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**Conference Paper**

## Incentive, sustainable and fair pricing, a trilogy out of reach?

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**45<sup>th</sup> Congress of the European Regional Science Association  
23-27 August 2005, Vrije Universiteit Amsterdam  
Land use and water management in a sustainable network society**

Key words: price, incentive, sustainability, fair.

Title: Incentive, sustainable and fair pricing, a trilogy out of reach?

During the last decade, water price rose dramatically in France. In Seine Normandy river basin, water price went up 44% over and above inflation for the last decade<sup>1</sup>. In 1992, the average yearly water and sanitation bill represented 208€ and in 2002, it amounted to 352€ on the basis of a 120m<sup>3</sup> consumption. This increase, mainly due to important sanitation investments, raised awareness on water bill social impact. Water is not like any other good, it is a bare necessity. Therefore, each and every citizen should have access to it for a reasonable price. Hence, water price should always remain affordable, acceptable and sustainable. In 2004, the Artois Picardie water agency led a study in the north of France to compare the mean water invoice with the mean available income per household. This ratio ranges from 1.5% to 2% in most of Artois Picardie river basin. But in some municipalities, it rises above 3% which is the top guidance value<sup>2</sup>. Due to these emerging economic and social concerns, the emphasis is more and more laid on implementing an adequate water pricing policy. Aside from this on going trend, the European water framework directive (WFD) states in its article 9.1 that “Member states shall ensure by 2010 that water pricing policies provide adequate incentives for users to use water resources efficiently, and thereby contribute to the environmental objectives of this Directive.” Water pricing is to become an economic tool to reach water quality and management goals.

Water tariffication has therefore become a real issue as it is required at once to be incentive, affordable, fair and to ensure sustainable development and compliance with good ecological status. But aren't we setting too many goals for one policy? Are these objectives compatible

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<sup>1</sup> Page 16 of « 2002 water price in Seine Normandy basin », Observatoire du prix et des services d'eau, Agence de l'eau de Seine Normandie

<sup>2</sup> Guidance value given by OECD, and by Henri Smets from the French water academy (October 2004).

and coherent with one another? Working out an incentive pricing system that is both sustainable and fair is far from being an easy task.

### 1) Is an incentive pricing always a sustainable pricing?

#### a) A low rental part might endanger sustainability

Water & wastewater services are very capitalistic activities. Infrastructure investments are very heavy and expensive and the return on investments is of a long term scope. Fixed costs therefore represent a strong economic constraint for water services. The discounted value of drinking infrastructure (assets net value) installed on Seine Normandy river basin during the last century amounts to 25 billion euros (plants, networks, reservoirs)<sup>3</sup>. This estimation takes into account the equipment downgrading according to its life duration. Using this calculation method, we have assessed that the annual reserve for depreciation for the next decade should arise to 510 million euros for the whole basin. This amount of money should be used to renew infrastructure and maintain water services quality. This renewal need accounts for half of the basin drinking water invoice (excluding taxes).

Table 1: Overview of drinking water infrastructure and renewal need assessments

	Cumulated Installed Value (M€)	Assets Discounted Value (M€)	Annual Depreciation Value (M€)
<b>Water networks</b>	19 536	19 210	325
<b>Water plants</b>	7 470	3 410	147
<b>Reservoirs</b>	2 280	2 245	38
<b>Total</b>	29 286	24 865	510

On top of these renewal charges, other fixed costs must be taken into account. For instance, loans repayment, interest charges and some operation costs, such as staff costs, must also be added to the assessment of fixed expenses. All in all, fixed costs can arise to 80% of the total water services charges<sup>4</sup>. Some water experts even assess that they can represent up to 90% of the service costs<sup>5</sup>. Therefore water price structure should include a rental part dedicated to partly covering fixed costs. We are only talking about partial coverage of fixed expenses because economies of scale allow reduction of the burden of these charges. In Seine-

<sup>3</sup> *Cost recovery analysis*, Seine Normandy water agency, November 2004.

<sup>4</sup> *Gestion des Eaux*, F. Valiron, 1988.

