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**LIBERALISATION AND PRIVATISATION
IN ENVIRONMENTAL UTILITIES IN THE
INTERNATIONAL EXPERIENCE**

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Liberalisation and privatisation in environmental utilities in the international experience

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Abstract

La giustificazione dell'intervento pubblico nelle filiere delle utilities si è sempre basata sulla categoria dei fallimenti del mercato. Peraltro, nella maggior parte dei casi, l'analisi è rimasta confinata al tema, pur relevantissimo, del monopolio naturale, trascurando le altre dimensioni (presenza di beni pubblici o quasi-pubblici, esternalità, incertezze di lungo periodo fonte di asimmetrie informative, etc).

Questa limitazione è particolarmente importante nel caso dei servizi ambientali (ciclo dell'acqua e rifiuti), stante la grande importanza che questi servizi assumono nell'organizzare la fruizione collettiva di risorse naturali scarse e dunque la rilevanza dei temi di interesse per la regolazione ambientale.

Dalla comprensione di questa specificità discende l'esigenza di considerare in un modo speciale le opportunità di liberalizzazione e di privatizzazione che sono possibili in questi settori.

Un noto schema teorico utilizzato dall'economia pubblica, la cui sistemazione teorica si fa risalire a Breutigam, 1987, al fine di valutare le diverse opzioni di intervento pubblico in un mercato, suggerisce di considerare dapprima la presenza di costi sub-additivi per determinare la presenza di un monopolio naturale; in secondo luogo, di analizzare se gli effetti negativi del monopolio naturale rappresentino effettivamente una perdita di benessere non tollerabile; in terzo luogo, se sia possibile attivare forme di concorrenza alternative a quella di first best (concorrenza a la Demsetz, concorrenza intermodale, common carriage etc).

Utilizzando questo schema, in altri termini, la preferibilità delle diverse forme di intervento è funzione delle caratteristiche tecnologiche, dell'importanza che la società attribuisce a un determinato settore, allo sviluppo del mercato lungo le "filiera verticali" che caratterizzano i diversi servizi. In tutti e tre i casi, si tratta di variabili che evolvono nel tempo, mutando dunque la preferibilità relativa delle soluzioni.

Nel caso dei servizi ambientali, questo schema richiede di essere ulteriormente arricchito considerando ad esempio il sistema di diritti di proprietà sulle risorse e le regole della loro allocazione (pubblico o privato, sottoposto ad autorizzazione o a concessione, pianificato o contrattato, etc.).

La natura di servizi monopolistici, ma locali, inoltre, apre inoltre interessanti spazi potenziali alla concorrenza nel mercato (ossia fra aree territoriali che competono fra loro per offrire servizi: si pensi ad esempio alla possibilità di creare una concorrenza fra impianti di smaltimento dei rifiuti collocati in aree diverse), creando tuttavia problemi di coordinamento e di controllo, oltre che richiedendo una regolazione ambientale del tutto simmetrica al fine di evitare fenomeni di migrazione dei rifiuti verso le aree con regolamentazione meno severa.

Gli effetti delle diverse strategie di finanziamento e di regolamentazione tariffaria vanno valutati non solo con riferimento all'efficienza allocativa e produttiva, ma anche rispetto agli incentivi offerti ai diversi attori per un comportamento sostenibile dal punto di vista ambientale.

La tesi centrale del presente contributo è che l'aggiunta della componente ambientale della regolazione determina delle conseguenze di non poco conto per le prospettive di liberalizzazione. Questi settori si potrebbero considerare alla stregua di utility come tutte le altre solo a patto di poter rappresentare la regolazione ambientale come un insieme esogeno di standard di prestazione. Al contrario, in tutti i paesi, l'industria dei servizi ambientali gode di notevoli gradi di libertà nel tradurre in pratica gli obiettivi che la politica ambientale esprime di solito in termini piuttosto generali e a-

specifici. Gli investimenti nei quali si sostanzia l'implementazione delle politiche ambientali (si pensi ai grandi schemi idrici, agli impianti di depurazione, allo smaltimento dei rifiuti; ma anche agli investimenti immateriali, come la costruzione di un clima di fiducia reciproca con la popolazione) hanno quasi sempre la caratteristica di costi affondati, con rilevanti margini di incertezza circa il ritorno nel tempo.

Trascurare queste dimensioni, o banalizzarle ipotizzando che possano essere facilmente acquisite attraverso strumenti come la gara d'appalto, può essere dunque rischioso. Del resto, in quasi tutti i Paesi, il dibattito sulla "liberalizzazione" di questi settori è evoluto in modo molto più lento e con molti più dubbi; negli stessi USA, si tratta dei settori con la più rilevante presenza dei soggetti pubblici sia come regolatori che come produttori.

Per dimostrare questo assunto si parte da un'analisi dei "fallimenti del mercato" e dei contrapposti "fallimenti del non-mercato" presenti nelle due filiere, nonché della loro evoluzione nei decenni recenti, alla luce dei contributi teorici più recenti combinati con un'analisi delle caratteristiche tecnico-economiche dei servizi e della situazione contingente dei relativi mercati.

Si passano poi in rassegna i principali modelli di organizzazione presenti nelle più significative realtà europee ed extraeuropee, analizzandone l'evoluzione recente e i processi di liberalizzazione in corso. Adattando lo schema della "policy roadmap to regulation" di Braeutigam, sopra richiamato, si esaminano una per una le diverse alternative di regolamentazione e liberalizzazione, discutendone la praticabilità nel contesto dei servizi ambientali.

Si conclude quindi con un'analisi delle prospettive per il caso italiano, anche attraverso un esame critico della legislazione di settore e delle recenti proposte in materia di servizi pubblici locali.

Liberalisation and privatisation of environmental utilities in a European perspective

Antonio Massarutto

1. Introduction

From direct production to regulation: this has been the keyword of liberalisation policies in the field of public utilities in the past 30 years. In case of a natural monopoly, government policy should not be to operate “against” the market, but rather to re-create artificially the conditions for an effective competition (Vickers and Yarrow, 1988; Armstrong et al., 1994).

However, within this general strategy, the choice of the optimal policy mix is not straightforward, depending on the specific features of each industry. The spectrum of alternative policy options ranges from the full liberalisation of the market to selective liberalisation following deverticalisation; from public auctions to incentive pricing.

Among the economic science, three alternative theoretical frameworks have been proposed (Massarutto, 1995).

The first approach (public interest theory) represents an evolution of the traditional theory of public finance, based on the concept of “market failures”. After recognising that the existence of market imperfection is not a sufficient condition for justifying state intervention, nor any particular form of it, the modern public interest theory therefore has evolved in the direction of accepting the concept of “non-market failures” (Wolf jr., 1991; Crew, 1992; Braeutigam, 1989; Helm, 1989).

The second approach (economic theory of regulation) can be seen as an evolution of the contributions of the public choice school, according to which the behaviour of regulatory institutions should be analysed by considering regulators themselves as self-interested utility-maximiser individuals (Borcherding, 1989; Peltzman, 1989).

The third approach relies on the theory of institutions, and considers administrative regulation and liberalisation as ingredients of a more general governance achieved through a combination of regulatory regimes based on authoritativeness, mutual exchange and/or common values (Williamson, 1996; Goldberg, 1976)

While the former approach aims at an “objective” and “normative” result – that of individuating the best available options in terms of allocative efficiency or whatever other economic policy target, the latter are above all effective in the ex-post interpretation of the concrete evolution of regulatory systems, interpreted as the result of a political and economic game.

The present study adopts the first perspective in order to discuss liberalisation opportunities in a given field of public utilities – that of waste management, water supply and sewerage, here comprehensively labelled as “environmental services”. The aim of the paper is to discuss the specific features that characterize environmental services within the broader category of public utilities, and to adapt therefore the well-known theoretical and analytical instruments of the public interest theory to the reality of these industries in order to evaluate liberalisation options. This specificity, according to the analytical framework proposed herein, originates by the need to address simultaneously several different market failures, among which environmental externalities are one of the more crucial (Massarutto, 1993 and 1998; Cowan, 1993)

The theoretical justification of public sector involvement in public utilities has been traditionally based on the broader concept of “market failure”; however, in the majority of cases, public utilities have been basically conceptualised as natural monopolies, that is a foremost, but not unique market failure that can be considered. Further features that might justify some degree of regulation can be found in the presence of public or quasi-public goods, externalities, long-term uncertainties generating information asymmetries. These factors also can produce a distorting effect on the private decisionmaking therefore resulting in

suboptimal outputs.

Environmental utilities are not just providing a basic service to individual households, yet more generally they are the essential interface through which the collective access to natural resources is organised and regulated; their “output” is not simply the service delivered to the consumer, yet it should include sustainable use of natural resources and positive externalities on the concerned territorial area.

Environmental regulation affects many other fields of industrial production, such as energy or transport; however, in our case, the role of environmental regulation is much more widespread. Environmental regulation cannot be considered as an external, exogenous constraint, but rather needs to be analysed as an endogenous element, since it determines directly important aspects of the demand side, it shapes the investment agenda, and very often operates directly at least some segments of the service management system.

This specificity requires that the liberalisation debate considers further aspects that are often neglected in the economic analysis, namely to provide adequate incentives aiming at the sustainable use of environmental resources.

Environmental utilities in Europe are traditionally a responsibility of the local authorities, yet increasingly within a planning framework arising from environmental policies generated at the national and regional level. Though with some national exceptions, it can be said that the public sector actually dominates either the demand side (individuation of the collective service quality standards and of the willingness to pay, in a context of compulsory connection to the public system) or the supply side (through various form of public enterprise).

Delegation of (at least) some activities to the private sector is nonetheless representing a valid alternative, increasingly practiced in many countries, particularly where significant new investment and modernisation efforts are needed.

The increasing involvement of the private sector – basically motivated by the industrial development, technical and entrepreneurial requirement as well as by the difficulty to finance utilities’ development through the traditional channels of the public budget – call in any case for an overall re-design of the rules of the game, in order to avoid that public monopolies are simply and brutally privatised.

Following the paths already traced in other sectors such as energy and telecommunications, European and national policymakers are in search of an effective way to introduce market stimulus in the field of environmental services. However, there has not been so far a comprehensive and definitive effort aimed at understanding the liberalisation process in this particular field; policy options are often mutated from other sectors and not based on the specific features of these industries. The aim of the present paper is to analyse the basic economic characteristics of environmental services in order to provide a theoretical foundation for the analysis of liberalisation opportunities and the main issues posed to the regulator.

For this purpose, a well-known theoretical scheme, whose elaboration can be reconducted to Braeutigam, 1987, is adapted to the field of environmental services by including the market failures on the demand side (externalities, public goods) together with natural monopoly (par. 2).

In par. 3 we sketch out the actual structure of environmental utilities in Europe. The aim is not to provide a comprehensive inter-country comparison – for which there is a lack of meaningful and reliable studies, that needs to be addressed by further research; rather, we simply wish to present the main alternative models that are operating on the European scene.

Par. 4 develops the analysis of liberalisation opportunities, organised around the “policy roadmap” elaborated in par. 2.

Conclusions and perspectives for further research are finally presented in par. 5

2. The spectrum of liberalisation alternatives: the Braeutigam scheme revisited

In a seminal work, Braeutigam (1987) has proposed the so-called “policy roadmap to regulation” as a practical rule-of-thumb for selecting the optimal regulatory strategy in case of a natural monopoly.

