

# **Comparison of Water Prices in Europe**

Summary Report

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## 1.1 Abstract

In this project, the costs of water supply services and water prices in selected Member States of the European Union were investigated. An analysis of available studies and statistics was complemented with research and interviews carried out by experts based in the countries under study. The results were documented in case study reports following a standard outline. These provided the working basis for this report.

There are clearly a number of obstacles to international comparisons, and the distorting influence of these factors can only be assessed and controlled on the basis of detailed knowledge of the units under comparison (supply areas, municipalities, regions, states). Prominent among these are different tariff structures with fixed and variable components, the allocation of costs for new connections, accounting and invoicing procedures, taxes and charges, depreciation of assets and their fiscal and liquidity effects, provisions and reserves, subsidies and cross-subsidies as well as differences in the quality of the services provided. Relevant of these factors may be for international comparisons of water prices, the data and information necessary for a systematic comparison of the costs and prices of water supply services are nevertheless not currently available in the Member States investigated.

Through this research project nevertheless resulted in an overview of relevant differences, revealed a number of shortcomings in existing international comparisons of water prices, and identified possibilities for improving such comparisons.

## 1.2 Background

A trend towards increasing prices for water supply can be seen today not only in Germany, but in all the Member States of the European Union. It is associated generally with an increasing politicisation of the provision of public services (Borrowdale, 1993: L'Èlu d'aujourd'hui, 1994: Rajah and Smith, 1993).

The reasons for the increasing costs and prices are not always fully known, but the following frequently play a role: rising demand, sinking subsidies due to empty government coffers, increasing taxes in the areas of water supply and sewerage, the introduction of new taxes and fees, the increasing profit orientation in running the network on the part of supply companies, and many more. Interestingly, water supply and sewerage are frequently not sufficiently separated. In political discussion, rising sewerage costs are often blamed on water supply. This confusion of two separate services is understandable, however, especially in two situations. The first is where both are undertaken by the same service provider, as is frequently the case in several of the countries studied in this report, and very common in England and Wales. The other is when drinking water consumption is used to calculate sewerage fees. This practice is not only found in Germany, but it equally cannot be said to be the rule throughout Europe.

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The reasons for the increasing politicisation of the issue are similarly unclear; they also appear to be different in the various Member States. In the Netherlands, for example, setting water prices and tariff structures is not part of public debate even though water prices are relatively high in this country. In the new German Länder, water prices are also quite high, particularly if compared to the situation a few years ago. Here, water prices are regarded as an 'existential' cost factor for many levels of society. Because of the very different industrial and structural policies that underlie them, the different assessments of higher or rising water prices and sewerage charges are interesting: In some Member States of the European Union, especially in the North, high prices and fees are seen to impugn or cast doubt on the competitiveness of the industries. In other Member States, predominately in the South and West, they are seen as a chance to finance (overdue) investment and to receive additional subsidies 'from Brussels' to build water infrastructure.

There are a series of methodological difficulties involved in making and evaluating water price comparisons. 'Insider' investigations, such as those regularly produced by the International Water Supply Association (IWSA) present the limited evidence from direct price comparisons (Achtienribbe, Homer et alii, 1992; Gundermann, 1988; Stadtfeld and Schalweck, 1988). The methodological difficulties are not always acknowledged and revealed in studies by 'outsiders,' which allows for rather dubious interpretations.

### 1.3 Motivation

In this context, international price comparisons increasingly thrive in the attention of the media and of politics, which because of the lack of cross-border competition, had previously only presented rather dry material for industry professionals (OECD, 1987). For Germany, which regularly appears in grossly simplified comparisons as one of the more expensive countries (NUS, various years; Sullivan, 1995), not only the scale and capacity of the water supply, but also the levels of protection that have been achieved for consumers and water resources were called into question.

Against this background, the German Federal Environmental Agency (*Umweltbundesamt*) commissioned the research project 'Comparison of Water Prices in Europe' (*Vergleich der Wasserpreise im europäischen Rahmen*) in 1996 as part of the Environmental Research Agenda (UFOPLAN) of the Federal Ministry for Environment, Nature Conservation and Nuclear Safety (*Bundesministeriums für Umwelt, Naturschutz und Reaktorsicherheit*). It was carried out with the help of collaborative researchers in selected Member States of the European Union: along with Germany, these included Denmark, France, Italy, the Netherlands, Spain as well as England and Wales as the dominant regions in the United Kingdom.<sup>1</sup> This procedure made available a great deal of detailed information about each country, but it required considerable work to ensure the comparability of the results.

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<sup>1</sup> The authors of the case studies were: Mikael Skou Andersen (Denmark), Anja Kipfer (Germany), Sophie Cambon-Grau and Bernard BarraquÈ (France), Antonio Massarutto (Italy), Sonja Schuurmann and Geerten Schrama (Netherlands), Josefina Maestu (Spain) and Thomas Zabel and Nick Orman (England and Wales).