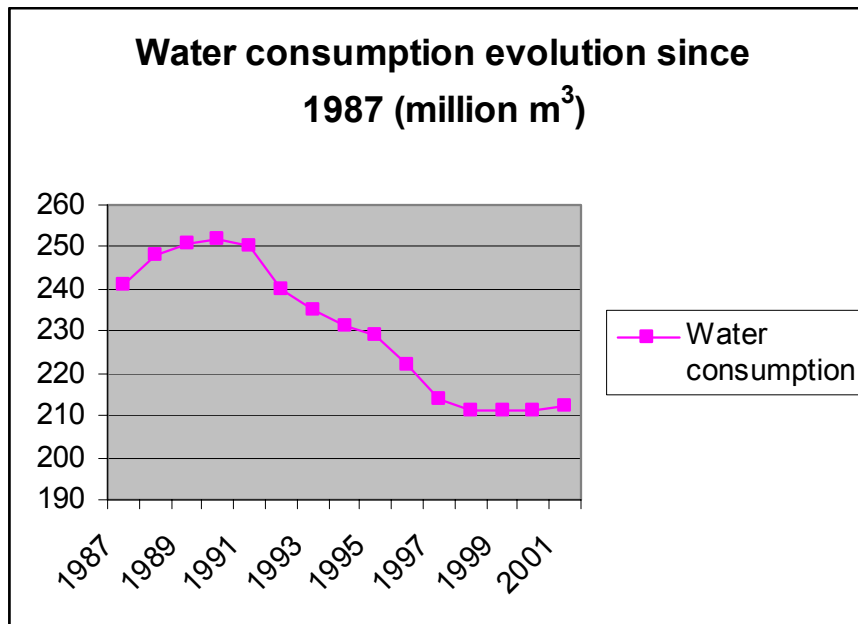
<sup>5</sup> A. Grand d'Esnon, Service Public 2000, June 2003.

Normandy river basin, we have assessed that economies of scales arise in cities with more than 3,000 inhabitants.

With regard to pricing structure, 97% of Seine-Normandy population (i.e. 17 million inhabitants) paid an average rental part that only represented 15% of the drinking water invoice (25€/year before tax). This means that 85% of the drinking water bill is proportionate to consumption and therefore is based on incentive principle: the more I consume the more I pay, and vice versa. Hence, the actual pricing structure aims more at incentive rather than sustainability. The existing rental part poorly covers the fixed costs of drinking water services. At some point, this situation might either jeopardize the water services economic sustainability or induce a water price increase. The existence of a rental part in the water invoice does minimise the possibility to implement a very incentive pricing structure. But in the mean time, this rental part ensures water services economic sustainability. The price setting authority has to determine the fine tuning between incentive and sustainability.

#### b) Water economy versus economic sustainability

To some extent, incentive pricing aims at reducing water waste and consumption in order to promote a rational use of water and a sustainable management of water resources. More & more municipalities communicate on the need to save water and this concern is growing bigger so that it will be the main theme of a seminar entitled “Water savings management” that will take place in Aix-les-Bains (south of France) in September 2005. But saving water, reducing water consumption can have dramatic consequences on the water service balance when water consumption drops within a very short period of time. Indeed, such a drop results in a revenue decrease for both water and wastewater services. In 2002, in Paris, the 8 biggest water consumers upgraded their air conditioning system. This led to a decrease of 15% of their water consumption. More generally, water consumption in Paris has been dropping since 1987 (as shown in the graph below) which represented a revenue drop around 12 million euros for Paris water services.



Graph 1, Source: SAGEP, report 2001

In 2003, in the department of Seine–Saint-Denis (north of Paris), the sanitation service calculated that due to water consumption decrease from 2002 to 2003, there was a revenue drop of 1.1 million euros in the sanitation budget<sup>6</sup>. The funding of some investments is presently jeopardized partly because of this revenue decrease so that a sanitation price raise has been decided.