In practice, the scheme is based on the following questions, each ending up in a given optimal regulatory framework:

- Is there a viable *competition in the market*¹? If yes, the industry needs no regulation and can be liberalised; if no, the traditional theory of public finance would have suggested immediately to subtract the industry from the market; modern theory, on the contrary, requires further filters:
- Does the natural monopoly involve a *major welfare loss*? In fact, the answer is not straightforward: welfare loss is caused by the social importance of the service at stake, and by the constraints encountered by the monopolist (eg the existence of goods and services that can even partially surrogate). If the answer is no, regulation is not necessary despite cost sub-additivity; if it is yes, some form of regulation should be introduced; its concrete form will depend on the answer to a further questions:
- Is *competition for the market* viable (eg through competitive franchise bids)? According to the economic theory, the conditions that have to be fulfilled are absence of transactions costs in the auctioning process, completeness of contracts on which franchise is based, full information, competition among candidates to provide the service (Sappington and Stiglitz, 1987). If these conditions are satisfied, the optimal regulatory solution would be to concentrate the role of the regulator on the demand side (e.g. on the definition of qualitative parameters) and on the selection of an adequate bidding scheme²; if not, the next question is:
- Is it possible to introduce competition in or for the market in *definite segments of the service* after their separation from the service core? If yes, the efficiency losses due to de-verticalisation (eg transactions costs) can be compared with allocative benefits of competition in order to decide. If no, the government should “resign” to regulate and chose the appropriate payoff scheme for the regulated industry with the use of incentive regulation. The final question therefore becomes:
- Is it possible to *evaluate the economic efficiency* of the operator and/or provide permanent incentives to productivity improvements via standard cost pricing or price caps? Normally, the adoption of incentive regulation requires an unambiguous specification of service quality standards, at least on an ex-post basis. If service quality is not a-priori definable and measurable, however, incentive regulation might well lead to sub-optimal quality levels (Marchand et al., 1986; Laffont and Tirole, 1993).

Only if the answer to all questions is negative, the regulator should “resign” to accept some inefficiency; marginal or average cost pricing or direct public control would be than the inevitable solution. Further stimula to efficiency might nonetheless be searched in non-economic regulatory instruments, such as those based on *voice* or *loyalty* (Hirschman, 1970).

In the case of environmental utilities, this relatively simple logical scheme deserves some further complication.

First of all, we have to consider that the access to the basic input of the service – namely, the natural resource – can be governed under different regimes, ranging from the private property of the resource to administrative regulation, with many intermediate options (eg that of negotiable resource use permits).

The environmental regulatory regime has many important implications, since it drastically changes the opportunities to have competition in the market. For example, competition among waste disposal facilities is strongly reduced by the application of the European “proximity principle”, according to which each territorial area should be self-sufficient for the treatment of its own waste flows.

The liberalisation issue, at this level, concerns the opportunity to introduce some market allocation mechanisms instead of the dominating command-and-control administrative regime.

Second, environmental services contain a typical dimension of public good, requiring regulatory intervention at least in the definition of the basic quality standards and expression of willingness to pay for the

¹ It is important to know that according to the modern economic theory the existence of a natural monopoly requires cost sub-additivity, that is a generalisation of the traditional rule requiring economies of scale (Cervigni and D’Antoni, 1994; Waterson, 1988). Cost sub-additivity can be due to other economies (e.g. vertical, horizontal, territorial integration; coordination; risk allocation etc).

² The most coherent framework for analysing the optimality of alternative contractual relationships and auctioning procedures has been provided by Laffont and Tirole, 1993 and Laffont, 2000 funding on the economics of information. See Bardelli et al., 2001 and Boitani and Petretto, 2000 for a detailed and formalised analysis more specific to local public utilities.

public good components. Public hygiene, urban propriety are evident examples, as well as the collective compliance to environmental regulation, or rainwater management.

In order to achieve these public goods, environmental services can be – and in fact usually are – not supplied on an individual demand base.

Free riding behaviour being well possible and difficult to prevent and detect, connection to environmental utilities networks is often *compulsory*, what usually does not happen in the case of other utilities such as energy distribution, transport, telecommunications; at least, non-connection is admitted only in particular circumstances.

For example, in the field of solid waste, the municipality usually regulates the structure of the collection system – technology to be used (eg large street containers or curbside individual bins), timing, frequency, separate collection systems etc – while the environmental regulator more and more regulates waste disposal – with emission standards, selection of technologies, authorisation of facilities, legal barriers to waste transfer.

The public sector has to take the important decision of setting the limits of the compulsory service by individuating which customers might have the right to use alternative solutions³. A further liberalisation issue concerns the possibility to open margins for direct negotiations between individual customers and service operators, regarding certain aspects of service quality and pricing.

Finally, environmental services – water supply, above all – belong to the category of “merit goods”, in the sense that it is regarded as a socially desirable target that access to basic goods such as water is allowed to everybody regardless the readiness to pay a price, or at least at such economic conditions that do not weigh too significantly on family budget.

This last aspect is not a peculiarity of environmental services; however, the issue is most sensitive in this case, even because the obligation to connect attributes fiscal nature to the payment.

The liberalisation issue, at this last level, concerns the opportunity of changing or even removing the structure of publicly-governed subsidy schemes (e.g. by the adoption of the full-cost recovery principle).

Given these particularities, we have summarised in figure 1 the decision tree occurring in the field of environmental services.

At one extreme we have the pure market, in which supply and demand interact freely and all inputs are acquired from competitive markets as well. At the other extreme, we have pure public provision (public organisations control 100% of the value chain of the service, owns all the facilities, takes all decisions concerning production level, quality standards and finally bears the cost through general taxation).

Between these extremes, all the alternative regulatory regimes can be individuated. The critical issues that should be examined in order to characterize each regulatory regime are:

- Property rights regime on the natural resource
- Does the service involve a public good nature (is it obligatory or not to purchase the service) and/or is it possible for eligible customers to bypass the public utility
- Responsibility for service provision
- Ownership of service infrastructure
- Property of the operator and contractual aspects of service provision
- Allocation of financial burden and economic risk among the public budget, operator’s shareholders, service consumers and eventually further actors.
- Responsibility of price setting
- Structure of the vertical value chain

In the next section, we provide a rapid overview of water and waste services in Europe, analysed according to this list of issues; in the following two sections we discuss liberalisation opportunities in both

³ While public water supply and sewerage, as well as domestic waste collection, are normally under public responsibility, there are many boundary services that might or might not include the obligation to connect to a public system according to discretionary decisions of the public authority. Among these, for example, irrigation water supply, water and waste services for commercial and small industrial customers. The extension of the concept of public service should also be assessed with respect to the vertical value chain (for example, while waste collection is normally regarded as a public service, waste disposal and recycling can be exchanged in the free market or not, according to national conventions).

sectors following the above described checklist.

3. The actual regulatory regime in the European environmental services

3.1 - Public water supply and sewerage

Property rights on the natural resource

Whatever the management structure, water supply and sewerage operators rely on administrative decisions for what concerns the water resources that they are entitled to use.

In some countries such as Italy, the environmental regulator is also in charge of individuating the water resources that are dedicated to each water supply system, or the discharge points. In other countries, the selection of available resources is left to the service operator, yet the right to use water resources must ultimately be authorised by the environmental regulator and fulfil various technical, quantitative and qualitative requirements.

Water use and discharge licenses are released with different degrees of discretionality allowed to the public administration; after an initial phase dominated by emission standards – and therefore, limited planning discretionality – the idea of river basin management and water quality management have been gradually prevailing, with the related power to plan water uses according to the desired water resources policy objectives.

Economic instruments are used in many countries as a complementary instrument, yet never alone and almost never with a “pigovian” effect in mind. The only exceptions with this respect are Denmark and some German *Laender*, in which water abstraction and discharge taxes reach meaningful levels (in the reach of 10-25% of the total water price) with the aim of achieving a “double dividend” in terms of fiscal revenues and environmental sustainability.

In some countries, environmental taxes are used in order to finance environmental regulation authorities (UK) or in order to raise earmarked budgets for later contributing to the investment in the water sector (France). In general, however, these taxes are raised by Regional or national governments, maybe with some broad requirement for later re-use of funds for environmental policy purposes.

In a limited number of cases, the water price is used as an allocative instrument (eg in some irrigation districts in order to allocate available water among farmers)

The use of tradeable permits for water resources and discharges is never practiced in Europe. Water use licenses normally entitle the licensee to use a maximum amount of water; if it is not totally used, a new allocation can be made only by the public administration. Some limited tradeability occurs in the irrigation sector in Spain (again, among farmers in the same district); more informally, it might occur that licensees for productive water uses transfer water to public water supply systems without the intermediation of the public administration.

Public good content and responsibility for service provision

Public water supply and sewerage – sometimes vertically integrated within a single “water service”, sometimes separately managed, are everywhere under the responsibility of the local public administration (municipalities), with the only exception of England and Wales, where competences on water services were regionalised in 1973 and later privatised in 1989.

The development of water infrastructure in the long term has followed different paths, with strong linkages with urban planning regimes. Nowadays, connection to urban infrastructure is normally compulsory

(where the infrastructure exists) for households, and in general also for sanitary uses in commercial and industrial premises. Connection to the public sewerage system by industry is usually not compulsory, since there is an option left whether to discharge directly into the environment (by respecting the required effluent quality standards) or into the public sewer (in which case, the quality standards are determined by the sewerage service operator or by the public authority)⁴.

The territorial size of water management systems is varying a good deal throughout Europe. On one opposite England and Wales have 10 large regional systems; on the other one Italy and France, whose independent water management systems count in the order of 10,000-15,000. A certain degree of fragmentation is also occurring in Germany and Spain, and more generally in the rest of Europe, with only The Netherlands and Portugal having a more concentrated system.

However, this picture should be further complicated, since in many European areas – notably Southern Italy, Spain, Portugal, but also some German Laender, The Netherlands and occasionally in France – local water management systems rely on upper level bulk supply systems managed in various forms (state or regional agencies, intermunicipal syndicates, publicly owned companies). A similar segmentation occurs, although only occasionally, in the case of sewerage, where large systems operated under control of upper level institutions receive the discharges of individual municipalities, together with industrial discharges.

Ownership of service infrastructure

Water and sewerage infrastructure is usually part of the public domain, even with legal restrictions to transferring it to private property.

However, there are exceptions to this rule, particularly in the case of new investment. Basically, the public property has the advantage of guaranteeing degrees of flexibility to the municipality, yet has an important shortcoming in the fact that public accounting rules do not normally provide for capital depreciation. The involvement of the private sector in the financing of new capital assets can nonetheless entail different degrees of financial risk for the private investor.

In the UK, property of assets has been fully transferred to the privatised water companies. The valorisation of the infrastructure – resulting from an accumulation lasting for more than a century – represented a very tricky issue: after the previous debt was cancelled, this value finally resulted from the price paid by those who purchased the water company shares, with serious difficulties for later depreciation.

According to Zabel, 1999, this does not represent a major difficulty, since what is actually relevant is the burden of new investment needed for maintaining and improving the existing infrastructure, since the water companies have the duty to maintain it properly.

Nonetheless, capital locked up in the infrastructure with a very long term repayment schedule and quite low returns on investment is being judged a serious shortcoming for the industry: some water companies have recently attempted to re-sell the full property of infrastructure in order to increase their liquidity, yet this strategy has been stopped by the regulatory authorities.

In France, delegation entails a very flexible mechanism, in terms of which infrastructure capital for the new infrastructure can be fully anticipated by the private contractor, and later repaid by tariffs along the duration of the contract; or, conversely, by the local authority, that has later on the possibility to depreciate the investment through the peculiar institution of “*affermage*”: the private contractor substantially pays a lease tariff to the municipality, financing it out of service tariffs; these revenues gradually reconstitute the capital anticipated. In both cases, property is transferred to the municipality after the contract has expired.

Normally there is a trade off between the financial exposition of the private contractor and the duration of contracts: pure concessions can last for 30 years or more, while pure lease contracts have normally durations in the range of 5-10 years. Between these extremes, many intermediate solutions exist, what renders the French model very flexible and adaptable to different situations.

Private ownership is also increasingly diffused through project financing or securitisation mechanisms,

⁴ This issue is particularly delicate in case the sewerage system is privately owned or managed, since the private operator would have the power to regulate discretionally other private subjects. On the other hand, the sewerage operator is responsible later on for the quality of the effluent arising from its own treatment plants.

involving financial institutions, capital markets or private investors. These solutions are more frequently applied for big new facilities (eg production of bulk water, comprehensive restructuring of distribution networks, sewage treatment plants) and therefore start being diffused particularly in those countries that are positioned in an expanding phase of the investment cycle.