## **1.4 The Work Programme**

In the course of this project, after the usual preparation (literature search, making contact with the appropriate authorities and associations and so on), a uniform framework for questions was worked out for the national reports. A balance had to be found between completeness and depth of coverage, and between comparability and flexibility to address of national particularities. A draft of the framework was approved by those responsible for the national reports, the experts supervising this UFOPLAN project, the German Federal Association of Gas and Water Industries (BGW - Bundesverband der deutschen Gas- und Wasserwirtschaft), the economic regulatory authority for England and Wales (OFWAT), as well as experts in France and at the OECD. The suitability of the framework for the various economic and legal conditions in the Member States under investigation was thus guaranteed. The following areas were included in the framework:

1. General information about the economic, social and political context, including an overview of geographical conditions and their implications for water law. This section also includes statistics about the amount of water abstracted and consumed, drinking water quality and the quality of the supply, as well as key economic facts and detailed information about public opinion on the subject of water supply.
2. Information about the legal framework and institutional structure of the water supply, the age and condition of the supply system, as well as its historical development. Investment and investment subsidies are also addressed here.
3. Economic regulation and price setting were naturally the core of the project. Detailed information was generated about regulation mechanisms, from available national price comparisons and identifiable cost factors with their implications for price setting as well as tariffs and their relation to the cost structure and the uses to which the proceeds or profits are put. This section also includes information about the costs of new connections, special types of tariffs and their role, as well as the satisfaction or dissatisfaction of the population with their water supply.
4. Conclusions are drawn at the end, and presented with a general assessment and a list questions which remain to be answered.

The most extensive part of the project was the compilation of the national reports by the partners. A comparative analysis of the draft reports led both to provisional findings, and the identification of ways to improve the individual case studies. The national reports then were used to produce the final report in German. This is a translation of the summary version of that report.

## **1.5 Similarities and Differences**

There are a number of important similarities in the countries under study. Water resources (raw water) are under public control in them all, and a permit from the relevant authorities is required to use them. Differences arise chiefly over the question of who is responsible for

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providing water. As a general rule, responsibility lies with municipalities; the complementary roles played by regions, provinces, the state and the freedom to establish private supply systems (like in Denmark), however, turn out to be very different. England and Wales are an exception to this rule, because water supply has been entirely removed from municipal control.

In historical terms, the origins of public water supply in all the countries under study are found in the same period, namely the middle of the 19th century, but since then they have developed along very different lines. Accordingly, some countries have a thoroughly developed supply system, while in others the infrastructure is still considered to be under construction. The connection rate alone does not tell the whole story. It is also necessary to take the safety of the supply and quality control into account.

The degree of economic concentration differs markedly among these countries. France and the UK represent its extremes: France has 36,000 municipalities and 27,000 separate supply networks, while England and Wales have only 29 companies, which are sometimes connected to one another. At the same time, however, much of the water supply in France is delegated to a much smaller number of construction and water firms, which are integrated with one another in practice. The situation in England and Wales must be similarly qualified. The 29 companies run some 2,500 distinct supply areas. A distinction thus needs to be made between the technical and the economic concentration in the various countries as they can differ significantly from one another.

Water meters are being installed and tariffs are being set in relation to water use everywhere, except in England and Wales. There are generally two-part tariff structures, with great variation in the relative weight of the fixed portion such as a flat rate or meter rental. This has implications not only for incentives based on tariffs and prices, but also makes it necessary to make assumptions about average consumption in order to calculate average prices. These assumptions can have significant effects on the prices that are then based on them.

### **1.6 Germany as the Starting Point**

Water prices in Germany in 1996 can be summarised on the basis of statistics published by the BGW, as presented in Table 1. When they are calculated in terms of price per cubic metre, they show considerable differences between prices in the former East Germany, the 'new' Länder, and West Germany, the 'old' Länder. In terms cubic meters, water in the new Länder is on average about one quarter more expensive than in the old Länder.

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**Table 1: Water Prices in Germany per Cubic Metre (1996)**

Water prices in German Marks/m <sup>3</sup>			
Water prices per m <sup>3</sup>	Old Länder	New Länder	Germany all Länder
average	2.54	3.21	2.63
weighted average	2.76	3.35	2.85

All figures exclusive of VAT

Source: Derived from BGW (1996a).

A comparison of per capita water costs, however, turns conclusion on its head, as can be seen in Table 2 which shows that by this measure water supply for the residents of the former East is actually cheaper per capita and per year than it is for people in the West.

**Table 2: Water Prices in Germany on a Per Capita Basis (1996)**

Water prices in German Marks per connected inhabitant			
Water prices per year	Old Länder	New Länder	Germany all Länder
per person	141,00	135,00	140,00

All figures exclusive of VAT

Source: Derived from BGW (1996a).

This comparison of the two ways of calculating costs itself shows how misleading it can be to compare water prices per cubic metre without taking consumption into account. Neither of these two methods reflect other important factors which should be part of any international price comparison, such as the quality of the drinking water and of the supply service. International comparisons show that even at the level of water supply there are considerable differences in quality, which affect costs and prices.

The figures above are averages, which can hide large regional differences. In Figure 1: Water Prices in Germany (1987-1996), the statistical spread of water prices in the years in question is shown on the left axis, in German Marks and on the right in ECU or Euros. The boxes represent the mean 50 per cent of prices. The horizontal line in the middle of the box shows the median. The vertical lines represent the 25 per cent of prices that fall above or below. The horizontal line at the bottom shows the lowest price, and the line at the top shows the highest. The little circles mark statistical extremes (outliers). This type of graph is suited to showing the range and distribution of values in visual form.