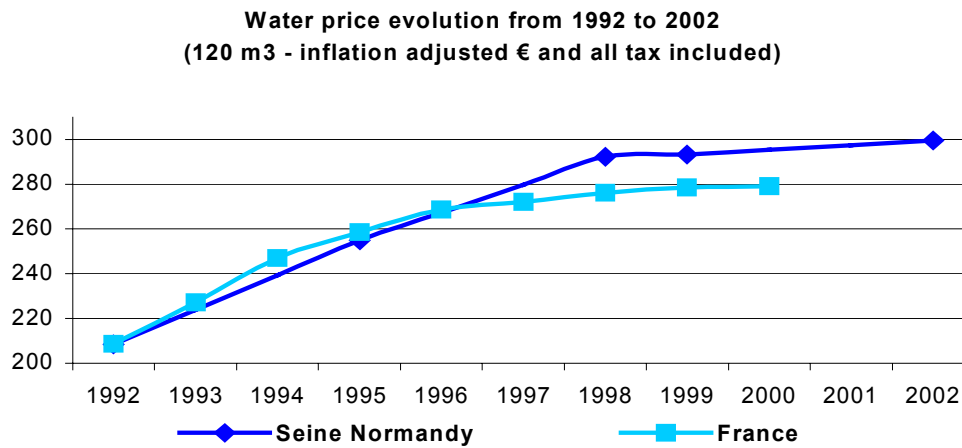
One may object that those two examples are very specific cases, and that it is acknowledged that water price elasticity is generally low. Indeed, a water price increase does not imply a proportionate water consumption decrease. But although water price elasticity is rather low, price increase is one of the reasons for water consumption reduction in France during the second part of the 90's. In the following table, various assessments of water price elasticity are described. They all range from 0.8% to 3.2%, meaning that a 10% price increase induces from 0.8% to 3.2% decrease in consumption.

<sup>6</sup> Observatoire de l'hydrologie urbaine de Seine Saint Denis, March 2003.

Table 2: Water price elasticity assessments

Authors	Years studied	Area of study (France)	Water price elasticity
Pouquet and Ragot, 1997	1989	France	-0.12
	1995	France	From -0.32 to -0.31
Le Coz, 1998	1995	Yerres basin	-0.31
Nauges <i>et alii</i> , 1998	From 1990 to 1994	Gironde	-0.08
	1989-1993	Moselle	-0.22
Azomahou, 2000	1989-1993	Moselle	-0.23

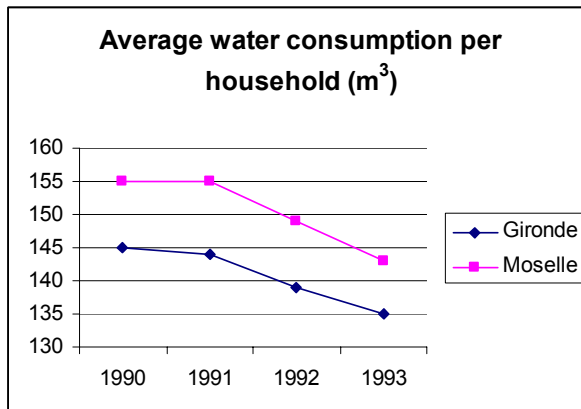
During the last decade, the average water price in France raised by 34% (inflation adjusted) as shown in the below graph.



Graph 2.

This price increase is one of the reasons why we witnessed a water consumption decrease during the same decade.

The following figure shows the water consumption evolution in two French departments:



Graph 3, Source : Inra, sciences sociales n°5, December 1998

OECD data also confirm this trend as they show a decrease in water withdrawal in France:

Million m <sup>3</sup>	1980	1985	1990	1995	2002
Water withdrawal	30 972	34 887	37 687	40 671	30 932

Table 3, Source: OECD, 2005.

In order to achieve both ecological and economic sustainability, it is necessary to implement changes progressively. Drastic and sudden modifications can only bring dysfunction and imbalance. As shown, some investments might be difficult to fund or might be postponed, even though they may be necessary to maintain water & sanitation services quality and to reach environmental objectives.