Property of operators and contractual arrangements

Municipalities – individually or in association with other municipalities, sometimes compulsorily designed by upper level administrations – can discharge their responsibility by adopting a wide spectrum of management alternatives ranging between direct labour, creation of own private law or public law enterprises, delegation to the private sector through concession and lease contracts or more simply contracting out.

Direct labour resists in nearly all EU countries, though with declining market shares, especially in smaller towns and in rural areas. It is more diffused in the case of sewerage, even with an important share of the value added constructed outside the public sector through contracting out (particularly of blue-collar as well as technically complex activities).

Municipal enterprises are mostly diffused in Italy, Germany and other central and Northern European countries. These enterprises are often operating many other local services, such as gas distribution and electricity supply.

The trend in recent years is towards the acquisition of legal status and private law regime, with an increasing involvement of the private sector through capital markets or even participation of private firms, though – generally – with minority shares. In parallel with this trend, we can observe an increasing formalisation of contractual arrangements: *service contracts* (specifying operator's duties with respect of service quality, investment levels etc), *service charters* (specifying duties with respect to individual consumers), *economic and environmental reporting* are being diffused and required, with an increasing detail and specification.

Delegation through concession or lease contracts has its historical origin in France; it is also diffused in Spain, Belgium and in Eastern Europe, only occasionally, though with an expected upward trend, in Italy. According to this model, the involvement of the private sector can involve very different exposure to risk, ranging from the full concession – usually for long periods of time – to the leasing of infrastructure that is owned by the municipality, with the private operator supervising the new investment and maintaining the existing network.

The British case is particular, since the privatised Water Authorities have inherited the legal responsibility to provide the service through a national law; water companies created in this way have a territorial monopoly, with only limited space open to competition – basically, for new connections in the boundary zones, while quality and price regulation are managed by dedicated government agencies.

Allocation of financial burdens and economic risks

In the past, the public budget has represented the ultimate payer for most of the developments occurred to the water and sewerage infrastructure. If we exclude some early XIX century developments, in all countries, capital for the first-time investment has been always anticipated by the public sector. The difference between Northern and Central Europe (Ireland excluded), on one side, and Mediterranean countries, on the other, is that after the initial investment tariffs have been set on a cost recovery base with the aim of repaying the long term maintenance of infrastructure in Northern countries, while in Italy, Spain, Greece and Portugal tariffs used to be very low and unable to cover but operational expenditure.

Only in recent times the idea of full-cost recovery – entailing in some way a transfer of the economic risk from the taxpayer to the consumer – is gradually becoming the rule in most countries, even if with exceptions and ambiguities (Massarutto, 2001b). The big issue on this aspects regards properly the financing of new investment: despite legal provisions for full cost recovery in the national and european legislation, a significant part of the new assets fostered by environmental legislation will be actually financed in a way or the other with the contribution of the public sector.

In fact, however, only in Germany water pricing can claim to catch up with true depreciation of assets, since the practice of continuous revaluation at the reinstatement cost is practiced. In most of the other countries, depreciation is based on actual investment that is being made by the operator: given the long economic life of assets, there is a risk of gradual disinvestment over time, thus transferring investment burdens to the next generations, that will probably call for government intervention in the future.

With the increasing diffusion of privatised water management system, however, a part of the economic risk is being transferred to private investors. The pure concession contract, in fact, allocates risk on the private sector since the latter is obliged to supply the service at given quality standards for a certain time and for a given price: eventual new investment will just represent an extra cost for the private operator.

However, pure concessions are never practiced in the water sector: the transfer of economic risk on the private sector is limited by means of various alternatives, such as the possibility of cost pass-through of certain new investment on tariffs (England and Wales) and cost-based pricing rules

England and Wales are probably the case in which the exposure of the private sector is larger. Privatised water companies bear entirely the economic risk, with only a limited possibility to pass new costs onto consumers, while prices are regulated with a five-year price-cap. The combination of vulnerability to regulatory decisions and large flotation of the capital are aimed at favouring takeovers, that indeed took place in the past, for example with the successful POA made by the German electric utility RWE on Thames Water LTD.

Transfer of costs on tariffs is more typically made in France, in Germany and in Northern Europe. In France, however, the mechanism of the Agences de l'Eau, based on an ear-marked redistributive taxation system, allows capital for new investment at no interest; on the other hand, investment made by the private companies usually is made at market rates and requires a shortened repayment, thus resulting in high returns on that investment⁵. In Germany and in Northern Europe, on the other hand, the involvement of public financial institutions like the local *Sparkassen* contributes to lower the cost of capital and the risk premia. Extra margins raised by municipal firms are devoted to cross-subsidising other services such as sewerage and waste collection.

In Southern European countries, as we have seen, an important quota of the economic risk is still posed on the public budget, that is called to contribute to new investment at least for an important share.

Responsibility for price setting and price regulation patterns

In all European countries, water and sewerage prices are normally set by service operators, within limits and rules that originate from service contracts or from national regulatory authorities.

Within this broadly similar framework, important differences regard the way price limits are set.

Only England and Wales have engaged in the creation of a formalised and appositely organised regulatory system, based on the creation of an independent authority, whose declared objective is protecting consumers against water companies, while allowing the latter to fulfil their obligations without compromising their rentability.

The pricing mechanism is based on a price-cap set up every 5 years through a complex negotiation between the companies and Ofwat and focussed on the proposed asset management plan.

However, in most of the other countries, alternative regulatory mechanisms have been set up, for example concerning accounting rules, price setting, asset management planning.

The achievement of productive efficiency, while less explicitly pursued, is not completely absent; rather, it is left to informal bargaining between the operator and municipality and/or to the political control operated via voice instruments by customers, local press and politicians.

In Germany, in the rest of Northern and Central Europe and in Italy, where public management dominates, the bulk of regulation concerns accounting procedures aimed at revealing correctly the service costs. Profits for the municipality are sometimes allowed (eg Germany), sometimes not (eg Italy, until recent times). An interesting provision of the Italian regulatory system, though never applied so far, consist in the

⁵ The typical ROI in France is 15-20%, against a 5-7% or less in the UK.

use of standardised costs in order to delimit the maximum and minimum price levels.

In France, price regulation is even less formalised; the water price results from a negotiation between the operator and the municipality, with a general supervision of the correctness of accounting rules made by central institutions.

Structure of the vertical value chain

The organisation of the vertical value chain is quite differentiated, according to the different management models.

Vertical integration is typical of France, where service operators are also leaders in the field of project works, engineering, manufacturing of water equipment, technology, R&D. This means that competition is minimised along the value chain: each of the large company forming the French oligopolistic market tends to produce in house; technological specificities are also representing a barrier to market contestability in the future (Kraemer, 1995).

On the opposite, in the German model – that is also typical of Italy and Central and Northern Europe – the operator can be seen as a “procurement company”, selecting the technical solutions and adapting them to the local management system, yet purchasing most of the inputs on the competitive market.

This model also applied to the British Water Authorities before privatisation; after 1989, some steps towards vertical integration have been made, with special focus on engineering, financial services, specialised equipment. It is likely that the privatisation process in Italy, Germany and other countries that have been so far dominated by the municipal enterprise model will originate a similar trend, at least as far as privatised utilities will later engage in a strategy of enlarging their business to new areas.

A further trend that is visible in Italy and possibly in other countries is the search for decentralising local operational activities through outsourcing and/or creation of own operational branches.

3.1 - Solid waste collection and disposal

Property rights on the natural resource

The “natural resource” at stake in this case is the assimilative capacity of the environment, particularly considering the disposal of raw or processed waste into the soil (landfilling).

In all developed countries, the siting of waste disposal facilities is subject to public authorisation and control, in order to ensure appropriate technical standards. Emission limits, technical prescriptions, duties of care etc are foreseen in every European country national legislation, and increasingly harmonised within the European legislation. Nonetheless, important differences continue to exist among different countries.

Environmental legislation is not limited to set emission standards; rather, in the last ten years, it has evolved towards a comprehensive approach outlined in the 5th and later confirmed in the 6th Environmental Programme of the European Commission. According to these documents, and to the subsequent detailed directives 91/157 and 94/62, waste management policy should be targeted to the material flow and not to the mere generation of waste at the end of the production-consumption cycle. For this reason, legislation introduces a priority ladder in which reduction, recycling, energy recovery and finally safe disposal are the targets to pursue. All national legislation foresee quantitative targets for recycling and recovering, more or less authoritatively imposed and more or less formalised and rigid.

Public good content and responsibility for service provision

Traditionally, the public service is represented by the collection of waste from the streets, where households and usually also commercial waste producers are authorized to deposit their waste following

apposite regulations. Industrial waste is normally not included in the public service, although this sometimes occurs for small industry and laboratories. In most cases, industry has the faculty to use the public service, and pay the related tax, or provide on its own by addressing a specialised firm in the waste disposal sector.

The collection service is normally linked with street cleaning and other minor activities aimed at urban propriety. The nature of public good is confirmed by the fact that domestic – and also the other – customers are compelled to use the service under specified conditions, and do normally pay a tax to the municipality, regardless they actually produce waste or not (Massarutto, 2001b).

The responsibility for waste collection and successive elimination lays everywhere on municipalities, that are also universally the administrative level that is financially responsible for expenditure and in most counties raises dedicated taxes; in many countries, municipalities have the faculty to associate among themselves for the collective provision of the service.

The destination of waste after its removal from the streets used not to be a problem of public service until recent times. In the past, waste was simply dumped outside the urbanised areas, using the void space left free by quarries and mines, owned by private enterprises or directly by the municipality if this was reputed convenient.

However, this way to dispose of waste revealed to be unsustainable given the spectacular increase in waste quantity and harmfulness and the progressive social unacceptability of new dumping sites. At the same time, alternative solutions such as incineration revealed other shortcomings.

As a result, legislation started to require appropriate planning of disposal facilities in order to ensure an adequate disposal capacity of satisfactory technical capabilities within each territory. The County or Region was chosen as the suitable territorial level. This decision has the consequence of extending the public good concept to disposal as well as to simple collection. It is the environmental regulatory authority who specifies size and technological features, and sometimes directly operates, disposal facilities.

This model has been developing throughout Europe with different features.

In Germany and in the rest of Central and Northern Europe, for example, disposal is normally supplied by public facilities owned and sometimes even directly operated by regional authorities, with a strong emphasis on the proximity and self-sufficiency principle.

In France and in the UK, planning is less pervasive: Departments and Counties limit their role to the supervision and licensing of private sector activities, and in the regulation of the behaviour of waste handlers (municipal collection systems, in our case).

In Italy, waste disposal planning has been based on very detailed prescriptions concerning siting and typologies of technical facilities; these were later realised directly by municipalities, often within compulsory associative agreements. During the very long implementation phase, however, planning authorities have also concentrated their activity in the pro-tempore authorisation of landfills owned and managed by the private sector.

In recent times, a third dimension of public service has emerged, namely the organisation of recycling activities. The strong emphasis put by European environmental policies on the recovery of resources from waste has been enacted typically through the institution of extended producer responsibility. This means that industrial and commercial subjects – located along the vertical value chain of a given material or product – are forced or incentivated to accept responsibility over the achievement of a publicly-determined recycling target, and to finance this effort through their own expenditure, later on reversed on product prices.

These new entities, artificially created by environmental legislation, can be interpreted from the economic point of view as providers of a public good – namely, the achievement of the recycling target – again with appropriate measures that are typically aimed at avoiding free-riding behaviour. Adhesion to industrial consortia is obligatory in some countries (such as Italy), while in other cases consortia are legitimated to use their monopoly power against those who do not participate⁶.

⁶ For example in Germany retail distributors often refuse to distribute products without the “green dot” witnessing the adhesion to the consortium.

Ownership of service infrastructure

Collection infrastructure – bins, lorries, temporary storage and processing facilities – can be owned by municipalities, operators or even by customers, under a wide spectrum of alternative combinations.

Disposal facilities used to be private until the 60s, when many municipalities started to build their own plants, in general in order to avoid paying monopoly rents to the landfill owners. From the 70s on, and particularly after the diffusion of incineration facilities (characterised by important sunk costs) property has become more frequently public, even if many plants still belong to privates.