For the years 1987 to 1996, the VEA statistics are based on a sample of approximately 60 cities, in which the Association of Energy Consumers (VEA) conducts annual surveys. The annual increases in water prices can be clearly seen, but must be interpreted with caution for two reasons:

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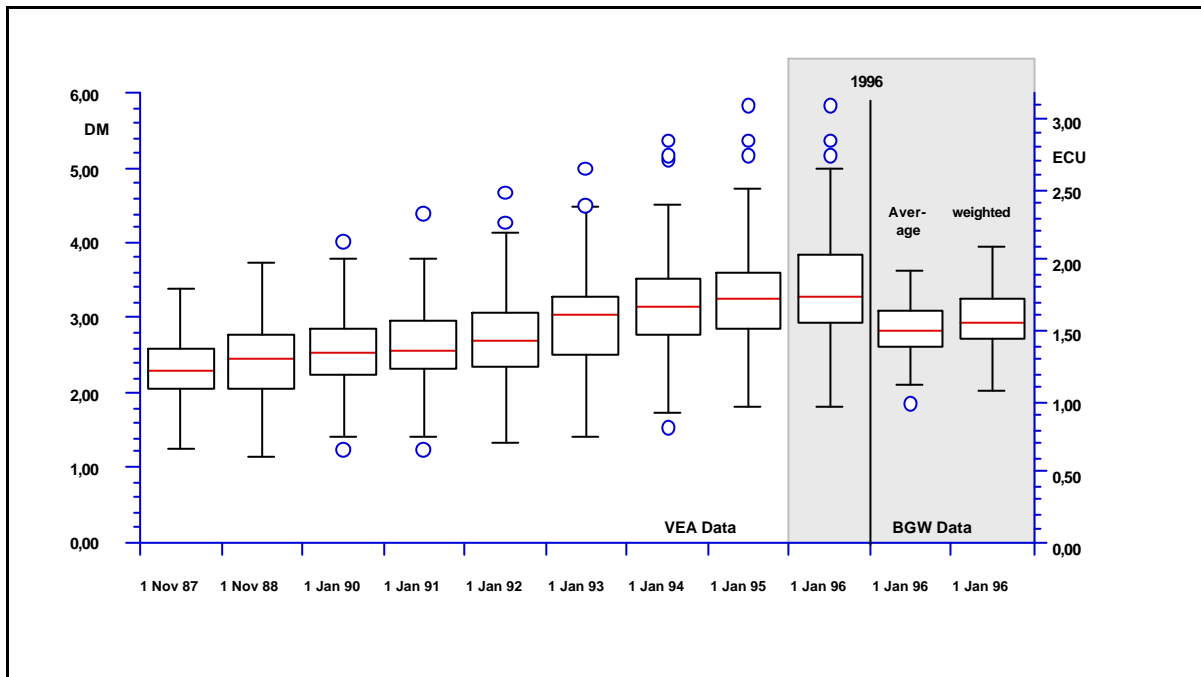
- First, the data is not based on a representative sample of cities. Furthermore, the way in which the random samples were put together has changed over the years. Accordingly, it can not be used to draw conclusions about general trends in Germany.
- Second, VEA has overestimated the annual price increases. They assumed that water consumption remained constant over these years. In fact, according to BGW data, water consumption in the western *Bundesländer* decreased by 5.4%, from 147 litres per person per day in 1990 to 139 in 1996. In the eastern *Bundesländer*, consumption decreased by 26.9% from 141 litres per person per day to 103 over the same period. The price increases turn out to be considerably smaller if the VEA data are corrected for decreased water consumption.

The following assumptions underlie these statistics, and in this context those of the BGW about the general structure of households in Germany are more reasonable:

BGW: general water tariffs, smallest water metre, consumption of 120 m<sup>3</sup> per year per household, 3 households per metre.

VEA: single family dwelling (1 water metre), consumption 150 m<sup>3</sup> per year, smallest connection size [1,5 to 2,5 m<sup>3</sup>/h].

**Figure 1: Water Prices in Germany (1987-1996)**



For 1996, there are three different calculations given (against the grey background). The VEA data correspond to the earlier years. The BGW values for 1996, which appear on the right in the diagramme, are calculated from the average price (left) for each *Bundesland* as the sum of all water prices divided by the number of water supply organisations. The weighted average (right) is based on the delivery to households.

## 1.7 Costs as the Basis of Tariffs and Prices

In Germany, as in most of the Member States of the European Union, the actual costs of supplying water are the basis for determining water prices. Water prices are not market prices, because there is no market for water. Rather, water supply is a 'natural' monopoly, whereby the water suppliers for technical and economic reasons cannot be in competition for service to the consumer. A water supply system in a city, for example, cannot either simply be duplicated, even if it were economically feasible, nor could multiple competing suppliers easily use a common water supply system.<sup>2</sup> The consumer therefore does not have a choice between different and competing suppliers, which is so important in the functioning of a market. Where there is a natural monopoly, price setting must be under the control of a communal, public body.

In Germany, there is a long-recognised set of rules to regulate price setting, which is taken into account by all water suppliers and the supervisory authorities (see BMI, 1982: 161-162; Schmidt, 1992; Gabriel, 1992):

1. Prices should on the one hand cover the costs of water supply (*Kostendeckungsgebot*), and on the other not be higher than the actual costs (*Kostenüberschreitungsverbot*). These two together could be referred to as the principle of 'precision landing' (*'Punktlandungsprinzip'*). Of course, such precision is rarely achieved in an economic context with fluctuating costs and variable water supply. In practice there is an attempt to balance out costs over several accounting periods.
2. Prices (and tariffs) should reflect the costs generated by particular users. Individual customers, especially large consumers that are relatively cheap to supply, can benefit from special contracts. However, there are seldom price increases for areas, such as sparsely populated regions around the periphery of supply areas, that are expensive to supply.<sup>3</sup>
3. Tariffs should take the cost structure into account. According to this principle, the approximately 85 per cent of water supply costs which are fixed should be borne by a basic price that is not dependent on consumption. Only the remaining 15 per cent of variable costs should be calculated on water metre readings. In practice, the fixed portion of tariffs