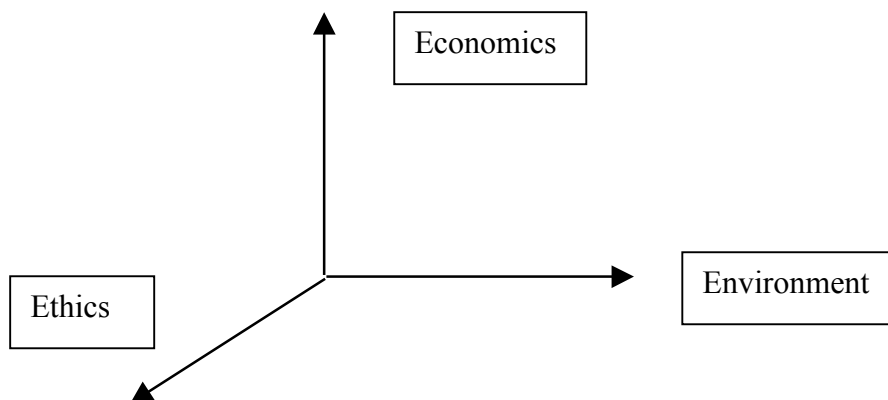
As we have seen previously, fixing a water pricing structure that is both incentive and sustainable is not an easy task. It requires a fine tuning. But what about setting a water price that is both fair and incentive? Are these two objectives more compatible than the previous ones?

## 2) Can an incentive or sustainable pricing be a fair pricing?

Water is a very specific good. It is a bare necessity for each human being to have access to it. Therefore, water price setting has a clear social and political dimension.

a) How can water tariff remain at once sustainable and social?

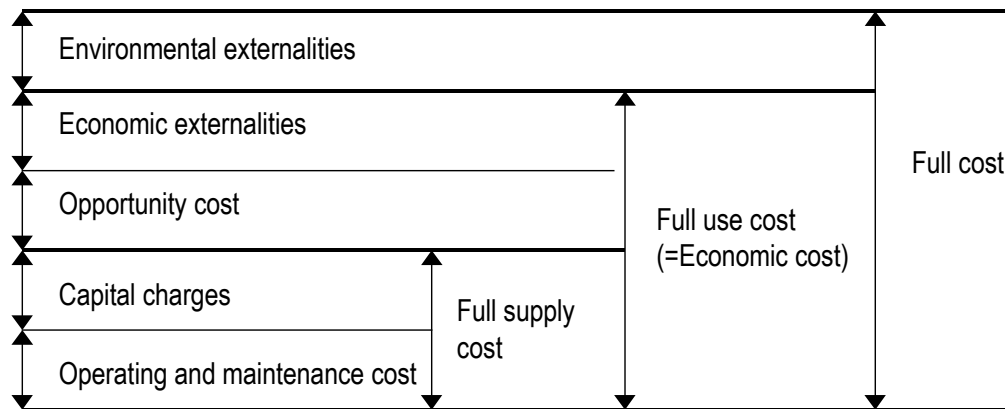
The United Nation definition of sustainability lies upon the 3 E concept: economic (getting closer to full cost recovery), environment (good ecological status) and ethics (public participation, transparency, equity). Hence, full cost pricing can be considered as the economic embodiment and translation of the sustainable development concept. Indeed, full cost tariff not only takes into account supply cost, but also opportunity cost, economic externalities and environmental externalities, as shown on the following chart.



Graph 4.



Table 3: Full cost pricing



Graph 5.

As we can see, full cost pricing accounts for environmental damages. Implementing the polluters pay principle is a way to reflect some externalities within water tariffs.

On the contrary, setting up social tarification means fixing a price that does not correspond to service full (use) cost coverage, nor even to full supply cost coverage. Social pricing responds to political and, to some extent, to humanitarian expectations disconnected from any economic or accounting analysis. For instance, in Belgium, the Flemish government decided to freely allocate a package of 15 cubic meter drinking water to each customer. Polluters pay principle and full cost tarification are the translation of economic theories aiming at achieving environmental objectives and funding water policy measures.

The two logics exclude one another as they are not based on the same purpose, nor use the same tools, nor search for the same objectives. Social pricing and sustainable pricing seem to be partly incompatible. Moreover, a social water price that abides by the “polluter pays” principle and the WFD environmental objectives may seem far from reach.

If social pricing and sustainable tarification seem partly incompatible, can we imagine a pricing that would be both incentive and social?

The Walloon region has implemented since January 2005 a social tarification for domestic water use only. This price setting is based on bracket tariffs as described in the following chart.

