ **SOCIAL:** Education.
 - MAIN LOCAL INSTRUMENT ARE:
 - ◆ ECOTAX (LIMITED)
 - ◆ NORMATIVE (LIMITED)

OCDE (1997) favours an 'integrated' approach with the use of the three type of instruments:

- normative
- economical
- social

The advantage of economical against technical is that the first one poses a continuous incentive to improve performance meanwhile the technical norms once are achieved there is not incentive for further improvement.

Nevertheless for **sludge**, clear standards are needed in order to:

- risk avoidance
- nature protection
- and even market creation.

Economic instruments for environmental policy

- ◆ **Taxes**, compulsory payments to the State (or City) but not related to resource use. Payments are related to income rather than use.
- ◆ **Charges**, compulsory payments related *directly or indirectly* to the cost of cleaning the pollution or correct the impact.
 - Charges may be flat rate, or variable fee moving from old general tax to PAYT systems.

Cities may use some economic instruments for sludge management, specially minimisation and quality control.

Already water prices in most countries are set in order to pay the full cost of water supply and sewage treatment (including sludge disposal).

Most countries already have a normative that regulate water emission quality, the problem is that is not well policed, and again we try to solve the problem with EOP solutions. Water price can be called an 'ecotax' as the amount of pollution both in quantity and quality can be supported fully by polluter. Nevertheless approach and solutions for sludge treatment should as much as possible 'cost effective' to avoid a burden on domestic user and companies. OCDE (1.999) *Economic Instruments for Pollution Control and Natural Resources Management in OCDE Countries: a Survey*. Working Paper ENVEPOC/GEEI (98) 35/REV1. <http://www.oecd.org/env/docs/epocgeei9835.pdf>

'Polluter pays' (Dir 94/62)

- All activity should decrease environmental impact adopting necessary measures and supporting the cost.
- Each polluting activity should bear directly the cost of environmental solutions.
- This implies '*internalise cost*':
 - **Social equity**, when environmental cost is not supported by polluter all society pays the cost, therefore socialising the damages.
 - **Economic efficiency**, as each activity / product integrates ALL cost when decisions are made (consumption or production).

Additionally to the directive 94/62 we should consider also the Water Framework Directive (2000/EC) That in article 9 reads as follows.

<M.E. shall take into account of the principle of the recovery of the cost of services including environmental (...) in accordance with the polluter pays principle'. (...) water pricing policies provide adequate incentives for users to use water resources efficiently ...>

This implies that user of water should pay the cost of sludge disposal in any case. Finally financial equilibrium of city budgets requires the translation of price increases to polluters.

¿How it applies to MSW?

◆ In many countries (e.g. Spain) solution for MSW is to distribute cost, therefore packaging is attributed to producers and the rest is paid by residents.

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graph LR; A[Waste charges and fees] --> B[Non-package (inc. biowaste)]; C[Green dot] --> D[Packaging waste]; E[Water price Sewage charges] --> F[Sludge treatment];
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Packaging Directive translation to National Laws implies that producers should pay the full cost of packaging waste management.

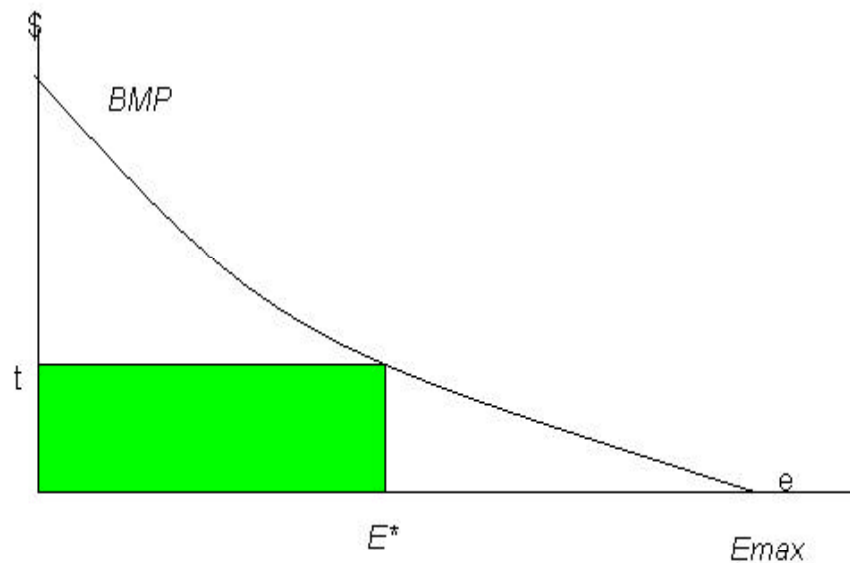
General MSW including biodegradable waste (25-50% of MSW) has different regulations in Europe, the most common one implies city authority for full cost recovery through charges and taxes.

