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Water Governance for Ecological Modernization

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Global water resources are at risk. Many rivers and canals have become depleted and polluted (UNESCO 2006). Big basins like the Jordan River threaten to dry up. Besides availability, accessibility to water is a major problem. More than a billion people lack access to potable water and twice as many do not have basic sanitation (UNDP 2006). Thus the international community is extremely active in promoting innovation and technology transfer in the water sector. The UN Millennium Development Goals (MDGs) and the Johannesburg Plan of Implementation (JPoI) aim to halve the proportion of people without access by 2015 (figure 1). Technical and financial support and capacity-building to developing countries and regions facing water scarcity conditions or subject to drought and desertification are explicitly mentioned. Technological innovation and the diffusion of processes and products that protect freshwater ecosystems are most crucial.

Water supply and waste water disposal have for long been considered a public task for which either the national government or the community has been responsible. In difference to the energy sector where the increasing oil price incites the demand for more efficient technologies, water is often subsidized, especially, for social reasons. In recent years, however, notions have changed and the sector has currently undergone dramatic changes. Market mechanisms have become more popular (Conca 2006: 215). Water services and technologies are now traded on an international scale (Deckwirth 2004; Finger/Allouche 2002).

Multinational service corporations such as Veolia serve customers around the world (figure 2). Thus there are apprehensions that these multinationals will be controlling an increasing portion of the world's affairs. We argue that the water corporations do however not operate independently from domestic governance. Governance refers to political as well as market framework conditions. Those are even essential for the performance of multinational corporations. It is no coincidence that global market leaders come from France. There is a clear interplay between domestic and foreign water policies. The article introduces the concept of ecological modernization to the water context. The concept points to the interplay of domestic policies and a country's performance at the global market. Active environmental engagement is indeed considered essential to lead markets for innovative technologies.

1. Environmental innovation and foreign policy

The assumption that environmental and modern industrial policies do support and not contradict each other is a core assumption of the discourse of ecological modernization. This thought has not been accepted for long (Jänicke 2007: 13) and is still not without controversy (e.g. BMWA 2004). Meanwhile most countries have formulated strategies for sustainable development (Jansen/Osland 2007). The strategy of ecological modernization is hereby the dominant approach in order to achieve sustainability. Ecological modernization approaches to policy making encourage innovation and diffusion of more ecologically suitable processing and products (Jänicke 2006: 11).

Innovation describes the first market launch of a new technology which improves a product's life cycle in parts or in total (Jänicke 2006: 11). Environmental innovations are currently driven by two main factors: 1) state legislation in the sense of "smart" regulation (Jänicke 2006: 14), and 2) increasing uncertainty for pollutant industries against the background of a globalized world and complex multi-level regulation which is an incentive to invest in better environmental performance (Jänicke 2006: 9; Tauchmann et al. 2006: 12). Diffusion describes the spread of innovative technologies in the global market, and offers first mover advantages to pioneer countries. Such pioneer countries or lead market have become very important for the promotion of environmental policies (Jakob et al. 2005).

1.1. Ecological Modernization – Combining Ecological and Economic Benefit

Environmental policies are more successful when companies compete for the greatest improvements to the environmental friendliness of their products (Jänicke et al. 1999: 126). The concept of ecological modernization is based on this fact. Ecological modernization requires a re-orientation of market economies (Jänicke 2006: 10). It counts on technological capacity to reduce and compensate for environmental impacts. Technological innovation and the diffusion of processes and products that protect the environment and the natural resource base are essential for ecological modernization approaches to be successful in improving environmental characteristics. 'Clean technologies' are posited as the sine qua non in order to decouple economic growth from increased pollution as well as from augmenting resource and

energy use (Jansen/Osland 2007: 6). Being the currently dominant political strategy in Europe, especially in the field of climate and energy policies, it is characterized by the following (Jänicke 2006; Jansen/Osland 2007):

- Establishment of win-win situations through technical improvements and hence decoupling economic growth and green house gas emission (due to more efficient use of resources, energy, land, water etc.)
- Make, on the one hand, extensive use of market mechanisms and economic instruments and, on the other hand, to a lesser degree make use of direct regulations mechanisms (but “smart” regulation)
- Mainstreaming ecological considerations in other policy fields, i.e. rather than altering the relations between the environmental and other authorities (such as industrial sector, transport sector, lower level of government such as municipalities) – the main emphasis has been on procedural changes towards sustainable policies that integrate social, ecological and economic factors across sectors.

The ecological modernization approach implies at first a clear redirecting away from a post-treatment (end of pipe) approach towards a precautionary handling of the environment and natural resources (Jänicke 2006: 9ff). For industrialized societies, it does not imply a fundamental change of values and divorcing from the capitalist economy as enterprises still follow the paradigm of profit maximization (see table 1). In essence, ecological modernization is about an improved efficiency of consumption and production patterns. This implies the danger that, on the one hand, resource efficiency of single products and processes indeed improves while, on the other hand, the over-all wastage continues to increase due to greater consumption levels. For instance, the current trend to expand irrigation agriculture can only conditionally be compensated by more efficient technology (Shiva 2003: 155; WBGU 1997: 148). Irrigation techniques might improve while more land area is irrigated, and, in the end, more freshwater resources are used. The strategy of ecological modernization can hence only be considered a first step and sort of “appetizer” for a more comprehensive environmental strategy implying changes of consumption and production patterns (Jänicke et

al. 1999: 127). It is clearly limited by the technologies available and their potential for resource efficiency.