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<sup>2</sup> Exceptions to this rule can only be envisioned under restrictive assumptions, which in practice play no role: 1) Water coming from different places would have to be able to be mixed, without endangering the water supply before a 'common carrier' regime could be applied (even then, users would not know who delivered their water). In fact, mixed water is almost never balanced in terms of calcium and carbon dioxide and is corrosive. 2) The water consumption of a client and the water delivery of "his" supplier must be very precisely calculated in terms of time and in precise quantities and must take the dynamic effects in the network into account, which implies high communication costs. If not, the result would be pressure and supply fluctuations affecting all other users of the network. 3) It must be reasonably easy to determine whether people are following these rules, which would not be so in practice. 4) There must be enough suppliers (and consumers or buyers) to create a market with competing participants.

<sup>3</sup> The principle of solidarity within the community of water users in a supply area is acknowledged to intervene in other countries, but is not recognised as such in Germany.

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is 9 per cent, and 91 per cent of water companies' revenues come from quantity-based unit costs. Because of the unit cost is proportional and high, the consumer has an incentive to save water. In other countries, the fixed portion of water tariffs is up to 30%, which is clearly higher. As a result, the unit cost per m<sup>3</sup> can be lower in these countries, which can distort international price comparisons.

4. Prices should take the necessity of maintaining capital assets into account. This means that depreciation due to wear and tear on facilities should be considered as a cost and included in prices, and that reserves should be built up to cover future investment in necessary repairs, taking inflation into account. Moreover, an appropriate rate of interest is to be guaranteed, as long as it is consistent with public goals.

Similar principles underlie the tariffs and prices in other countries, except for in England and Wales where there is a special form of water price formation and regulation.

### 1.8 Cost-Recovery and Subsidies

That costs should be covered is at least declared to be a principle in price formation in all the countries under study. However, there is widespread deviation from this principle and subsidies are common, although they are not found as often in relation to water supply as they are in relation to sewerage.

Subsidies can be of a fiscal nature and paid out of public funds, or can take the form of parafiscal cross-subsidies through redistribution between urban areas (with fully developed networks) and rural areas (which still need to build networks). A special form of (artificial) subsidies can arise in the redistribution system because of regional or national taxes, which leads to a zero-sum game. This is, for example, the case for the French river basin authorities. Not least, cross-subsidies in favour of large users, usually industry, or poor members of society for social reasons are hidden behind the tariff system in several countries. Cross-subsidies within any one supply area (based on the solidarity principle) cannot be regarded as real subsidies as they have no influence on the average water prices.

In a comparison of water prices, it is above all subsidies from the general public budget that are important, because unlike payments within 'solidarity' systems for redistribution, these cannot be seen as a zero-sum game in relation to water supply. They can actually distort prices.

In Germany, especially in the western *Bundesländer*, subsidies play a subordinate role in water supply (BGW, 1995). State support (contributions, grants, aid from the public budget) is predominantly in the form of low-interest loans, with special conditions for their repayment. They are used primarily in the construction of supply infrastructure and the technological improvement of supply plants. These forms of support accounted for some 3.3% of the total amount spent on investment in 1994 in the western *Bundesländer* (including Berlin); in the former eastern *Bundesländer*, some of which were in desperate need of investment, this

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contribution reached 13.8%.<sup>4</sup> In view of the overstretched financial situation of the public finances, and the higher standards for drinking water that have been reached in the meantime in the former East, these types of assistance have been cut back.

The degree to which water prices cover costs can only be determined and comparatively assessed if all the expenses and expenditures, as well as all income are disclosed. The comparison shows that reliable figures are not available either on the expenditure side or on the income side. There are many good reasons for this. In Spain and in Italy, for example, water prices and tariffs have long been used as instruments of social policy and for regional development. Water was made available to everyone at affordable prices, if not actually free. The resulting costs were borne by the general tax budget, and water prices were thus comparatively highly subsidised. It is therefore impossible to compare these water prices with those in a country with a high degree of cost-covering (like Germany or the Netherlands, for example) without further work.

The rate of financing of past and future investments must also be taken into consideration. In England and Wales, current water prices do not reflect the actual investment costs, because these were financed by the state before privatisation in 1989, and these costs were not transferred to the new owners when the industry was listed on the stock exchange. The current situation in Denmark must give cause for future alarm at least in some regions. Necessary investment in fixed assets and source protection to secure future water supply was not undertaken everywhere to a sufficient extent. This situation is, however, now recognised and should be rectified, which will likely have the effect of raising future water prices significantly, considering the decentralised structure of the Danish water supply and the thus limited possibilities for generalisation.

Not least, the condition of the supply system must be included in a comparative assessment. Low water prices, insufficient to support the water supply system for example in Italy and before privatisation in England and Wales, must be evaluated differently from the financing of a fully developed and intact system that is maintained through constant investment. The setting up of reserve funds for future investment pose a particular problem for a comparative study. In some of the countries examined, such as Denmark, it is allowed, while in others, like France, intervention by the central government make it so unattractive that municipalities, who are obliged to provide water services, do not set up reserves.

### 1.9 Subsidies and Water Prices

The following became clear from the case studies describing the known subsidy mechanisms in the EU Member States under study:

- Subsidies could have a detectable influence on water prices, unlike in Germany, and in the western *Bundesländer* in particular.