UK local authorities are not allowed to fix taxes and other countries have an upper limit to taxes such that they should be lesser or equal to cost.

Water and sewage treatment is allowed the full cost recovery to polluter in most of the EU countries.

The recent debate on WFD has highlighted this issue.

Nevertheless at the present level of **cost of sludge management it is around 3%** of total price of water and 12-15% over total cost sewage treatment.



Theoretically, as the polluter consumes water and produces sludge the amount produced is not the maximum when the polluter does not pay any externality, but as the normative imposes higher cost to the polluter to the level 't', the amount disposed is reduced. The shaded area 't x Q' is the value of the environmental protection.

Part of the protection to the environment creates employment for the management of the waste.

OCDE (1997). *Environmental policies and employment*.

Effects of Topfel Ordinance			
Germany	1991	1995	1998
Pack-waste (Kg/per)	94,7	84,28	82,00
% decr.	--	-11,00%	-13,40%

The success of the packaging ordinance can be seen in:

- prevention at source
- recycling goals achieved

This may be used a model to avoid mistakes and adopt valuable experience.

<http://www.gruenerpunkt.de>

Gains from recycling (COM (98) 463)				
Material	Waste (Kt)	% Rec.	Energy Saving	Jobs
Ferrous	70.000	43	60-70%	100.000
Non Fe	3.500	57	60-95%	80.000
Paper	30.000	46	--	60.000
Plastic	17.500	6	--	30.000
Textiles	4.200	20	--	20.000
Glass	7.400	50	20%	15.000

It is difficult to evaluate the employment created by stricter organic waste norms and by landfill directive application but it is obvious that more employment is need when organic waste needs to be treated against landfilling the waste.

Regarding organic waste, the Ordinance on BioWastes came into force Oct 1st 1998, and has produced the following impact:

- separated collected biowaste from 1 million tons (1990) to 10. Million tons (2000)
- bio-composting plants from 130 (1990) to 500 (1997) and still growing
- According Bundesgütegemeinschaft Kompost 4.000 people are employed in the sector in Germany 2000.

Consequences of packaging directive on Cities
◆ Increase cost both logistic and processing (+ 30% -50%)
◆ Reduce landfill
◆ Increase recycling
◆ Improve local sustainability
◆ Create local jobs.
◆ Global effects positive
◆ <u>FINANCIALLY NEUTRAL BY LAW.</u>

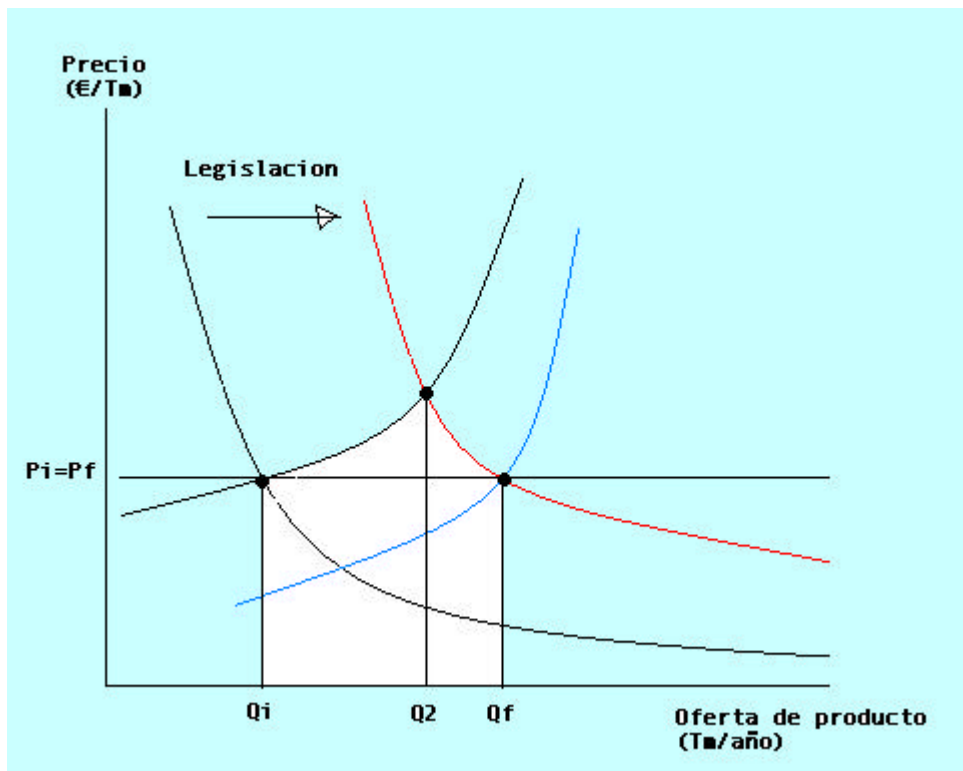
The selective collection and recycling subsidies that packaging directive induced has moved collection and treatment cost of waste globally an 30-50% increase.