With the important exception of France – where the private industry plays a foremost role even in the property of disposal facilities – waste processing and disposal facilities different from landfills are nearly always owned by the public sector, sometimes under private law forms. Landfill of raw waste tends to have a decreasing role, even because it is fiercely adversed by legislation; modern landfills more often receive the leftovers of previous processing phases. These landfills, also authorized to receive industrial waste, are often owned and operated by privates on the open market.

More generally, the disposal of industrial waste is in general supplied on the market, without too many constraints to waste transfer at least within Europe. European directives single out lists of materials whose trading is authorised, restricted or totally forbidden, therefore requiring *in situ* processing.

Property of operators and contractual arrangements

The organisation of the waste management sector in Europe is similar to that of water, though with a still lower concentration. Municipalities (individually or associated) can discharge their responsibility with a variety of management solutions ranging from direct labour to full delegation.

France is undoubtedly the Country with the highest level of delegation to the private sector: private companies operate as concessionaires, even if they normally do not charge consumers directly. The peculiarity of the French model is the fact that the private industry is also delegated the responsibility of finding disposal solutions, that often takes place in plants that are controlled by operators themselves.

In the rest of Europe, despite a certain diffusion of delegation, normally disposal sites are individuated by the municipality and/or by the regional plan.

Like in the water sector, the management form of the municipally owned enterprise is massively adopted, particularly by larger cities, especially in Italy and Germany. Direct labour organisations are diffused in all countries but the UK.

An emerging trend in most publicly controlled management systems is the delegation of many operational activities to private subcontractors; on the other hand, initiatives with higher degrees of complexity and economic risk (eg new treatment plants) are often realised in collaboration with other public or private firms and financed with the recourse to the private capital market.

The UK has adopted a compulsory competitive tendering model: municipalities are obliged to entrust the service after a competitive bid, to which former public employees can participate with the creation of their own firm. After 10 years of application, the British model has now reached its maturity, with the 100% of the service units delegated to the private sector. The peculiarity of this system with respect to the French one, however, is that only occasionally it ends up with the full delegation of responsibility over the waste management cycle to a single private firm; rather, the preferred option is that of delegating the “blue-collar” activities, while holding in public hands the strategic management of the service. Bids concern simple activities, very often fractioned in a great number of different contracts.

Allocation of financial burdens, economic risks, price setting and price regulation

Only exceptionally waste management operator are asked to bear the economic risk of the service. Normally, the operator is rewarded by the municipality according to the terms foreseen in the contract.

In case of private firms, the competitive selection process in theory allows to guarantee efficiency, and this is utmost true in case relatively “simple” services are contracted out (Szymansky, 1996; Biagi and

Massarutto, 2001).

In turn, when publicly-owned firms are in place, rewarding normally follows a cost-based rule, with or without some profit margin left to the operator.

The municipality usually finances this expenditure through its own budget; in most countries, a dedicated municipal collection tax is foreseen, through which municipalities are in the condition of recovering the costs. The correspondence of tax revenues and service costs, however, is not necessarily total, since many municipalities, particularly in Italy, prefer to finance at least a part of the cost through the general budget.

The two extremes are the UK – where no dedicated waste collection tax is foreseen, and the service cost is entirely financed through the municipal budget like many other urban services – and Germany, where the recovery is total.

If the cost is totally transferred to the tax, the economic burden is allocated on individual customers, yet following rules that are quite distant from the marginal cost. In fact, the waste collection charge shares many of the typical features of local taxation. So it would be better to say that the economic risk in this case is posed on the local taxpayer.

Sometimes, more complicated financial structures are foreseen, with the provision of a direct charge raised by the operator (typically, on a fee-for-service base)

The most delicate issue, in both cases, regards the treatment plants, particularly the technological ones. Since the cost of the landfill is much lower than that of incinerators and other disposal solutions, the equilibrium disposal price tends to allow an economic rent to the landfill owners; in turn, technological plants are at permanent risk of underuse if the municipalities are left free to choose the preferred disposal solution. Given the sunk cost entailed in the investment for an incinerator, this risk is perfectly evident. In fact, in many countries, the realisation of such technological plants is accompanied by more or less strict compulsory provisions for municipalities to confer their waste to the facility (Massarutto, 2001d).

On the other hand, it is normally not foreseen that the public authority exercises a regulation on the disposal price, or at least these efforts are very often unsuccessful. The final outcome in terms of disposal price and correlated rents for the owners of disposal facilities is very much a result of the relative shortage of disposal solutions in any given areas.

A further important issue in the economic regulation concerns the recycling sector. Two delicate points have to be raised with this respect.

The first one concerns the price that recycling consortia award to municipalities for separately collected material. Since the objective of the consortium is to persuade municipalities to engage in separate collection, this price should compensate the cost; however, the relevant cost here is not the industrial cost of the collection system, but rather the differential cost with respect to ordinary disposal. Therefore, in congested areas, this price can be much lower than in other areas characterised by lower disposal price. If the consortium is left free to negotiate with municipalities – what generally happens in all European countries – it ends up with appropriating a part of the economic rent of disposal facilities.

The second issue concerns the relations between industrial sectors themselves, particularly in case a single consortium is set up for different materials (what occurs for example in the packaging sector). The risk here is that the consortium uses its monopoly power in order to discriminate against certain actors (eg. producers of a particular material, such as PVC, or small retail distribution premises) or adopts technical standards or other measures that raise barriers to competition on the goods market, or artificially alter the prices by introducing hidden cross-subsidies between materials.

None of these problems has found a comprehensive solution in European countries, although industrial consortia are regulated by very complex and evolving statutory norms (Massarutto, 1997; Buclet and Godard, 2000).

Structure of the vertical value chain

As in the water sector, the industrial vertical value chain has been rapidly evolving in the last three decades. While traditional waste management was a labour-intensive activity, with very poor industrial content, modern waste management involves a large use of capital equipment, technology, specialised services that are more and more produced by independent firms operating on the market.

Engineering and manufacturing of equipment has brought forth a vital industrial sector, increasingly internationalised (Hafkamp et al., 1998).

On the other hand, as we have seen, a parallel outsourcing process is gradually externalising most of the labour-intensive activities to local private firms. In many European countries, this outsourcing process has also a social value, since these activities are among the best candidates for the employment of “socially sensitive” categories. In turn, services like separate collection do often rely on the contribution of volunteers and NGOs, for example for the promotion and education of citizens to recycling.

The service operator, in this perspective becomes once again a “designer” and an “assembler” of goods and services that are produced by independent organisations.

4. Liberalisation opportunities in the water sector

4.1 - Water markets

The idea that market mechanisms should be used in order to improve the efficiency of water allocation has been sustained for a long time by economists, particularly in the US (Dosi and Easter, 2000, Dinar, 2000; Spulber and Sabbaghi, 1994).

The very well-known case-study of Californian cities purchasing water from upstream farmers located in other States is often cited as the demonstration of allocative benefits potentially arising from an enlarged scope for market transactions.

Liska (1984) has advocated the creation of an internationally-owned private-law company to which the property rights on the river Danube, in order to manage allocation disputes among riparian countries.

However, one must consider that these solutions are conceivable only in a water property rights regime that admits private appropriation of the resource – what is in general not the case in Europe, because of a great number of historical, cultural and institutional reasons, and also probably because of objective causes like the higher density and interdependency among users at the watershed level in Europe (Barraqué, 1995).

While it is difficult to imagine that water resources could be freely appropriated by privates, one might evaluate whether it could be feasible to introduce some degree of flexibility in the rules for the allocation of water use rights.

In fact, actual rules are the most rigid one can imagine. Allocation of water among potential users is made by the state, usually following a very complex and time-consuming decisional process, and only the state can introduce any further changes. What is allocated is not the property right (that remains public) but rather the right to use a given amount of water under given circumstances and given rules (Barraqué, 1998).

Allocation is rarely assigned following an economic rationale, but rather basing on political judgments. In the past, discretionality of the public administration used to be highest, and this represented undoubtedly a source of power since the ancient times. More recently, objective criteria and priority ladders have been introduced (e.g. requiring the respect of minimum flows for environmental protection, or by ensuring priority to potable use over productive uses, and to irrigation among productive uses, as occurs in Italy). In many countries, the water allocation process is supported with the creation of ad-hoc committees and users' associations, whose power in the decision process varies from a purely consultative to a veto right (Massarutto and Nardini, 1997). In other cases – namely in Germany and in Central and Northern Europe – water use rights are not entrusted to single users, but rather to users' associations, voluntarily or compulsorily created, that later on determine punctual allocation among their members (Correia, 1999). Spain has experiences, though with little success, water rights tradeability among farmers associated to the same irrigation board, in the search of temperating the rigidity of the traditional per-capita allotment (Massarutto, 2001c).

Nonetheless, an economic analysis based on the evaluation of users' WTP confirms the economic rationality of the final outcome of the traditional allocation process, as far as consumptive uses are concerned; on the other hand, in-situ water uses, landscape conservation and ecologic functions are often

undervalued, therefore generating a sub-optimal allocation between use and non-use of water (for a survey see Fontana and Massarutto, 1995; Massarutto, 2001c).

In case of new waterworks planning, distorted welfare effects can be provoked: this was demonstrated for example in the case of the proposed Rhone-Barcelona water transfer, whose economic feasibility appeared clear in the cost benefit study (WTP of Barcelona water users seemed actually higher than the cost of the transfer), yet it failed to consider that the same amount of water could be obtained far cheaper from local reservoirs used by agriculture. If water users would be enrighted to trade among themselves the acquired use rights, therefore, one might expect that allocative efficiency gains could be achieved, particularly in order to avoid the construction of very costly new water infrastructure (Barraqué, 2000).

Summing up, as far as the public water supply system is conceived, there do not seem to be many opportunities to benefit from water markets in Europe, mostly because of the relatively smaller quantities of water involved and the priority that the law normally ensures to this use over the other. Efficiency gains are more likely to occur in case of a redistribution of water rights between categories (eg irrigation vs. public supply), rather than among the same category.

The reliance on long distance water supplies is conceivable only in case local water resources – underground and sources – are of insufficient quantity or quality. The cost of connecting to long distance bulk supply systems is usually very high and above all depends on the sunk cost met for the construction of pipelines. Once the investment is made, it seems unlikely that this source of supply is abandoned in favour of a new one.

Nonetheless, some limited tradeability might result beneficial, especially in order to face short term emergencies in the dry season; in fact this already occurs, though informally. For example, the water plan of the city of Palermo foresees the purchase of water in case of demand peaks from a nearby reservoir managed by the National electric power generation utility. If these solutions could be generalised, the result would be probably to reduce the scope for new transfers, whose feasibility is often justify on the need to meet unexpected demand in the future.

In any case, water markets seem to have a role – if any – as far as long distance water supply systems are concerned, not at all for local distribution systems.

Another related issue – following the German example – entails the tradeability of pollution rights, with particular reference to the use of underground water contaminants (fertilisers and pesticides) by agriculture. Legislation and soil use regulation normally entail quantitative restrictions, that are higher in the areas designated as vulnerable to pollution; however, restrictions are not sufficient in order to avoid contamination of drinking supply sources, thus obliging operators to adopt very costly potabilisation techniques. A peculiar insitute of the German legislation (the so called *Wasserpfeffnig*) enrightens the water supply operators to negotiate with farmers in order to persuade them to stop using contaminants in certain areas, being compensated for that out of the water bill (Barraqué 1995, Ecologic 1998). This is evidently an application of the Coase model of environmental bargaining, whose validity has been sometimes criticised on ethical and political grounds, but whose economic validity is unquestionable.

4.2 - Competition in the market and eligible customers

Water supply and sewerage networks are among the most perfect example of natural monopoly. The high infrastructure investment compared with the low value of water ensures that no more than one supply system can efficiently serve a given area (Massarutto, 1993; Spulber and Sabbaghi, 1994; Cowan, 1994; Beecher, 2001).