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<sup>4</sup> Precise information about the payments is not available, so the actual (lower) effect of subsidies is not presented. The proportion of the money that comes from the water abstraction charges is also not clear.

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- There are many different types of subsidies, and mechanisms that are like subsidies, which either directly or indirectly lower water prices.
- Subsidies are not always readily recognisable as such, as is the case of the non-payment of monies owed to state agencies (by the Spanish river basin authorities, for example).
- Specification of the precise extent of a subsidy is difficult to obtain.
- Not all subsidies affect average water prices, for instance if they are part of 'solidarity' redistribution systems.

These imply that certain types of subsidies are perceived as such in some countries, and not in others. An example of this is the provision of free services and facilities (including the supply network) through state institutions in France. A further example is the state support of research and technological development for the water supply which doubtless exists in many countries, but which is not generally seen as a subsidy. When a type of subsidy is not recognised as such in a country, it should not be concluded that it does not exist. Very often they are simply taken for granted. Subsidies can thus contribute significantly to price differences not only inside a country, but between countries. They should be included in comparative analyses, even if there is currently not enough information available to assess their actual influence on prices.

### **1.10 Raw Water Quality and Source Protection as Cost Factors**

The expenditure necessary to purify drinking water is determined by the quality of the raw water. Increasing environmental pollution raises the costs of preparation measures in all the countries studied, but not always to the same degree. Denmark is able to meet 99% of its drinking water needs with ground water that is for the most part local. This raw water is generally easily used and of very high quality; its exploitation is therefore inexpensive. The situation in relation to associated costs is very different in the Netherlands, where severely polluted surface water must first be purified, then filtered through bank or dune infiltration, and then further processed to become drinking water. In the Netherlands and in Germany, expensive measures to purify ground water of nitrates and pesticides have become necessary. The water suppliers in some areas of France will soon have to face higher costs because the delivery of drinking water with pollution that exceeds the legal limits will no longer be tolerated, as a court judgement in Brittany recently made clear.

The expenses which must be borne by the water suppliers for the protection of their sources differ from country to country. As a general rule, ground water protection is considered to be a duty of the state, the costs of which are to be paid by the general tax budget. However, in some countries there are administrative fees, rates, incentives structures and other mechanisms to impose on water users the cost to cover source protection. Among these one can count the 'cooperations' in Germany between water suppliers and the agricultural sector which increasingly involve compensation payments for restrictions an land use (incl. advisory services, soil analyses etc.) or land purchases which lead to increases in water prices. The charges in question may amount to only a few pennies, but can, like the water abstraction

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charges in Germany and the Netherlands, add up to a considerable level of up to 20% in Berlin or 15% in Hesse.

Above all in the southern Member States of the European Union, but also in some areas of Germany, long-distance supply networks are necessary to supply enough water of sufficient quality to heavily populated areas and areas of intensive water use. Reservoirs must sometimes be built to cope with periods of drought. These sorts of infrastructure were and sometimes still are partly financed by the state.

### 1.11 Taxes and Rates as Cost Factors

There are considerable differences in the countries under study in the taxes and rates which consumers are charged on top of the water prices. The value-added tax (VAT) ranges greatly from 0 per cent<sup>5</sup> in England and Wales (for domestic consumption) to 25 per cent in Denmark. Relatively low value-added taxes are found in Germany (7%), France (5.5%), Italy (8.6%) and Spain (6%). Industrial consumers can reclaim the value-added tax paid on water by tax deduction.

In Germany the municipalities can negotiate the payment of concession fees with the water supply companies. They are imposed to create an exclusive right of use to lay pipes for customer supply. Their amount is based on the net turnover, and is drawn up according to the size of communities. Depending on the size of the municipality, a rate of between 10 and 18% of profits is charged to tariff customers. For large customers with individual contracts there is generally a rate of 1.5%. A prerequisite for paying a concession fee to the municipality is that a supply company makes a minimum profit.

In an international comparison, water prices in Germany and at the moment in Denmark, and also but to a lesser extent in the Netherlands, are comparatively heavily burdened with taxes and fees on water abstraction. In the Netherlands there is a uniform ground water abstraction charge of 0.025 hfl/ per m<sup>3</sup> (0.022 DM) and a ground water abstraction fee of 0.17 hfl/m<sup>3</sup> (0.15 DM). There is an additional ground water tax for the drinking water supply of 0.34 hfl/m<sup>3</sup> (0.30 DM). In Denmark, a water supply tax was instituted in 1994 as part of an ecological tax reform. It is levied not only on public water suppliers, but also on abstraction from private wells. It has been continually increasing, and went from 1 dkr/m<sup>3</sup> (0.26 DM) in 1994 to 5 dkr/m<sup>3</sup> (1.31 DM) in 1998. The majority of the German *Bundesländer* charge water abstraction fees, and they vary greatly in their form and rate structure. They are presented in the following Table 3. The abstraction fees in Berlin (now 0.60 DM per m<sup>3</sup>) and in Hessen (0.50 DM per m<sup>3</sup>) are exceptional because of their level, and not only in a comparison within Germany.

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<sup>5</sup> In England and Wales there is, however, no VAT exemption which would imply that water supply companies could not reclaim VAT paid on goods and services bought in. Rather, water deliveries to certain customers, among them households are taxed at a VAT rate of 0 per cent, and the water supply companies can reclaim the VAT on their purchases.