Table 4: Tariff brackets in the Walloon region (2005)

	Volume Bracket (m <sup>3</sup> )	Tariff (€)
Vital bracket	From 0 to 15	0.8
Social bracket	From 15 to 30	1.39
Normal bracket	From 30 to 60	2.06
Comfort bracket	Over 60	3.06

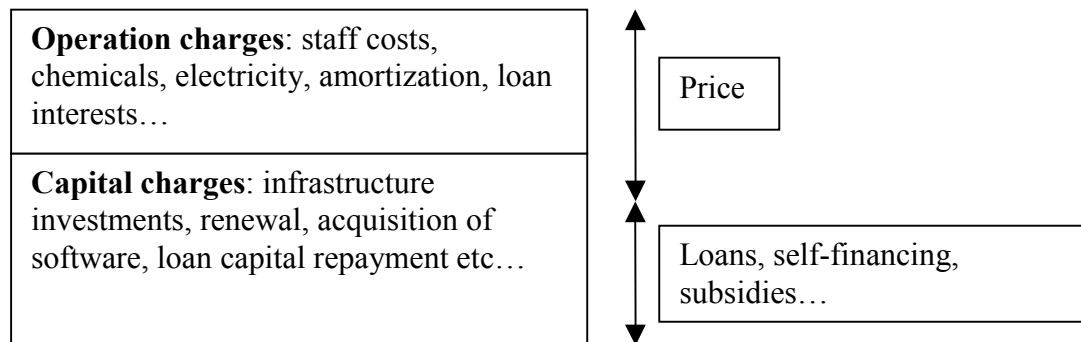
Of course, it is too early to take stock of the social effects of this new tariff policy as we are lacking in feed back. But we can notice that, in this example, incentive begins after the 30<sup>th</sup> cubic meter consumed (normal bracket). Therefore, some pricing brackets are dedicated to fairness and social concerns whereas others focus on incentive. The “official names” given to the different brackets by the IBDE (Intercommunale Bruxelloise de Distribution d’Eau) reflects this dichotomy. The two first brackets are dedicated to social pricing and the two following ones are supposed to have incentive effects as the price raises by 32% & 54%. Could this tarification be the perfect marriage between social concerns and incentive effect? Here again, water pricing authorities have to find a fine tuning between fairness and incentive. An incentive water price that takes into account social concerns is not easy to reach.

b) A fair tariff based on good management program is sustainable

Water price setting is both the result of a political decision and the solution of an economic calculation. In France, municipalities or groups of municipalities are in charge of water and sanitation services. They can either directly manage their own services or have them managed by private companies (this management mode is called public service delegation). But no matter what management choice they make, mayors are responsible for fixing water tariffs.

In order to properly set those prices, mayors, who are elected by the people for a 6 year mandate, have to take into account the economic reality of the water service, among other elements.

Price setting can be considered as the result of an overall balance:



Graph 6.

Loan terms generally run over 10 to 30 years. Water and sanitation equipments are running on operational and economic cycles that ranges from 40 to 80 years. Therefore amortization terms runs over a quite long period of time.

Here are various assessments of water and wastewater infrastructure duration:

Table 5: Life duration assessments for water networks

Material		Study 1	Study 2	Study 3	Study 4	Study 5	Source 6
PVC	before 1975	50		70	30	60	30 to 40
	after 1975	75					
Asbestos cement		removal before 2013					
Grey cast-iron	before 1960	removal before 2013	75				
	after 1960	75					
Ductile cast-iron		100	110				
Steel	before 1960	removal before 2013	75				
	after 1960	75					
PEHD		100					
Reinforced concrete	Lead joints	100	80				
	Sealed joints		110				

Study 1 : Le renouvellement du patrimoine en canalisations d'EP en France

Study 2 : LATTIS, Rapport de stage scientifique 2002, Durabilité des services de l'eau dans le département de la Val de Marne

Study 3 : OIEAU, Etude sur la structure par âge des réseaux d'AEP et d'Assainissement, département de l'Hérault

Study 4 : OIEAU, Etude sur la structure par âge des réseaux d'AEP et d'Assainissement, département de l'Allier

Study 5 : Approche du coût réel des services de distribution d'eau, département de la Savoie