The only cases in which competition in the market could be envisaged are those in which water and sewage are transported to and from the service user's site by alternative means (e.g. tankers). These cases do sometimes occur (e.g. small islands with important touristic resorts; industrial sewage), yet they do not seem important enough so as to justify ad hoc regulatory provisions.

As far as drinking water is strictly concerned, the diffusion of bottled water consumption has originated a competitive market, with growing degrees of integration at the European and even global scale. However, despite the not negligible economic dimension of the bottled water business, this shift of consumers'

behaviour has limited importance for the public water supply system, since it regards a very small fraction of water consumption (only some percentage points of the total consumption of water are for drinking purposes), and public water utilities still have to respect the same quality standards as if tap water is to be used for drinking.

Intermodal competition can be as well excluded, since water has no substitute.

The social importance of water is such that arbitrary exploitation of the monopoly position would surely result very harmful in terms of social welfare.

Again, it does not seem worthwhile to adopt solutions inspired to third-party access to infrastructure network: the greatest share of the value added is contained in the infrastructure, while differences in the cost of water production could be at best reconduced to the control of better quality resources, that are more plausibly due to rent positions rather than to efficiency.

TPA could be nonetheless conceived at some stages of the vertical value chain, for example in the case of large reservoirs and water transfer system, that in theory could serve as common carriers used by many different water suppliers having abstraction licenses in the same watershed.

However, since public property regimes on water resources are dominant in Europe, and since large water transfers are normally dealt with at the environmental planning level, the scope for similar solutions seems quite modest.

It is well possible that vertical separation between bulk and retail water supply, as well as between sewage collection, sewage treatment and sludge disposal occurs; yet even separated, all of the main segments of the water service remain natural monopolies, with important public good features.

A recent consultation document issued by Ofwat, the British regulatory agency in the water sector, individuates two further areas of possible competition in the market: connection of new areas (eg new urban development), realisation of dual networks for the supply of particular uses (eg industry) and finally in the possibility of associating customers in order to negotiate better service conditions (Ofwat, 1999).

Customer pooling for the sake of self-management of water services – eventually promoted and participated by public entities – is quite common in Italy, in France and in Germany, especially for industrial water supply and sewerage and for irrigation.

Nearly in all cases, consumers different from domestic ones are “eligible”, in the sense that they are not legally forced to connect to the public system; connection is nonetheless often inevitable in order to be able to respect environmental standards. In fact, connection of industrial water users/dischargers, as well as farmers for irrigation, is often considered a desirable policy (in order to limit the environmental risks of self-supply) and promoted in many ways. There do not seem to be many further opportunities with this respect.

Considered altogether, all of these liberalisation opportunities seem to be limited in scope and not very much interesting in terms of potential for improving efficiency. Liberalisation through competition in the market, even for service segments, seems unviable in the water sector.

4.3 – Contracting out, franchise, competitive bidding

The next step is to evaluate whether liberalisation could be achieved by introducing competition for the market, through the introduction of franchise bids.

A comparative analysis of the ongoing European experiences allows to argue that the critical aspects with this respect are the information and technological barriers to new entrants, on one side, and the choice of an appropriate risk-sharing in order to cope with sunk costs embedded in the water infrastructure, whose economic life lasts in the range of decades or even centuries.

Both issues determine sources of uncertainty and market incompleteness, that hamper the viability of franchises (Beecher, 2001; Massarutto, 1999).

The first aspect is linked to the information asymmetry existing between the incumbent operator and the public administration in terms of knowledge of the territory, state of the networks, investment and maintenance needs; as well as in the learning by using the existing infrastructure technology, particularly if it results from in-house engineering and patents, like in the French case.

The public administration is realistically not in a good position for transferring this information into a new bid, what makes the typical Demsetz model quite implausible.

This statement is far more relevant if we consider that the water industry is in a dynamic phase of the investment cycle in many countries, especially in Southern Europe; and that the drivers of the new investment are the need to cope with water supply vulnerability and to drastically improve the sewerage system in order to achieve the demanding environmental policy targets set up by the Framework Water Directive.

Both aspects entail a complex bargaining at the political level. The water service operator is not simply asked to comply with regulation, but rather to propose solutions that are functional to river quality objectives at the basin level. This causes difficulties to the franchise bidding model, since it is concentrated on ex ante procedures, requiring a full specification of contractual arrangements and investment duties.

Moreover, given the technical characteristics of the water service, it is unlikely that the turnover, if it even occurs, will imply that a full substitution of the previous management organisation will be made by a new one; rather, technology, fixed assets, manpower etc will be mostly transferred from the previous to the new operator. What the substitution actually will be about, in fact, is the organisational, financial and strategic management of the service organisation.

In fact, competition takes the shape of a periodical re-disputing over the future management of the municipal assets.

Given the complexity of this exercise, the bidding game should be very carefully orchestrated; one-shot bids are with this respect less likely to generate beneficial outcomes with respect to open processes, in which further rounds of negotiation might occur (Fazioli, 2000; Bardelli and Doni, 2000). However, these complications are likely to weigh down the decision process, with lower expected benefits wherever the incumbent operator has already reached an acceptable level of efficiency.

Therefore, competition for the market seems a promising solution particularly in case there is a decision to privatise an already existing public management system, particularly when this is characterised by low efficiency levels and incapability to finance the necessary new investment.

As Barraqué (1995) points out, competition in the French water market seems to operate above all in the occasion of the first time contracting out to the private sector: the municipality can use the benchmark of the former existing public management system in order to evaluate the proposals. In the following bids, despite their relative frequency, the turnover is practically inexistent and the oligopolistic nature of the industry guarantees that the threaten of incumbent substitution is more theoretical than real.

The second aspect is crucially linked to the exposure that is requested to the private contractor in terms of new investment. This point is particularly relevant in the water sector, given the social relevance of the water price – particularly in developing countries, where most of the new business opportunities for the water industry could be found. Therefore, being water charges difficult to raise up to a cost-recovering level, the risk related to investment is significant, despite customers are captive.

The French system, as we noted before, has solved this delicate problem with the adoption of a very flexible contractual system, based on municipal property of assets that are later leased to the operator in exchange of a canon that reconstitute the basis for financing maintenance and renewal of infrastructure (*affermage*). In this way, the municipality can continue to rely on the private capacity to optimize financial flows, while keeping it relatively free from the economic risk in case the contract is not renewed.

A similar, though less flexible solution has been proposed in Italy in the project law issued in the last legislature, concerning the overall regulatory reform of local public utilities (Osculati and Cavaliere, 2001; Massarutto, 1999 and 2001d). According to this proposal, investment should have been agreed with the municipality along the duration of the contract, with the municipality holding property over the assets; at the moment of the new bid, the book value of not fully amortized investment would have been paid by the new operator to the incumbent in case of substitution. The *prima facie* simplicity of this scheme, however, was counterbalanced by other shortcomings, since this mechanism would require asset management planning by the municipality, therefore limiting a good deal the opportunity of exploiting the operator's capabilities with this respect; another obstacle was recognised in the necessity for municipality to sell out their existing assets at a very low price, therefore giving up the income opportunity embedded in the privatisation (Massarutto, 2001a).

On the other hand, it requires a detailed ex ante contract specification, and therefore seems more

practicable in the situations that require management, renovation and marginal improvement of an already established water infrastructure, rather than substantial new investment: but the need for new investment is usually one of the most important factors that trigger privatisation.

To sum up, full delegation through competitive bids has proved to represent an interesting privatisation option, with particular reference to those cases in which the local public system had to be drastically abandoned, because of its technical or financial incapacities. In fact, this has occurred more frequently in developing countries than in Europe.

In order to represent a valid option in the developed world, franchise bid requires very good planning and evaluation capacity by the public administration – what is in general correlated with well developed management structures already in place, and thereby reducing the usefulness and political desirability of this model of privatisation.

In fact in most cases a second-best alternative is chosen, namely the contractualization of water services still maintained in the hands of publicly-owned operators. In other terms, delegation is increasingly based on formalised documents specifying performance standards to be achieved, investment levels etc, after a negotiation between the municipality and the public operator. This solution, though giving up the potential benefits arising from competition, increase the “arms’ length” separation between the public administration and the operator, enabling some comparative performance evaluation (Guerra et al., 2001).

In alternative, franchise bidding could represent an interesting option for the management of single elements of the water service – for example, construction and/or operation of single facilities such as treatment plants or potable water production. The development of project financing, again, requires the selection of appropriate risk-sharing solutions, without which the private industry will find very difficult to reward the investment. The recent history of the water sector in the developing world has been very illuminating, with significant disillusiones for both the private firms engaged in the water business and for local consumers and political systems (The World Bank, 1997; Rivera 1996; Beecher, 2001)

4.4 - Privatising monopolies

The preferred privatisation model that has been adopted in Europe is undoubtedly the privatisation of established monopolistic utilities, under many different models ranging from the complete sellout (England and Wales, where the role of municipalities, traditionally much weaker than in continental Europe, was completely eliminated still in 1973) to the pure legal transformation with 100% of shares still in municipal hands (Lorrain, 1995; Barraqué, 1995; Finger and Allouche, 2001; Beecher, 2001).

Between these extremes, we can find many alternative solutions.

For example, in Italy it is becoming very common to constitute ex novo private law companies with the participation of municipalities previously engaged in direct labour management system and eventually other public administrations; after the new company is set up, concession is awarded for a given, usually very long, time, and a preliminary strategic plan is adopted, a minority share is sold to an industrial partner, after a competitive bid in which the awarding criteria usually are based on a mix of reputation, financial capabilities and quality of technical and financial proposals face to the original asset management plan.

A similar model to many respect has been adopted in most Eastern European countries, where the already existing public management system had to be strengthened and recapitalised.

Alternatively, an already existing municipal firm, after being transformed into a private law company, can be quoted on the stock exchange and enlarge its capital on the market in order to raise venture capital for financing its own expansion or the investment needs of the original city. This model is very common in Italy again, as well as in Germany, and has also favoured a gradual process of concentration and integration through a complex spiderweb of industrial alliances between municipal firms themselves or with the participation of national operators of other utilities, public or private.

Only where the share flotation is big enough and the contestability of property has been higher, however, this transformation has also been accompanied by aggressive takeovers. This has occurred above all in the UK – where more or less successful takeovers have interested even the bigger utilities (such as Thames Water Ltd, successfully took over by the German RWE).

This privatisation model surely is less likely to achieve immediately and permanently those efficiency gains that liberalisation promises in other sectors; however, most municipalities seem to prefer it with respect to full delegation, because of its greater flexibility, because it allows capital higher revenues in occasion of the sale, and finally because it seems more reversible, avoiding to dismantle completely the originally accumulated know-how in the hands of the municipality.

Moreover, this solution, better than delegation, allows the municipality to continue extracting a rent from the service operation, either via the concession charge or the profit. In the delegation model, the municipality has to accept its remuneration in advance via the concession charge and eventually the rent from the assets loaned to the operator, yet it is easier for the operator to hide this rent via transfer prices.

Despite these evident advantages, however, it becomes clear that the more privatisation goes on, the more an appropriate regulatory system is needed in order to avoid these new entities to exploit their monopoly power (Beecher, 2001; Massarutto, 1997).

The critical aspects here seem to be less the exploitation of the monopoly via profit maximisation on the internal captive market – that is normally made difficult by the high political sensitivity of the water price – but rather the use of this captive market as a sort of “insurance” for cutting down the risks of operating on new markets. In other words, local monopolists could try to engage in expansive strategies without focussing on their profitability, given that eventual extra costs would ultimately be suffered by local captive consumers. Another critical point – particularly evident in case the chosen industrial partners are also manufacturers of goods and suppliers of technological services – regards the control of the vertical value chain and of input prices. Finally, the privatised monopoly is likely to recover from the economic risks of the contract by delaying or postponing investment (Beecher, 2001).

In fact, this model seems to function at its best once the service operator becomes more and more an empty shell, a pure “procurement company” purchasing inputs on the open market, and keeping in-house the strategic design of the service, asset management planning and choice of appropriate technological solutions.