**Table 3: Abstraction charges for water supply in Germany (1997, German Marks (DM))**

Land	Abstraction charge	Land	Abstraction Charge
Baden-Württemberg	0.10 DM/m <sup>3</sup>	Lower Saxony	0.10 DM/m <sup>3</sup>
Bavaria	ñ	North Rhine-Westphalia	ñ
Berlin	0.60 DM/m <sup>3</sup>	Rheinland-Palatinate	ñ
Brandenburg	0.10 DM/m <sup>3</sup>	Saarland	ñ
Bremen	0.10 DM/m <sup>3</sup>	Saxony	0.03 DM/m <sup>3</sup>
Hamburg	0.10 DM/m <sup>3</sup>	Saxony-Anhalt	ñ
Hessen	0.50 DM/m <sup>3</sup>	Schleswig-Holstein	0.10 DM/m <sup>3</sup>
Mecklenburg-W. Pommerania	0.035 DM/m <sup>3</sup>	Thuringia <sup>6</sup>	0.05 DM/m <sup>3</sup>

As public fees these cost factors are relatively easy to document. Other expenditures required by negotiated agreements for environmental protection, the preventative costs of reducing and avoiding damage or isolating and eventually cleaning up contaminated water resources are not easy to ascertain. Their effects on the cost structure and on water prices as well as their distorting effect on an international comparison cannot reliably be assessed.

## 1.12 Quality of the Water Supply

The quality of the water supply has a very great influence on water prices. The quality of the water delivered, the quality of its delivery to the consumer, the quality of the supply network and the quality of the customer service must be considered in order to arrive at a comprehensive judgement. The quality of the water delivered includes an assessment of the pollutants in the drinking water, bacterial pollution and its visual impression (whether the water, whatever its quality in microbiological and toxicological terms, appears pure, and smells and tastes appetising). This area is for the most part comprehensively regulated by the European Drinking Water Directive. There are, however, sometimes considerable differences found in practice, as with the delivery of water with dubious micro-biological contents in Italy.

Along with differences in drinking water quality, there are different technical characteristics of water supply, the costs of which can be estimated. These include the reliability of the supply, maintaining a constant pressure in the pipes, as well as the relationship with customers. There are many parameters which both theoretically and practically can be used to assess these. In England and Wales, for example, the supply companies were evaluated in terms of how long they took to reply to written complaints.

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<sup>6</sup> Not actually enforced at the moment due to a suspension in the *Land Water* law.

## Comparison of Water Prices in Europe

A general indicator of the condition of a supply network is the percentage of water leakage or loss, which turns out to be very different among the countries under study. They fall basically into two categories:

- Low leakage in the Netherlands (3%), Denmark (9%) and Germany (9%). In Denmark and Germany, leakage statistics include losses due to metering errors as well as statistical differences. The figure for the Netherlands is an estimate of actual leakage, after subtracting water used for extinguishing fires and flushing mains.
- High leakage is found in France (on average 25%, see above), Italy (27%), as well as England and Wales (29%). As is seen in the case of France, there are some supply areas within these countries that have leakage rates like those in the first category.

The case of Italy best illustrates the relationship between leakage rates and supply interruptions. It is currently only in England and Wales that there is a separate system to register and assess interruptions in the water supply and restrictions on water use. This is due to the nature of the British regulatory system.

Other characteristics of water supply are not so readily observed, such as maintaining a minimum water pressure in the network, avoiding pressure surges (water hammers), and the existence of effective measures to stop back flow to avoid impairing the water quality, as well as the existence of lead pipes.

There was not sufficient information available on these subjects in the countries under study to undertake a systematic comparison. These aspects are of varying importance in the different countries, and are generally not discussed in the context of cost structures or price formation. There is sometimes purely technical information available, but its implications for costs cannot be estimated.

### **1.13 Data quality**

In practice it is difficult to produce a comparison that takes all the essential factors into account. The data that is available varies too greatly in quality, even in those Member States that have a similar level of development and basically comparable political and economic structures. The lack of data and the poor quality and insufficiency of that which is available is due both to the different levels of effort that go into on statistical data gathering and evaluation in the countries investigated, and to the different structures of their water supply.

Access to the data necessary for a meaningful comparison illustrates one last important point. Most of the countries in question do not have the institutions necessary to generate comprehensive statistics. In countries where there is representative data available about water prices, as there is in Germany, it is often the associations of water supply companies that publish the data and information that is generally regarded and cited as the most reliable. In all the countries under study there is a clear information asymmetry in favour of the water supply organisations and against state authorities. This means that the water supply sector has data and information (and power over them) which governmental agencies do not have or

## Comparison of Water Prices in Europe

at least not in comparable quality. They can make this information available to others in whole or in part and process it to reflect their particular interest.

### 1.14 Comparison of Water Prices in Europe

In spite of the difficulties in systematically comparing water prices described thus far, a table doing just that is presented below (table 4). Water prices are given in German Marks per cubic metre, both as a range and as an average (rounded). The information on prices per cubic metre is, however, potentially misleading, because of the proportion of fixed costs in water supply and the different levels of consumption. "Typical" or "average" yearly costs for drinking water supply are therefore given alongside, both by household and per capita.