Source 6 : Durées indicatives d'amortissement proposées par l'instruction M49 pour les ouvrages de génie civil pour le transport de l'eau et les canalisations d'adduction d'eau

Table 6: Life duration assessments for water plants

	Study 1	Study 2	Source 3	Source 4	Source 5
<b>Civil engineering</b>	70	60		130	30 to 40
<b>Plants equipments (classic technology)</b>	30	10	30	29-30	10 to 15
<b>Plants equipments (filtration)</b>	20		10	18	

*Study 1 : LATTS, Rapport de stage scientifique 2002, Durabilité des services de l'eau dans le département du Val de Marne*

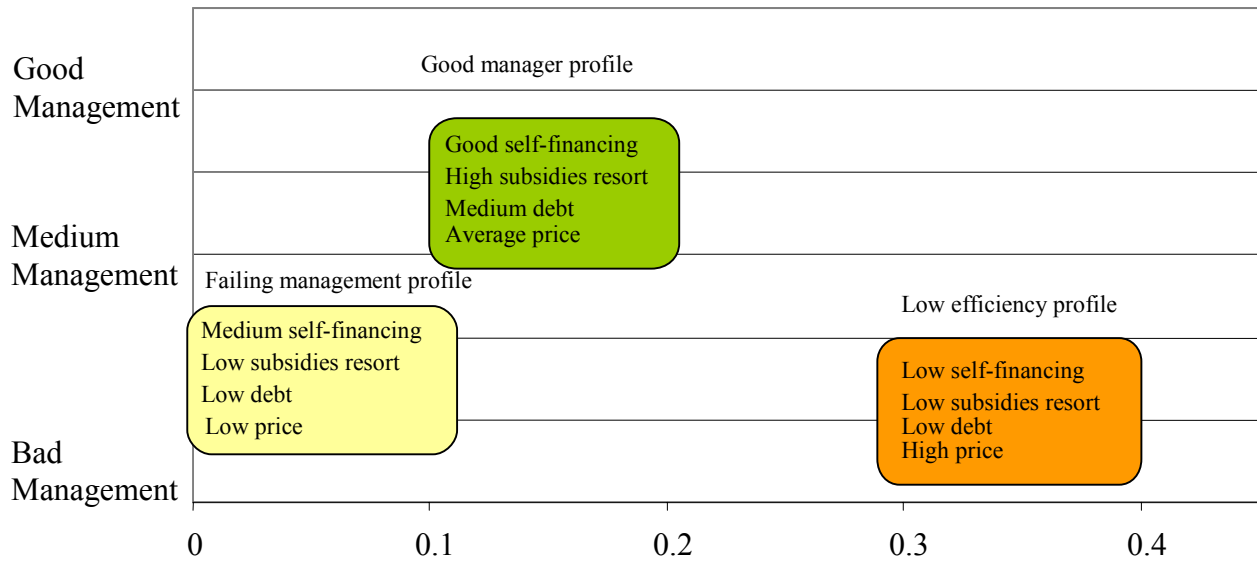
*Study 2 : Approche du coût réel des services de distribution d'eau, département de la Savoie*