1.2. Ecological Modernization in the Water Sector

Water policies should aim to reduce water wastage, to maintain ecologically healthy surface basins and to protect aquifers from pollution and over-extraction. Ecological modernization approaches count on technological innovation and diffusion in order to achieve these objectives (Jansen/Osland 2007: 6). There are still fundamental questions remaining related to what sustainable water management and future-oriented technologies are. The sustainability debate on water lags behind debates in other fields such as climate/energy and forestry (Postel 2006: 55; UNESCO 2006: 17). In order to implement the UN water targets (figure 1), in general, most technologies currently being offered are suitable – some more, some less (Dalkmann et al. 2004; Tauchmann et al. 2006). Expanding water infrastructure and access to water can, however, harm natural eco-systems. For instance, desalination technologies are characterized by high energy needs and degradation of coastal environment. Desalination is a remedial action if water is scarce already due to over-use (UNESCO 2006: 310; Weitlaner 2007). Clean-up of brownfields as such is post-treatment, whereas single aspects of clean-up can be considered precautionary, such as blocking the diffusion of contaminated water in the ecosystem. A major problem is that each technology has only punctual impact as a rule. What is needed are innovative system solutions, for example the combination of water and non-fossil energy technologies (UNESCO 2006: 312; Tauchmann et al. 2006: 275).

Compared to the energy sector to which concepts of ecological modernization have mostly referred to thus far, the water sector is confronted with a very different situation. Water supply and waste water disposal have for long been considered a public task for which either the national government or the community has been responsible. The EU Water Framework Directive states explicitly (reason 1): ‘Water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such.’

Water is often subsidized. In difference to the energy sector where the increasing oil price incites the demand for more efficient technologies, in the water sector, there is hardly any demand-side orientation to management. In recent years, however, notions have changed and

the sector has currently undergone dramatic changes. Market mechanisms have become more popular, especially with the approach of Integrated Water Resource Management (IWRM) (Conca 2006: 215; Neubert et al. 2005).

In this context, water services (consultancy, planning, supply, sanitation) must be seen separately from water technologies (building assets and components). While the latter ones have for the major part always been offered by private enterprises, water supply and sanitation have only recently become of interest to private investors and profit expectations. Meanwhile the private sector controls 35 % of water supply and sanitation in developing countries and 80 % in developed countries (UNESCO 2006: 419). The privatization of supply has often come with an opening of local and national markets for foreign investors. The demand for new technologies and assets (still) comes from municipal and regional suppliers, which act in the interest of water users as end customers (Dalkmann 2004; Kluge et al. 2002). However, many regional suppliers now belong to a few multinationals (Deckwirth 2004).

As there is always only one pipe system in a city or region, and as waters of different sources can be mixed only conditionally, there is no proper competition between different service providers. There is only a 'market for the market': Companies compete merely at the moment of bidding (Kluge et al. 2002: 21; Tauchmann et al. 2006: 29). Municipalities thereby do not tend to demand less single services and technologies from different companies but rather one complete package. Such packages include the product cycle, from consultancy and ready-to-use assets to water operations. They are put in place if municipalities sign management or concession contracts with a company (BMWA 2005: 106).

1.3. Pioneer policies and lead markets

Environmental innovation today must be seen in the context of a globalized economy with, on the one hand, increasing resource demand and, on the other hand, the intellectual and technical capacities to solve persistent problems. Both aspects need to be analyzed with global reference (Jänicke 2006: 12). The governance performance of provider countries is most crucial if enterprises have an environmental lead role at the world market (Porter 1990, Wallace 1995). There is no doubt that national sovereignty has been limited in the context of political and economic globalization (Martin/Schumann 1996). There are diverse international

regimes such as WTO rules that limit the nation state's ability for legislative action. Moreover, countries compete for direct investment what limits the nation-state's ability to tax multinationals and set regulation that results in extra cost (Altvater 1997).

The Porter hypothesis (1990) shows, however, the positive relationship between environmental policies and competitiveness. Environmental regulation can be beneficial for product and process innovation and generate advantages in international competition. Highly developed countries have an especially good position when it comes to competition for quality and innovation as new and unrivalled products can be more expensive (Jänicke et al. 1999: 126). The Resource Based View (RBV) amends the Porter hypothesis (Rugman/Verbeke 1998; Spanos/Spyros 2001). According to RBV, competitiveness of companies and industries depends on the quality and quantity of the resources available and on the ability of industries to optimize their use. Hence, this approach increases the diversity of resources that the companies and industries can rely on.