The form of a table always implies a certain comparability of the figures, which actually cannot be assumed. Table 4 is therefore only to be interpreted with caution. Some of the most important qualifications are given in the footnotes. More general reservations are the following:

- the reference years vary, which can lead to distortions in the general picture of price development.
- due to limited data availability (Italy, Denmark, France) or to previous aggregation (Germany, England and Wales), the range of water prices in DM per cubic metre is actual significantly larger than appears in the table.
- In relation to the statistical basis, it was impossible to determine whether the same method was always used to calculate the range and the averages. (calculation for Denmark without fixed part of the tariff). The possible implications are illustrated by the two possible figures for Germany.
- Different methods were also used to estimate an average yearly cost for water supply per household and per capita, when setting the average number of people per household, for example. Further risks arise in the differences between the population as a whole, and the population that is connected to the water supply system, which are sometimes quite small.

In general, the table does, however, give an impression of the order of magnitude of annual water bills. Further refinement in the calculations to increase the comparability would require a considerable expenditure to generate and prepare data.

The table also shows that the variation in prices within the individual countries, even if they are only incompletely expressed in terms of the ranges provided, is considerably greater than the variation among the average prices in the individual countries. The conclusion that can be drawn from this is that regional differences inside the Member States have a greater influence on the costs of water supply and water prices than the legal and institutional differences among countries.

By examining Table 4, it is easy to group the Member States in two classes. Some countries, like Germany and the Netherlands, as well as England and Wales have prices that cover

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costs, and are relatively high. Countries such as Italy and Spain, in which there is still a high level of state subsidy, have low prices per cubic metre. France falls between these two.

It is no coincidence that these classes can be discerned. The Southern Member States are still in the process of constructing and expanding a water supply system, especially in rural areas. This construction has only been possible with considerable state subsidies, even in those countries which have cost-covering prices today. At the moment these countries are found in the north. The fact that in Germany recently state support has been higher in the new *BundesLänder* than in the old shows that the connection between state support and the necessity of constructing and maintaining infrastructure it to be found there as well.

It needs to be stressed that the water price data contained in the following table deserves further comment. Information currently available on drinking water prices is not sufficiently precise and does not allow for direct comparison. The main factors influencing the level of drinking water prices are presented in summary fashion following Table 4.

## Comparison of Water Prices in Europe

**Table 4: Comparison of European Water Prices**

Country	Year	Drinking Water Prices in DM/m <sup>3</sup>		Average Annual Bill in DM/year		
		Range	Average	per House-hold	per capita	capita / Household
<b>Denmark</b>	1993	0,25 - 1,65	0,80	n/a.	55,00	-
		Based on unit rates relating to consumption and not including fixed tariff component. The above mentioned data does not accurately represent the current situation in Denmark. Less than half of all Danish households have water meters. A water abstraction tax has been in place since 1994 as part of an ecological tax reform. Drinking water can be inexpensively produced using ground water. Data availability is poor.				
<b>Germany</b>	1996	1,81 - 3,96	2,85 / 2,63	255,00	140,00	1,8
		For the purposes of this chart, price ranges for Germany have been calculated on the basis of weighted and unweighted Länder averages; the actual range is in much wider. Averages, weighted/unweighted; are based on data from BGW. The majority of Länder have water abstraction taxes which vary considerably in regulative detail and tax rate levels.				
<b>England and Wales</b>	1995	1,00 - 2,80	1,70	270,00	115,00	2,3
		Consumption-related tariffs are the exception. As a result of the 1989 privatisation the cost basis has been distorted. A relatively high number of existing lead pipe connections, about 8.6 million, need to be refitted. Water (and sewerage) prices include administrative fees imposed by the Environment Agency for abstraction (and discharges). Depreciation periods for large-scale investment are relatively long: 50 years to unlimited (no depreciation). Price comparisons are affected by currency fluctuations.				
<b>France</b>	1994	0,12 - 3,63	2,00	260,00	105,00	2,5
		Available data for France is not representative. Existing data relates to a selection of major towns and cities; with values of up to FFr 37.00 (DM 11.00) per m <sup>3</sup> being reported for remaining regions. In France, there is a water abstraction levy and a special charge earmarked for the expansion of water supply infrastructure in rural regions. Until recently, subsidy levels were relatively high. As a consequence of decentralisation, subsidy mechanisms are currently being restructured. As a rule, cost structures are not known (delegation).				
<b>Italy</b>	1992	0,20 - 1,31	0,70	220,00	75,00	2,9
		Available data relates to major cities only. The water supply system is characterised by a marked dependence on subsidies. In Italy, water tariffs and prices are used as instruments to conduct social policy and as a method of fighting inflation. Data availability is poor, difficult to calculate and often irrelevant.				
<b>The Netherlands</b>	1995	[0,80 - 2,55]	2,70	340,00	135,00	2,5
		For the Netherlands, only unit rates for consumption are shown in the 'range' column. Fixed price components (connection fees, meter rentals) range from DM 21.23 to 121.96 per connection. Groundwater abstraction taxes and groundwater charges exist in the Netherlands. Meter use is widespread. Two-part tariffs as well as contributions and charges for new connections make accurate comparisons difficult. Thanks to a well developed statistical system, the data basis for the Netherlands is good.				
<b>Spain</b>	1992	0,01 - 2,50	0,40	n/a.	n/a.	-
		In parts of Spain, water supply requires costly long-distance transfers. Data for 1993 is calculated on the basis of an average annual consumption of 50 m <sup>3</sup> . Regional governments levy 'sewerage taxes' on water prices to finance subsidies for sewerage services. Depreciation over 25 to 50 years is usually covered by the state. In Spain, there are manifold subsidy mechanisms which, combined with the ongoing regionalisation and subsidies from the EU (e.g., cohesion funds), impede detailed analysis. Data availability is poor.				