This has saved landfill space (10-50% depending city).

Recycling rates increased in all materials, some of them reaching a technical maximum 90% glass in some countries.

The Delors Report on Employment in Europe points out recycling and environmental services as a source of jobs in Europe. From the economic point of view, we are paying in this generation the environmental degradation, and when the option selected is more labour intensive in comparison the environmental protection has a positive impact on employment. When the proximity principle is applied, the jobs are demanded locally. (COM 97/592)

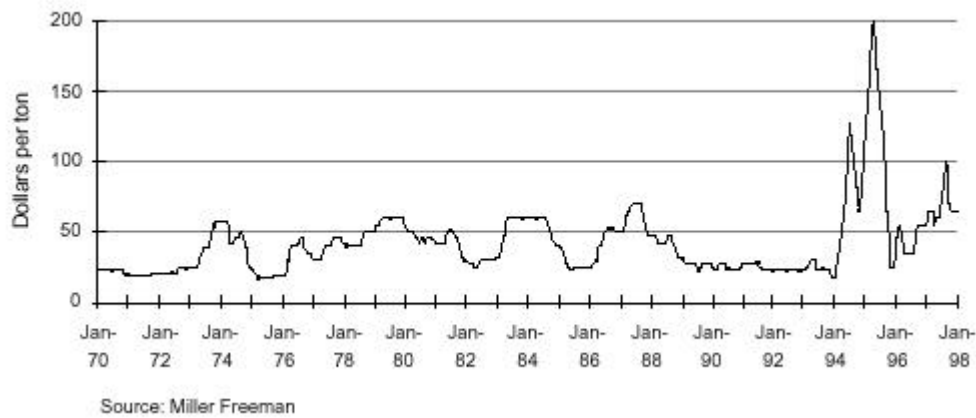
But the law also entitles cities to recover all cost in waste management (with the UK exception).



The case of recycled paper minimum contain standard implies that demand curve moves rightward, i.e. There is a global increase in paper consumption. Obviously as supply is not prepared to satisfy this increased demand (from Q_1 to Q_2) . At the new higher price capacity of production grows to meet demand, the new dynamic equilibrium is at Q_2 with a higher consumption of recycled material.

Unfortunately the case of sludge is a different situation as demand is not increased by any normative because there are environmental and health risk that needs to be addressed.

Farmers and NGO have serious concerns about it.



The figure shows the price of recycled paper during two decades, and we can see how it has a floor around 25 USD/ton and prices move in the range 25 to 60 USD during almost 15 years. The increase in paper price is the introduction of a minimum contain recycled paper by Federal Law, price increases are explained by shortages in the supply that are solved at medium term.

Result is the creation a growth both in demand and supply of recycled paper.

Landfill directive 99/31

- ◆ Increase safety norms
- ◆ Ban on organic waste >25% (2016)
- ◆ Increase management cost (x100%)
- ◆ Global effects positive
- ◆ (Again Cost-neutral for local governments).

In general landfill directives assume a high level of environmental protection. We can define it as a pure Normative instrument, but the real consequence is to be very selective in the treatment of the different type of landfilled materials.

Landfill directive by setting stricter limits on dumping waste has a economic consequence by increasing significantly the cost of landfill.

Obviously this increase of landfill cost has been softened by the support measures to prevention and recycling in the packaging industry, but we LACK of similar policy in the organic fraction of waste including sludge.

Problems with treatment bio-waste including sludge

LANDFILL <ul style="list-style-type: none">◆ Directive 1999/31: limits degradable organic landfill from domestic origin by 35%, 50%, 75%) y makes ME to develop a national strategy for reaching these goals	INCINERATION
ENVIRONMENTAL PROBLEMS <ul style="list-style-type: none">◆ Landscape use◆ Odours◆ CH₄◆ H₂O pollution◆ Organic matter loss.	<ul style="list-style-type: none">◆ Social conflict◆ High cost◆ Lack of flexibility◆ Loss of organic matter◆ Kioto goals

The most frequent options of sludge treatment are landfill and incineration, but the last one is expensive due to the high water contain in sludge. Also we find social conflict with strong opposition to incineration in Mediterranean countries. Incineration of sludge due to the low calorific value is not very positive in environmental balance.