Unless many efforts are put in place in order to create a permanent contestability of asset property – what is generally linked to the renounce of any majority or golden share by the municipality – the role of the market here is rapidly exhausted after the first privatisation. As Osculati and Cavaliere (2000) have noted, this way of privatising resembles the sale of a monopoly rather than the introduction of competition.

4.5 - Competition along the value chain

It has repeatedly emerged from the previous pages that a crucial element to consider is the competitiveness that the regulatory system fosters not only at the level of the management system, but more generally along the vertical value chain.

It is difficult to express a preference on theoretical grounds among the two polar liberalisation models that have been considered – full delegation to vertically-integrated companies rather than privatisation of local monopolies intended as “procurement companies” purchasing goods and services on the open market.

In fact, the French experience seems to have encouraged the creation of a very strong national oligopolistic industry, whose true competitiveness in the internal market is highly questionable, yet whose capacity to compete in the world market and to export, with great flexibility, know how and experiences is also undoubtable.

On the other hand, the German model has favoured the development of the national manufacturing industry, that is regarded among the world leaders in the field of water and environmental technology, while in turn the economic efficiency of the water management system has been repeatedly put into question, even if it is not well demonstrated whether the higher German water prices are to attribute to system inefficiencies and transactions costs in the choice of technology, or rather to the permanent search of technical excellence and the continuous upgrading and renovation of infrastructure (Ecologic, 2001; Kraemer, 1995).

A very similar model in Italy has actually lead to rather different outcomes, especially where the attitude towards big works and grandfathering had prevailed (Massarutto, 1999b).

Accompanying monopoly privatisation with a strong regulatory system aimed at cutting down price increases and to the encouragement of market takeovers, on the other hand, has probably guaranteed that

British water prices have been kept down, yet at the price of sacrificing long-term investment (Andrews and Zabel, 1999) and distorting the R&D effort from the search of quality excellence to the search of cost-saving innovations (Prost, 1997).

In the UK, this model has led to an intermediate solution between the French vertical integration and the German fully deverticalised model: the privatised water companies have rapidly engaged in a vertical and horizontal integration strategy, either through acquisitions or through other forms. In fact, since the beginning, Ofwat has emphasised the risks of vertical integration in terms of transfer of profits from the regulated to the non regulated business and has imposed a strict societal separation. Most of the water companies, although they might have direct relations with manufacturers and engineering companies, do not necessarily rely on them for their own procurement.

Both the French and the British water industries have found it easier to replicate themselves in new markets and to expand in new countries – including European ones in occasion of the successive waves of privatisation, while the most evident difficulty of German and also of those Italian firms that have adopted an expansive strategy has been the capacity to offer ready-to-use management packages, instead of their reputation alone.

4.6 - Regulatory regimes: incentives, benchmarking, soft regulation

According to the presentation made so far, there are many interesting available options for introducing market mechanisms into the water sector; none of them, however, seems resolute enough. Competitive forces alone, even in the most ingenious market design, are not likely to guarantee efficiency improvements.

A strong regulatory system should be established, and therefore the next question is whether the regulatory system could be improved in order to provide stimulus to efficiency, without sacrificing service quality with respect to customers and to the environment, nor the long-term maintenance of the capital assets.

As we have seen above, the European experience is quite variegated with this respect.

Standard costs are never used as a price-setting tool, but rather for benchmarking and comparative evaluation of efficiency. In fact the very “standardisability” of water supply and sewerage costs has been put in question: the peculiarity of the water industry is in fact its high dependence on local environmental specificities, highly influencing the costs. While the definition of outputs is quite straightforward and easily measurable, the cost function depends not only on entrepreneurial efforts to combine efficiently labour and capital. Hydrography, orography, population density, quality of water resources and desired local water quality objectives interact together in such a way that the predictability of costs out of econometric regression is seriously hampered (Martini, 1999).

Even if the analysis is confined to operational costs only, the statistical significance of econometric cost functions is supposedly higher once larger territorial units are considered. For example, the formula adapted in Italy for modeling operational costs, entailing 8 explicative variables and a large number of dummies allows but a very poor explicative power, despite it is based on a vast sample of management units (Massarutto, 1999).

A more promising approach seems the one based on performance indicators (Guerin-Schneider, 1999). This approach has some early tradition in Germany (Kraemer, 1995; Lorrain, 1995) and is being discussed in France (Guerin-Schneider and Nalkha, 2000) as well as in other countries.

These indicators, whose selection is a tricky exercise particularly in order to capture the effects of service and environmental quality, can provide useful information to the regulator; although not usable as an automatic regulatory instrument, they can well support the price-setting procedures, by signalling the potential margins for productivity improvements. In this perspective, comparative efficiency evaluation could be an excellent support either for price-cap regulatory models, like the one adopted in the UK, or for less formal bargaining, like the one occurring between municipalities and publicly-owned companies in Italy and in Germany. Comparative benchmarking could also represent a useful information for customers and organised pressure groups in order to found their voice-based control over the water service operator (Massarutto, 1997).

The British experience, based on the price cap model, is probably the best known and the one for which it is possible to draw the most convincing conclusions. Substantially, the price cap is based on the ability of the regulator to “guess” the productivity improvements that the operator is able to achieve, and on the stability and predictability of the service requirements over a reasonable period of time. After the initial price setting and two subsequent price reviews in 1994 and in 1999, the mechanism has been progressively fine-tuning, yet

The main problem emerged in the 1994 price review (AMP2) has been the difficulty in the understanding of the true investment requirements, especially those due in order to comply with the new environmental directives (Massarutto, 1994; Massarutto and Pesaro, 1996).

The following price review in 1999 (AMP3) entailed for the first time a decrease of water prices in real terms, given the persuasion of Ofwat that the productivity improvements would more than compensate new investment requirements. Once again, however, despite the development of sophisticated benchmarking models aimed at efficiency, the critical point was the achievement of an investment level that is able to catch up with the requirements posed by environmental sustainability and long-term reproducibility of the water assets. There are evident signals that AMP3 in particular has originated a drastic slowdown of investment, whose effect might be ultimately a gradual deterioration of the asset base (Andrews and Zabel, 1999).

Once again, the price cap model demonstrates that its best results have to be expected in the mature industry, without the need to radically expand the asset base (Waterson, 1987). Cost pass-throughs and renegotiations are in turn inevitable in the water industry, at least in the present phase. This problem could be minimised if the operator would be made responsible for maintenance only, while separate financial mechanisms would be used for the new investment: this requires an active role of the public authority (the municipality or the state).

Though less formalised than in the British case, in fact a negotiation over price increases also occurs in the rest of Europe: while the role of national regulators is basically that of setting up accounting rules and benchmarking indicators, it is the municipality who ultimately has to agree with the operator’s pricing proposals. The flexibility offered by the various alternative contractual models allow precisely to find ad-hoc solutions for new investment. This occurs in the French *affermage* model, yet even in other countries analogous solutions are devised.

For example, contracts for sewerage management in Italy do often distinguish between ordinary management (for which the operator has full responsibility and is remunerated by a corresponding quota of the sewerage charge) and extraordinary maintenance and new investment. The operator might propose and update the sewerage assets management plan and provide other valuable services (eg general contracting, overall supervision, projects), while the financing will be provided by the municipality out of the remaining of water charges and other contributions (Guerra, Massarutto and Tabacco, 2001).

The most important shortcoming of this model is the likely conflict of interests between the municipality and the environmental regulator, in a context of poor and relaxed enforcement of environmental regulation within the public sector. The municipality is in fact asked to sustain investment costs and later on management costs in order to implement an environmental plan whose beneficial effects are shared over the whole watershed. For this reason, the Italian legislation has foreseen that management units would become inter-municipal associations operating at a larger territorial scale and possibly the basin one; this solution, however, raised political and practical difficulties and after 7 years is still lagging behind (Massarutto, 1999).

As an alternative, the creation of a water planning system based on voluntary agreements between municipalities and basin/regional authorities, based on economic incentives/disincentives or on a broader political bargaining seems by far a more practicable solution.

5. Liberalisation opportunities in the market of solid waste

5.1 - Is privatisation of property rights on environmental resources possible?

As we have seen, the public sector controls the use of environmental resources with a very rigid administrative regulatory system. Waste disposal, while at once supplied on the free market without great difficulties, is now subject to the prescriptions of public planning.

There are at least three arguments that can be invoked for theoretically justify the subtraction of the disposal sector to the private initiatives:

- first of all, the need to ensure public control over waste disposal practices (and before that, to the movement and handling of waste before disposal), in a context of very strong informative barriers;
- second, the supply shortage that has occurred during the 70s and 80s (the “waste emergency”), caused by the difficulty to catch up with the spectacular rise in the waste generation, has originated economic rents for the benefit of facility owners
- third, because the substitution of landfills with more appropriate solutions requires sunk costs and economic risks that the private sector is not ready to accept without some sort of guarantee offered by the public plan.

The first point is probably the decisive political argument, though not necessarily the most important one as far as household waste is concerned. In principle, public control might be achieved by enacting a proper regulatory system focussed on emissions licensing and/or emission taxes aimed at fostering cleaner technologies. In fact, this approach is difficult to adopt, since the continued monitoring of waste flows – particularly, those entering landfills – is practically impossible.

It is well-known and documented from institutional and journalistic sources (Commissione parlamentare di inchiesta sul ciclo dei rifiuti, 2000; Berni, 1999) that the illegal transfer of waste within Europe as well as towards developing countries is unfortunately one of the most successful business of organized crime. Even if this

According to the Solid Waste Commission of the Italian Parliament, a significant fraction of waste, especially industrial waste, is actually disposed of in an unauthorized or illegal way.

It is also true, however, that control difficulties regard much more industrial waste – whose management is actually already liberalised – than household waste.

In fact, the two segments are gradually converging one in the other, since the very definition of urban and industrial waste is becoming an overlapping one for what concerns final disposal. In fact, waste management means more and more to engage in a successive series of valorisation processes, specialised according to materials content rather than through its origin, and whose final unrecoverable leftovers are converging towards the same landfills.

The second issue is more serious in the case of domestic waste, even because the high transport costs combined with the difficulty of building new plants have historically determined a spectacular rent in favour of facility owners, especially during the 80s and early 90s. To provide only a rough figure, disposal costs in Lombardia have reached 150-200 E/t, while the industrial cost of a landfill is not higher than 40-50. What is even more critical is the fact that in this way the waste crisis has been rapidly exported and extended to areas that did not experiment it so far. The 1990 emergency in Campania is illuminating: the Region where most of the Italian waste flows have been directed in the past 10 years has rapidly run short of disposal sites and needed to send its waste for disposal in Germany.

This point is strongly related to the third one: the displacement effect that cheap disposal elsewhere would have on the adoption of cleaner technologies and on resource and materials recovery, based on separate collection, processing and/or incineration. Many applied studies reveal that these options are well justifiable on economic grounds, unless they have to face the “competition” of cheap landfills, whose sustainability occurs only in the very short run (Massarutto 2001d).

This displacement effect had the notable effect of discouraging private realisation of facilities even when waste disposal plans did not forbid it. With the partial exception of France – where nonetheless the private initiative has been governed and guaranteed within departmental plans – “technological” plants such as incinerators have always been promoted by public actors, even if their construction and eventually operation have been later contracted out to the private sector, at guaranteed remuneration and thus with a low entrepreneurial risk.

Private initiative is not only admitted but also encouraged in most of the waste valorisation activities (from composting to recycling and use of waste-derived fuels), yet the success has been only partial and limited to some materials. In particular, the waste-to-energy through the use of processed waste has never

met an interest by the private sector, despite its theoretical economic rentability and the declarations of many industrial groups.

Even in the case of packaging waste and the other sectors in which the approach of extended producer responsibility has been adopted, despite the evidence of the massive effort produced by the private sector, it should be recognised that this is by no means a result of the “private initiative”, but rather of the creation of a legal private monopoly fostered by environmental legislation.

With these premises in mind, it seems that a full re-liberalisation of initiative in the waste disposal sector is, at best, premature; at best, it could be experimented in particular fields, especially those whose eventual failure do not compromise the short term effectiveness of the whole management system.