## Comparison of Water Prices in Europe

Source: Authors' compilation. The values in the last column are calculated from the values in the preceding two columns.

Drinking water prices are influenced in a number of ways, which, in practice, complicate any attempt to accurately compare prices. Some prices, but not all, are mentioned in the comparative table. The following list provides a summary of factors which should be included in a comparison of water prices but which may also complicate direct comparisons:

### **External conditions:**

- Bioregional conditions of drinking water production (origin of raw water);
- Structure of drinking water supplies (settlement structures, size of supply areas);
- Environmental conditions (is costly treatment necessary as a result of pollution);
- Water consumption (share of public supply, industry, etc.);

### **Level of service:**

- Quality of drinking water (purity) and of drinking water supply (interruptions per annum, constant water pressure, et.);
- State of the infrastructure, repair needs (does the supply network conform to B.A.T, water losses, percentage of lead pipes);

### **Financial Aspects:**

- Full cost recovery (prices and investment);
- State subsidies: self-financing capacity
- Taxes and charges (ecological tax reform, water abstraction taxes, 'solidarity' financing systems);
- Infrastructure financing. What is the value of the infrastructure? Which rate of renewal are investment decisions based upon?
- Depreciation (value basis, linear or degressive depreciation, etc.);

### **Tariff Aspects:**

- Average drinking water consumption per capita or per household.
- Mismatch of comparisons of unit rates (for consumption) and total annual costs; problems with decreasing consumption and high levels of fixed costs;
- Tariff differentiation according to consumer classes;
- Tariff structures (different blocks and block rates, subsidies for low-income users, redistribution of fixed cost components, new connections);

### **Economic Aspects:**

- Total employment in the water supply sector (e.g., employment practices as social policy measures of state-run drinking water suppliers);
- Total costs of water supply services, and levels of water prices, in relation to gross domestic product.

## **1.15 Conclusions**

This comparison of water prices in some Member States of the European Union has resulted in a number of questions and only allows for limited conclusions. Above all, it became evident how difficult it is to obtain the data necessary for a credible comparison. This also applies to background information about assumptions, estimation methods, conventions in statistics and so on, which much also be collected and taken into account. The methodology chosen for this project, namely decentralised research by experts in the individual countries, has proved successful. This is not least because all researchers involved had good previous knowledge about water supply not only in their own country but also in other Member States. Joint seminars during the course of the investigation would certainly have improved the analyses and made the results more easily comparable, but this was not possible during this project.

Rather simplistically, price formation in the field of water supply can be described by the following formula. In addition, a number of quality aspects would have to be considered. However, there is insufficient information on these for an international comparison:

$$\text{Costs} - \text{Subsidies} + \text{Appropriation of Surplus} + \text{Taxes and Charges} = \text{Prices}$$

The total (macro-economic) costs of water supply are usually not known, least of all the environmental and resource costs. Micro-economically, costs at the firm level can at least be estimated in case where there are cost-covering prices. Any difference between those two can be explained in part by subsidies or similar mechanisms. At the same time there may be an appropriation of surplus, such as through dividends for capital invested. Some of the mechanisms are transparent, other rather opaque. Taxes and charges are in principle easy to observe and the applicable rates are usually known. However, there are normally no statistics on the actual price effect of taxes and charges. Even external prices, i.e. those paid by the consumer, cannot always be documented at the level of detail that is desirable for a comparison. The reasons for this state of affairs can be found in the complexity of water supply structures, in the frequent lack of centrally collected and aggregated data, and in fundamentally different tariff structures and charging methods in the Member States studied here.

It is obvious from this international comparison that the calculation of water prices per cubic meter alone is misleading, all the more so as there is doubt about the various estimations of water consumption data entering the equations, because these are based in each country on

## Comparison of Water Prices in Europe

very different information and assumptions. The method of comparing annual bills per capita has been shown to be superior and should be developed further.

Table 5 presents a qualitative comparison of the most important factors influencing water prices. The comparison is not intended to evaluate drinking water supply systems as a whole, but rather to highlight the difficulties in accurately comparing water prices. This is done by illustrating that any comparison must take into account several different dimensions and underlines the fact that mere comparisons of unit rates per litre of m<sup>3</sup> of water supplied are misleading. The range used in the table includes '+' for 'high or good', 'o' for 'average', and '-' signifying 'low or bad'. The assessments presented in the table draw upon results presented in chapter 4 of the main report.

**Table 5: Qualitative Evaluation of Factors Influencing Drinking Water Prices**

	DK	D	E	F	I	NL	UK
Water Prices	-	+	-	o	-	+	o
Cost-Recovery Ratio	+	+	-	o	-	+	(o/+)
Drinking Water Quality	+	+	-	o	-	+	o
Quality of Supply Service	+	+	-	o	-	+	(o/-)
Cost of Raw Water Production	-	o	+	o	+	o	o

Source: Authors' compilation. Water Prices

Table 5 clearly illustrates that low water prices go hand in hand with low levels of drinking water purity and service quality. Even in countries with high government subsidies, consumers, who are also taxpayers, must cover the costs of drinking water supplies. In some countries, future investments are reflected in water prices through the accumulation of reserves. Other countries have not yet achieved this. Future cost increases, along with their likely political consequences, and further subsidies are inevitable in the latter case. Without taking these and other cost factors and financial mechanisms into consideration, any comparison of drinking water prices is an insufficient basis upon which the efficiency and effectiveness of drinking water supply systems can be evaluated.