Ecotax on landfill

- ◆ UK: 15 €/t non inert 3 €/t inert
- ◆ B: inc. 6-20 Euro/t ; landfill 3-100 E/t
- ◆ Dk: inc: 27-43 E/t; landfill 450F: landfill: 6-12 E/t
- ◆ I: landfill 10-26 E/t
- ◆ Ned: landfill 28 E/t
- ◆ Sw: 30 E/t

Most countries have set a landfill tax that increases additionally the price of dumping waste, and this tax is selective on material that may be recycled. All Eu members (except Esp, Port, Gre, Lux) have already a tax on landfilling that increases the relative cost of dumping waste (<http://www.clubresiduos.org/informcer.htm>).

Consequences of Dir.99/31 (gen)

- ◆ Make recycling more attractive
- ◆ Increase cost of landfill
- ◆ Increase safety of landfill
- ◆ It is co-ordinated with packaging waste and biowaste norms.
- ◆ High level of environmental quality

Landfill directive is complementary to Packaging directive and probably in the future with compost and sludge directives.

By increasing the relative cost of a the of treatment (i.e. Landfill) the recycling option is more favoured. This has been accompanied in the packaging waste but need to be done in the bio waste fraction.

Biowaste recycling and cities (I)

- ◆ We should learn from packaging
- ◆ Need of GLOBAL National plans
- ◆ Needs for market creation:
 - Standards
 - Demand shift: private and public
- ◆ Integrated approach (demand depends upon quality of sludge)

Following this line of reasoning, we should learn from packaging specially in the success in minimisation by prevention as a response to eco-tax (green dot charges). Therefore, the translation of the principle of PPP will be an incentive to minimisation.

Also as in the packaging industry global (national and European) consortiums should be build to co-ordinate efforts (such as the Ecoemballages, DDS systems, etc.).

The needs for recycling facilities creation through companies may be supported by these consortiums.

The recycling facilities for packaging (paper, glass, ferrous,..) should be built in the case of bio-waste by co-operation between users and suppliers, by setting voluntary agreements and standards.

Demand is quite different in the case of packaging and bio-waste, therefore Government involvement is required.

Biowaste recycling and cities (II)

- ◆ Financial: PAYT, 100% of cost
 - Most cities still run waste services with losses, (e.g. Wien cover only 94% cost)
- ◆ Technical:
 - R+D on methodologies for waste treatment
 - Objective risk assessment
- ◆ Economical: European integrated approach.

Most EU Member States give autonomy to cities to set taxes on waste collection and treatment with only the case of UK cities that are not allowed to set taxes. The legal framework varies but we may say that any norm should be financially neutral to cities.

Nevertheless cost efficiency should be a goal by itself avoiding to charge taxpayers with excessive economic pressure.

Research should be done to avoid unnecessary expensive treatments (e.g. Hygienisation of sludge when destination is incineration).

Objective risk assessment, probably too much stress is put into heavy metals from sludge when no control is done in other sources (fertiliser, manure, atmospheric).

Also the European approach may apply the principle *'think global, act locally'* and take into account the need for organic matter in the Mediterranean soils.

Cost effective approach

- ◆ Prevention by source control.
- ◆ Soil focused control: i.e. Sewage sludge, animal manures, compost and inorganic fertilized under common rules.
- ◆ Clear rules and stable framework for public operators about: standards, mechanism of control, legal responsibility.
- ◆ Enhance demand through collaboration with farming systems (subsidies, R+D, etc.).
- ◆ Sludge management in Spain is around 3% of full price of water or 12% of sewage cost.

Prevention is the most cost effective system to avoid pollution, and should be considered even if it is outside the sludge and compost measure. Probably the recent WFD is an adequate place to control pollution in the sewage system.

Soil focused control, it is not possible to use sludge as soil amendment when other organic fertilisers are not properly controlled.

Any legal and technical framework should be clear and stable to promote investment, both public and private.

A strong support of farming system research should be done and it is necessary to create wide consortiums for 'living soils'.

Conclusion

- ◆ Clear rules and definitions.
- ◆ Enhance demand of a product with agronomic value through:
 - technical control norms.
 - economic and market rules.
- ◆ Stable framework.
- ◆ Prevention at source.
- ◆ Integrated approach for all organic waste.

Most of the Southern Europe lack proper conditions of organic contain in soils, and soil loss and lack of fertility (with use of chemical fertilisers) , therefore, organic resources contained by sludge and other organic waste should not go to landfills and future application of EU directives will not allow that occur.

Therefore a movement towards conversion of waste into resource should be done and all actors (cities, farmers, EU, member states, researchers) should co-operate to solve the technical and economical problems that will be obstacles to this conversion.