If public planning is still needed, it should be also recognised that public control over waste management solutions, though inevitable, could be exercised in many different ways, and that authoritative planning – particularly in the very rigid and top-down version adopted in some countries such as Italy – has probably exceeded on the opposite side with the introduction of formalism, barriers and inefficiencies with only a limited success in the elimination of the shortcomings mentioned above.

5.2 - Competition in the market: “level playing field” vs. the self-sufficiency principle

The next step is to explore the possibility to introduce market incentive within the waste disposal planning, that is in the context of an activity in which the public sector continues to play an active role as the “owner” of the assimilative capacity of the environment and the one who authorises, or ultimately realises, waste disposal facilities.

The first issue to deal with concerns the need to create a legal monopoly, that is to vinctuate any particular area to dispose of waste obligatorily in a certain facility indicated in the plan. Wouldn't it be more efficient to allow municipalities the freedom to decide, if they could by chance have access to a cheaper solution (provided it is authorised) ? In fact, this is exactly what occurs in the industrial waste market.

The arguments against this solution are both economic and political.

The economic argument regards the need to guarantee a complete symmetry of rules before allowing waste transfers.

In an open market, economic activities tend to be localised – *ceteris paribus* – in the areas where the costs are lower. In the case of waste, the freedom to transfer waste would probably entail its migration towards the countries where realising new landfills is cheaper (net of the transport and intermediation cost). If this difference depends on a real competitive advantage, this effect is desirable and originates a welfare gain (for example, this can occur because a country is less densely populated, the soil is easier to impermeabilise etc).

However, if it depends on the fact that environmental regulation is not the same, waste transfer is assimilable to “environmental dumping”. The waste crisis is rapidly extended to the whole territory. As Brusco et al. (1995) point out, an analogous effect is produced by asymmetric control, even in a context of converging rules.

If we consider that the development of environmental regulation – at the national and also at the regional and local level – is also a consequence of the acuteness of environmental problems experienced in the past and of the priority assigned to environmental quality in the policy agenda – itself a function of income, employment and economic welfare – it is easy to conclude that a certain asymmetry of rules is inevitable within national markets and even more within free-trade international communities.

In fact, the harmonisation of rules is adversed at the Community level either by countries with a relatively less developed environmental policy or by the most advanced ones: if the argument of the former is that the sudden increase of waste disposal costs could displace the ongoing modernisation effort by making the new facilities rapidly obsolete, the latter claim their right to demand higher targets than the “average” ones originating from the European compromise.

The self sufficiency principle, established, though with some degree of elasticity, by Dir. 91/156, has actually been motivated by the need to stem the massive waste flows – initially only industrial, yet quite soon also those originated from separate collection – between Eu countries, whose triggering force was the very high disposal cost in German and Dutch facilities, because of the very demanding emission standards and the

environmental taxes and subsidies to separate collection (Buclet and Godard, 2000). In the same way, Dir. 94/62 concerning packaging waste, in order to preclude the massive exportation of the yields of separate collection, has forbidden to expand separate collection beyond a certain threshold unless the country can demonstrate that it can dispose internally of an adequate recycling capacity.

All of these difficulties could be overcome in the long term, and in fact the scope of these measures was much more that of solving a temporary crisis caused by asymmetric rules combined with a very rapid development of separate collection. At the same time, the recent approval of two directives concerning minimum standards for landfill and incineration has greatly reduced regulatory asymmetries, and the same effect is gradually produced by the generalised adoption of environmental certification (through the EMAS protocol) of waste disposal facilities (Hafkamp et al., 1998; Frey, 1997).

The problem with household waste transfer is much more a political one (with local constituencies refusing to be treated as someone else's "dustbin") rather than of environmental policy. In fact, areas experiencing lack of sufficient disposal capacity in the past have massively resorted to more or less authorised transfers of waste to other regions or even to other countries. The case of Strasbourg, incinerating the waste produced in a neighbour German city (that could benefit from the lower French emission standards) or of Milano, whose raw waste has been landfilled everywhere in Italy during the 80s, are very well-known examples that raised a lot of concern and complaints among the population.

In this perspective, the self-sufficiency principle had the function of "reassuring" people that would cohabit with the treatment plant that their sacrifice is for their own community. Since the siting of waste processing facilities has met in the past, and is still meeting today, a fierce social opposition, many studies demonstrate that social acceptability is much higher if it is possible to appeal to the sense of belonging (Dente, 1998).

In fact we believe that the interpretation of the so self-sufficiency principle should be flexible enough so as to admit at least as a second best solution that waste is disposed of outside the area where it has been originating. This can be achieved with the employment of economic instruments. For example, some Italian regions have started to experiment a model in which each district should be self-sufficient; yet waste exports are not forbidden, but rather discouraged with the provision of a special tax (Massarutto, 2001d). Exports are more rigidly constrained if they regard raw waste, while processed waste can circulate almost freely, provided it is handled correctly and destined to proper recycling or disposal solutions.

There are many good arguments in favour of a progressive enlargement of waste trade opportunities, once control, rules will be harmonised enough and frictional problems will be overcome.

First of all, the self-sufficiency principle, if literally intended, requires in each management area a full endowment of waste processing and disposal technologies. Given the difficulty of temporarily storage, this means that each area should dispose of excess capacity in order to face unexpected demand peaks, with a notable increase of fixed costs.

In order to avoid the risk of future incapacity to face the waste disposal demand, waste disposal plans in the past have in effect encouraged a certain overcapacity. In Germany and in the Netherlands, where the self-sufficiency principle was first adopted, this turned out in the underuse of incineration capacity once the boom of separate collection determined for the first time a slowdown of waste quantities. This is still causing problems, given that the cost of these facilities is for the greatest part a fixed and sunk one (Buclet and Godard, 2000).

Further on, in order to avoid the necessity of having too large management units, many plants should be undersized (for example, incinerators show declining average costs up to the size corresponding to 1 million people, and 4 times more if it is fuelled with the fraction with highest caloric power (Kaulard and Massarutto, 1997).

As far as the specialisation of waste flows goes on and separate collection is generalised, this risk is further emphasized. The optimal scale for handling certain waste fractions could be the national or even the European one.

A related advantage of an improved tradeability is still lying in the opportunities to recover material and resources from waste. The more recycling is generalised, the less it will mean reuse in the same production cycle and for the same purposes, and the more it will be likely that recovered materials will be "downcycled" in new production cycles. For example, scrap plastics of inferior quality are being used for chair stuffing or as an additive for asphalts. It is clear that the recovery potential will be maximised as far as trade of materials will be allowed.

If there are good reasons to believe that disposal and recycling – though by no means candidate to full liberalisation – would largely benefit from the introduction of some degrees of flexibility to the territorial monopoly implied by the self-sufficiency principle, it is nonetheless true that these benefits are largely dependent on the value that waste acquires through the first stages of the valorisation process. In other words, waste trade is conceivable only if the cost differentials are such as to compensate transport costs, that remain crucially important in the case of waste.

For any practical purpose, all the “ordinary” waste management activities – collection, processing for later recovery and disposal, incineration – are and largely will continue to be natural monopolies at the relevant territorial size, and will need therefore an appropriate regulation.

This depends less on the economies of scale, and much more on the huge uncertainties related to the realisation of technological plants, and on the logistic and coordination problems related to collection. An indirect demonstration is the fact that recycling consortia, though they are not necessarily forced to rely on the collection organisation of the local waste operator, in most cases find it convenient to delegate to them – and not to other firms – the material collection of packaging from households and commercial premises.

A still controversial issue regards the existence of integration economies between collection and processing/disposal. In fact in Europe both integrated and disintegrated management systems are in place, without substantial performance differences. Nonetheless, it can be believed that some integration economies could be searched in the need for an overall coordination of the system, at least if this is not appropriately delivered by public planning (Ascari et al, 1993, 1995; Bertossi e Massarutto, 1998; Iefe-Eco&Eco, 1998; Perra, 2000).

In the case of recycling, some early experiments concern the creation of waste materials stock exchange markets; however, the dominant solution in Europe is undoubtedly the creation of private consortia through the extended producer responsibility model.

Finally, with respect to the extension of the public service and the possibility to consider certain categories of waste producers as “eligible customers” entitled to purchase the service from the preferred supplier, most European countries allow this possibility to industrial waste producers, even because industrial waste is normally not qualitatively assimilable to domestic waste, and requires in any case a specialised and case-by-case handling. The “grey zone” is represented by the commercial sector, small industry and all of the many categories of small waste producers. In general, these are left free to choose whether to use the public service or not; however, in some cases, the obligation to use the public system (and pay the correspondent tax) has been motivated for the sake of controlling and restraining illegal disposal practices.

5.3 - Competition for the market

Solid waste collection is probably the segment of environmental services where the private sector is most active. Under different contractual agreements, ranging from full delegation of operational and strategic responsibility to simple contracting-out of blue-collar activities or even outsourcing of operational activities, private firms cover now probably the largest share of the market in the UK, in France, in Italy and in Spain. Even in Germany and in Northern Europe, despite the operation of the public utility formally remains to the local authority, private firms often do act as sub-contractors and resellers of capacity.

Private management of waste collection has a long tradition in Italy, where it used to be practiced immediately after the war. Yet only after 1990 the selection of the private operator has started to be compulsorily made through competitive processes.

Despite its relative novelty, the British experience deserves attention since it is the only case in which contracting out has been fostered explicitly for the sake of improving efficiency and governed by market rules. Analogous experience have been made in other anglo-saxon countries, such as Canada or Australia.

According to Szimansky, 1993, the British experience of CCT is very illuminating, since it offers an excellent empirical proof of the hypothesis first made by Laffont and Tirole (1993) about the expected savings and productivity gains.

CCT was introduced in 1992 in the UK for all services managed by local authorities – among which there

were neither water nor energy services, already managed at the national or regional scale. It required that municipalities set up a competitive bid for any service, possibly fractioning it in many simple activities in order to ensure control and better contract specification; former public employees could form their own enterprise and compete.

The first bids showed a drastic abatement of the cost, as predicted by the theory in case of an efficient newcomer facing an inefficient incumbent⁷. The following bids showed no further abatement, and if any a slight increase. In the meanwhile, most of the organizations created by former public employees had gone bankrupt and had been taken over by private firms.

At the same time, the waste sector did not show many of the quality problems experienced in other services. This can be seen as a proof that the waste collection service is quite suitable for contract specification and therefore to Demsetz-type competition, provided the service is fractioned in many sub-services – what requires in turn that the municipality maintains an overall function of strategic planning and quality specification.

It is important to remark that the British experience on CCT regards collection services only, with very limited degrees of freedom left to the private firm in terms of detailed service specification. In practice, activities contracted out are quite well specified (eg collection techniques to be adopted, frequency, location and timing of modes of organising separate collection. Disposal sites, on the other hand, are specified in the contract following an agreement that the municipality has already made with another operator.

Vice-versa in France the bid requires that the operator will later ensure disposal, what frequently happens in own plants thereby realizing a vertical integration.

An intermediate model is the one theoretically adopted in Italy, where regional plans should indicate the proper destination of waste; however, private firms are sometimes left some margins of autonomy particularly in the field of separate collection and waste valorisation (Biagi and Massarutto, 2001). However, the public disposal plans have often failed to reach the objective of securing disposal solutions for all municipalities, or at least have failed to achieve the best cost solution. Operators that dispose of own capacity at a lower cost can therefore offer better conditions (Iefe-Eco&Eco, 1997).

The French and the Italian example show that the control of disposal capacity within the local area represents a formidable competitive advantage in the bids for waste collection services. Since the owner of the landfill, or an operator with a strong contractual relation with this one, is still in the condition of practicing price discrimination against other operators of collection in the same area. In similar circumstances, regulation aimed at “common carriage” – that is, at ensuring that waste disposal facilities are ensuring the same price conditions to all operators – should be introduced, if not a complete separation of disposal.

On the other hand, competition for the market could be searched in the case of disposal, in many different forms ranging from the open bid for getting disposal offers from existing plants or – more likely – for projecting, constructing and later on operating waste disposal facilities. Again possibilities might range between the pure concession (using BOT or BOOT arrangements) or the delegation under lease contracts – what allows the public authority to conserve the economic rent that derives from the facility ownership, while entrusting a specialised private operator for what concerns technical management aspects.