*Source 3 : Dires d'expert (BL)*

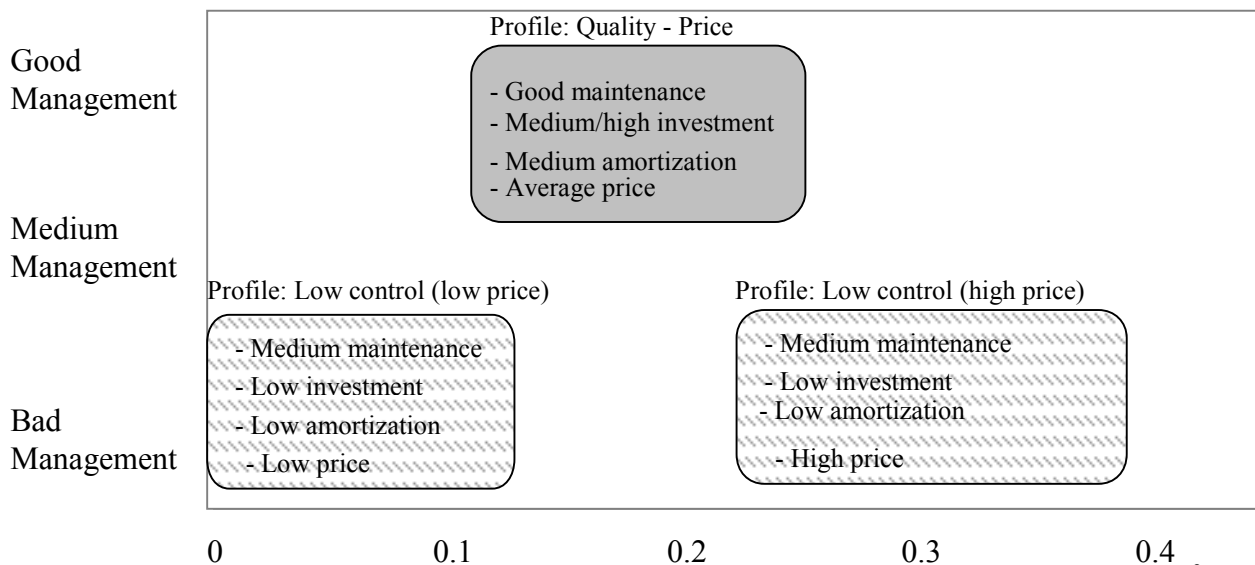
*Source 4 : SEDIF*

*Source 5 : Durées indicatives d'amortissement proposées par l'instruction M49 pour les ouvrages de génie civil et les installations (pompes, équipements électromécaniques) de traitement de l'eau*

Acknowledging the fact that political and economic cycles are running on two very different scales, how to conciliate political and economic cycles, political and economic concerns? The temptation is strong for political authorities who are in charge of price setting to ignore economic cycles and good economic management requirements. Mayors might be tempted to set a social price that would satisfy water users (who happen to be electors) and postpone important and needed investments or neglect current maintenance as they are thought to result in a price increase. Moreover, poor renewal investments hardly ever show as networks are underground whereas price increase directly shows on water bill. But such a disastrous management will eventually show at some point when catch-up investments will have to be made urgently to maintain quality service. At this point, price increase may even hit harder. In 2004, Seine-Normandy water agency led a study on funding and renewal of wastewater networks. This analysis shows that implementing current infrastructure management tools and strategies does not imply higher costs. On the contrary, these practices help prevent any dysfunction and allow investments programming. Therefore they induce lower costs and help controlling water price. The absence of economic and accounting managing tools means poor knowledge of infrastructure and lead price increase. In the above mentioned study, we have determined different profiles of water services managers described below. We have taken into account their economic, operational and financial management. In result of our observations and analysis, we have come to the conclusion that well managed services have a price that matches the average. Prices too high or too low reflect a failing or inefficient management situation.



Graph 7: Wastewater collection price in department "Hauts de Seine", euros/m<sup>3</sup>



Graph 8: Wastewater collection price in department "Hauts de Seine", euros/m<sup>3</sup>

Fairness pricing may not resist economic reality and requirements for very long unless it is founded on a good long-term management program. In order to implement a long lasting fair pricing, it is necessary to reinforce water services management: improve amortization policy, implement analytical accountancy, define investment programs, ensure high quality infrastructure current maintenance, promote closer working relationships between financial and technical experts and representatives, improve technical & economic knowledge of representatives, develop public participation to share knowledge & information... In such

conditions, fair pricing might be compatible with sustainable pricing and water services management.

\* \* \*

As we have seen, looking for the right pricing structure is a matter of fine tuning between different goals partly incompatible, such as incentive, fairness and sustainability. It seems impossible to reach these three objectives at once. But above all, pricing should be considered as a way to achieve global and sustainable water services management. The aim of any tariffication policy should be comprehensive sustainability, service quality sustainability both towards:

- customers: equipment quality maintenance, service quality, and
- the environment: water resources quality preservation and improvement, pollution reduction.

The right price is a price that allows sustainable water service management. Social and incentive tariffication is only a tool to achieve sustainability because sustainable development cannot be thought of without economic constraints nor social supportive measures.