5.4 - Incentive regulation

The issue of incentive regulation in the solid waste management sector has been thoroughly analysed by Biagi and Massarutto (2001) in another paper presented for this conference. Price regulation is still in its infancy in the European waste management industry, with competitive bidding (for collection) being the only efficiency-targeted policy instrument.

On the other hand, theoretical work has been quite significant and shows a sound comparability of performance between operators, at least at the national level. Empirical studies aimed at individuating

⁷ One of the explanations is also the fact that former public employees – who did win the largest majority of bids – offered very low prices in order not to lose the job.

standard cost functions and performance indicators, though still imperfect due to the unavailability of some data, show that the explanatory variables of costs are crucially linked to output indicators that include some measure of service quality. Though an overall cost function is difficult to estimate due to the high territorial specificities, single sub-services can be quite easily modeled in order to assess efficiency.

Once again, the crucial aspect seems to be the separation of collection from disposal. Disposal costs vary a lot even regardless the industrial costs, due to economic rents and possibly transport costs. While the regulation of disposal prices is a tricky aspect, particularly in those countries where the disposal capacity is in absolute scarce, it seems that collection activities are quite suitable for an economic regulation, or at least for the use of economic comparative analysis aimed at supporting price setting, elaborating comparative indicators to be used as an informative base for municipalities, or finally for managing the competitive bidding procedures and setting the reference prices.

On the other hand, disposal costs are more difficult to model, since they depend on engineering of plants – very often site-specific – and on the managerial capacity of the collection operator to find out alternative solutions entailing resource recovery in the industrial sector. The most diffused economic studies with respect to disposal are based on engineering costs, but their usefulness so far has been demonstrated above all for the elaboration of waste management strategies at the environmental policy level rather than in the evaluation of the economic efficiency of disposal pricing, and above all distinguishing the price components that are imputable to costs met for environmental purposes, costs due to inefficient asset management or operation, or finally economic rent. More research is undoubtedly needed in order to better clarify this aspect.

6. Concluding remarks

In this paper we have reviewed systematically the options for liberalisation that are applicable to the sector of environmental public utilities. A classification of the alternative regulatory strategies has been proposed, by integrating Braeutigam, 1987's "policy roadmap to regulation" to the case at stake, in which several market failures, and not only natural monopoly, are at stake.

Generally speaking, it seems that both water and waste industries are less suitable to radical liberalisation and privatisation than other utilities such as telecommunications or energy; nor there seems to be a substantial benefit in terms of allocative and x-efficiency in the search for common carriage and deverticalisation.

The main issue seems to be how to ensure the development of service supply organisations in the areas where it is still inadequate, or to open the way to private sector financing in order to sustain the challenging investment effort needed for modernisation; and not that of privatising and liberalising already existing and well functioning local management systems.

On the other hand, efficiency gains can be significant in the case of labour-intensive activities and for the provision of specialised services along the vertical value chain; both a rationalisation of operational costs and a careful targeting of new investment could be searched for by means of a sophisticated regulatory system. Liberalisation through competitive delegation faces great difficulties in the contract specification and in the search for optimal risk allocation mechanisms, and seems therefore a practicable opportunity for service sub-segments rather than for the overall integrated service.

In the water sector, the opportunities for creating competition in the market seem at best marginal. The most practicable liberalisation alternatives entail contracting out and privatisation of monopolies.

In both cases, market imperfections call for the development of an appropriate regulatory system, based on benchmarking and comparative performance indicators; this would be the first step for developing incentive pricing or for experimenting contracting out or franchise bidding at least in given segments of the service. As is shown in figure 2, the regulatory system should be organised around various actors and policy levels.

The private initiative is nonetheless hampered by the limited rentability of the water sector, resulting from the overall reluctance to raise prices up to a remunerative level and from the very long repayment schedules, stimulating the private industry to ask return rates that are higher than the socially optimal rate of discount (Massarutto, 2001e). Any privatisation exercise should develop appropriate measures for ensuring

an adequate risk-sharing able to reconcile private expectations with the social need to ensure an appropriate development and management of water and sewerage assets.

In fact, the preferred options so far entail only partial applications of the two models. Contracting out is actually occurring for given segments of the water industry, rather than for the overall management of the local water systems; the more the private sector is asked to have a greater involvement, the less competitive the entrustment is; on the other hand, privatisation has meant at best the transformation into private law companies with the gradual sellout of minority shares, while maintaining the local monopoly; only the creation of a very sophisticated environmental and economic regulatory system has allowed England and Wales to proceed to further steps.

Private initiative in the field of waste disposal has been very strong in the past, when landfilling was the dominant option; it seems much less practicable today, either because of the need to ensure stable and safe disposal solutions or because of the private reluctance to assume risks. Technological facilities are a practicable option only when some degree of vertical integration is guaranteed i.e. if the demand patterns are stable and predictable enough. Private projects aimed at realising waste-to-energy facilities at their own risk have been nearly always unsuccessful, unless in the case of industrial waste.

On the other hand, the involvement of the private sector in publicly-promoted initiatives is far more diffused and promising.

The potential for liberalisation seems higher in the segment of waste collection, where competitive bidding for operation is quite diffused in most European countries as well as eligibility of customers (at least industrial and commercial ones)

Opening to the private sector has also been remarkable in the field of particular waste flows in which the principle of extended producer responsibility has been introduced. The correlated risk, however, is that of favouring the creation of a private monopoly (the industrial syndicates that in all countries become responsible for financing separate collection and recycling).

Liberalisation of environmental utilities requires that environmental regulation and other public good components are specified as external constraints allowing to develop complete contracts with detailed specification of the required performance standards and to reduce risks and information asymmetries. However, in all European countries, the industry of environmental services has many degrees of freedom in the practical implementation of environmental policy objectives.

Environmental regulation is almost never at arms' length from service operation; rather, the typical situation entails a more or less ample "grey zone" in which environmental policymakers and service operators interact both in the definition of strategies and investment plans and in the finance and assumption of risks. The more environmental policy assumes the guiding principle of long term sustainability, the more the management of environmental services will rely on long term investment in infrastructure as well as in immaterial aspects such as knowledge and reciprocal trust with the local population.

It can be risky to minimise or banalise these aspects by assuming that liberalisation could easily overcome these difficulties. Even the introduction of competition for the market – leaving apart the French model, that is quite peculiar and in any case among the least competitive models in the world – would require heavy transactions costs and expose the local community to the risk of long term underperformance.

The economic benefits of liberalisation are not obvious. At a first glance, there is no evidence that the publicly managed water and waste management utilities have systematically underperformed in terms of efficiency face to private management benchmarks. It is nonetheless true that those countries in which regulation has been more explicitly targeted towards economic efficiency, significant cost reductions have been achieved, apparently with no quality losses, yet with evident difficulties in the development of new infrastructure and more sustainable water waste management practices, and serious concerns about the long term sustainability of asset management and renovation.

On the other hand, both the solid waste and the water industries are in an expansive phase of their investment cycle, and there are many signals that it will be troublesome to rely entirely on the market forces in order to finance this massive investment effort, even because of the high social sensitivity of the charging issue.

The forthcoming regulatory regime will need to find a sort of a compromise between the need to involve operators in the planning decisions and the search for market incentives.

This does not mean that nothing can be done in order to improve significantly the degree of

competitiveness and the stimulus towards efficiency. We believe, however, that the most promising strategies at present lay in the development of adequate benchmarking criteria aimed at correctly evaluating actual efficiency levels, and to promote cost reduction through the gradual separation of “the operator” from the supply chain, by means of segmentation of operational activities and specialisation of the operator in the strategic design and procurement functions.

Instead of the traditionally analysed bi-partition between the demand (local authority) and the supply side (the operator), we might assist in the future to a tri-partition: while a publicly-controlled (and eventually privately participated) subject will bear the overall strategic management functions, operational activities will tend to be more and more supplied through the market. The regulatory system might encourage this evolution, for example by posing statutory limits to the public subject.

Further research is needed in order to raise more knowledge on this aspect and in order to predict the likely consequences on the structure of the water and solid waste industries in the future.

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Figure 2 – The “diamond” of regulation of environmental services

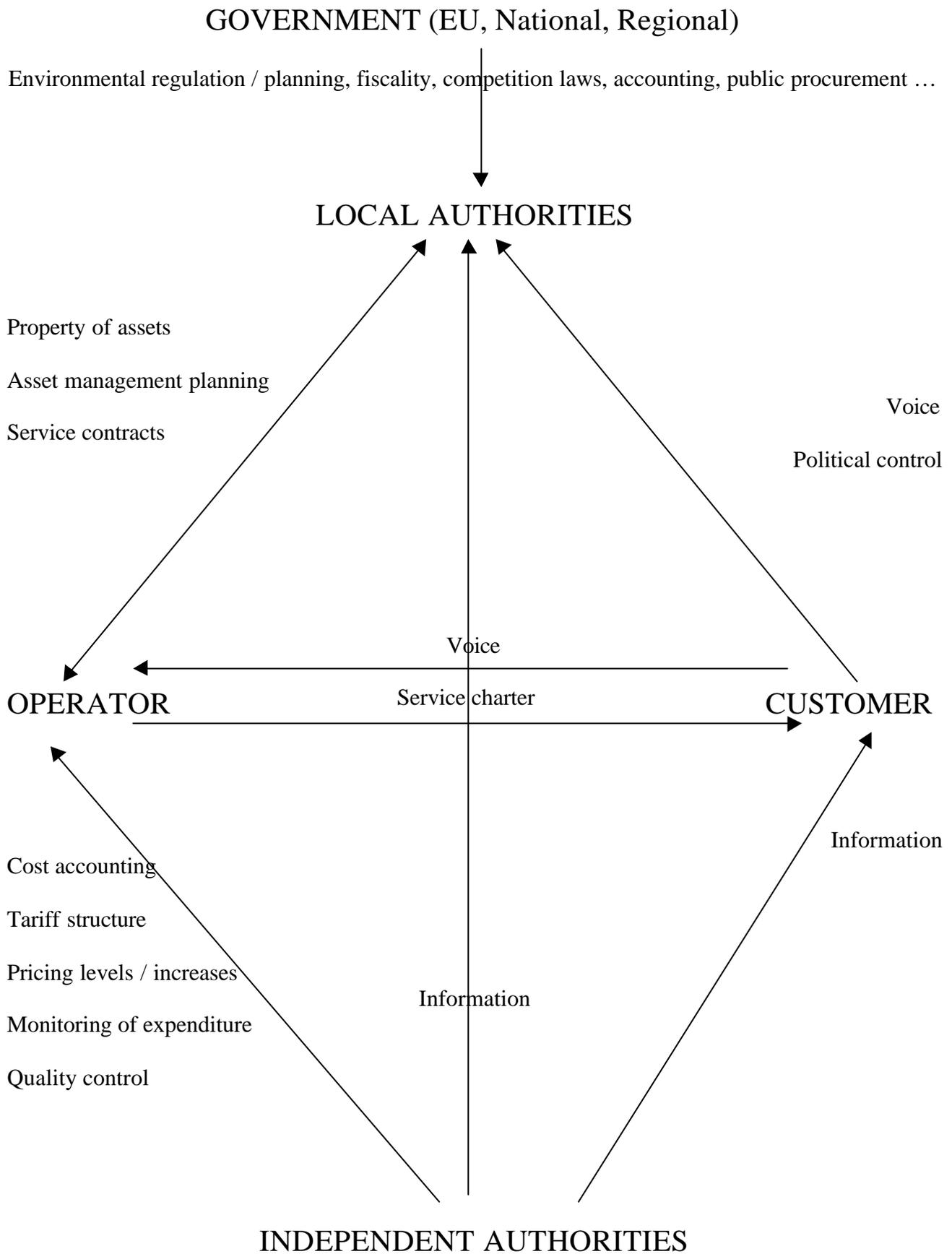


Figure 1 – The privatization decision tree