Therefore, the concept of ecological modernization allows governments to implement environmental legislation without deterring investments in the long run. RBV argues that industry has self-interest in resource availability and, hence, protection (Spanos/Spyros 2001: 909). Porter's pioneer thesis argues that if regulation is accomplished at the international scale, enterprises of those countries that invented the regulation in the first place benefit from their government's pioneer policy (Porter 1990). The ecological modernization approach helps to secure the competitiveness at the world market (Jansen/Osland 2007: 8).

A relevant characteristic of 'green' pioneer countries is their high degree of economic development measured in GDP per capita. It is a precondition for, on the one hand, the awareness of the resource problem and, on the other hand, having the administrative capacity for handling it (Jänicke 2005). Those countries from which the innovations are first successful in accessing the market are defined as lead markets (Jacob et al. 2005).

National competitiveness and economic effectiveness are thus closely linked to domestic environmental policies (Jänicke 2006: 15). The pioneer countries approach aims to adjust domestic and foreign governance of a nation state in order to secure advantages for domestic businesses in the global market. Development strategies are explicitly based on strong environmental regulation.

Pioneer countries are critical not only for being the first to introduce a certain policy. What is crucial besides is the visibility of pioneer policies, their contribution to the international political agenda and the diffusion of innovative policies (Jänicke 2006: 63). Lead markets are national or regional markets which standardize a certain innovative design before others – in contrast to pilot markets which are only *test* market improvements. Pioneers are starters for international innovation (Jänicke/Jacob 2002:11). For example, Germany is especially known for being a pioneer and lead market in the field of renewable energies (Jänicke 2006: 15). Several countries have also introduced a renewable energy promotion model with fixed feed-in tariffs, such as Denmark, Estonia, France, Greece, Italy, Sweden, and Switzerland (Busch 2003). The success story of the Toyota Prius hybrid car can to a large degree be explained by the Japanese innovation-orientated regulation (Jänicke 2006: 17).

1.4. Water Pioneers

In the water sector, French providers are the most successful, followed by U.S., U.K. and German companies. In the recent decade, an international market for water services and technologies has emerged – with a current volume of 250 billion euros and, according to EU estimations, up to 400 billion in the year 2010 (Wirtschaftswoche 25.01.2007a). In 2005 the water industry achieved a worldwide growth rate of 12 % in environmental technologies (Schwenker 2006).

Not all products are tradable at a global scale, of course. The assets of wells and pipes rely on local services in most countries and are thus difficult to export (Wackenbauer 2007: 19). Simple and locally available technologies are used for technical water systems, for instance, concrete building, steel construction, tank and pipe construction, sewage treatment plants and industrial cleanup (Wackenbauer 2007: 19). However, capacities for special equipment often required in water service provision cannot be built in each country, such as separation technology, pump and dosing systems, measuring and control technology as well process specific know-how (Wackenbauer 2007: 19).

Global market leaders in the water sector are the French corporation Suez, Veolia und Société d'Aménagement Urban at Rural (SAUR) (besides Thames Water) (Stadler/Hoering 2003: 92). They each control the whole value chain from the planning and building of the plants to

supplying end customers (BMWA 2004). This sort of centralized ‘mega’ panning and construction tends to result in central infrastructure projects and operation. Veolia, for example, holds concession contracts in more than one hundred countries (figure 2). In Germany, it supplies more than 450 municipalities and industrial enterprises, among them major cities such as Berlin and Leipzig (www.velolia.de). German business ascribes their lag in the water sector to direct support of their competitors by home governments (BMWA 2006: 56). For instance, USAID projects are strictly conditioned to delivery by U.S. enterprises (BFAI 2005).

It comes as no surprise indeed that France is very visible in international water politics (Dobner 2006). Since the early 1990s, political structures have emerged for water at the global level (Conca 2006). The World Water Forum has become the world’s largest conference, organized by the World Water Council with headquarter in Marseille, France (www.worldwatercouncil.org). The Forum has taken place four times so far, in Marrakech in 1997, in Den Haag in 2000, in Kyoto in 2003, and in Mexico in 2006. It can be compared in scale and significance to the Conference of the Parties of the Climate and Biodiversity Framework Conventions. The Forum’s impact and relevance cannot be underestimated against the background of an emerging institutional structure at the global level which is formed by regular conferences and meetings (Conca 2006: 241; Deckwirth 2004: 27).

French experts are also very visible in numerous international boards and panels (Dobner 2006), for example, the Camdessus Panel, named after the Frenchman Michel Camdessus, former director of the International Monetary Fund (IMF) (Finger/Allouche 2002: 115; Winpenny 2003). The Camdessus report is used by the European Commission to justify the strategy of mobilizing private finance for water infrastructure, established in the Communication on the EU Water Facility – following the French concession model (COM 2003-211 and COM 2004-43).

2. Water Governance of Selected Provider Countries

Governance structures within not only the target countries but especially by the provider countries are crucial for companies’ success. It is no coincidence that the most successful water enterprises stem only from Europe, especially France, and the U.S. While the market

has transnationalized, such transnationalization is only true for political structures to a limited extent. In the political realm, a distinction is still made between domestic and foreign companies, especially due to market liberalization which forces enterprises to compete with foreign companies even for the domestic market. Governments “their” water business through domestic legislation, on the one hand, and support of foreign activities and their engagement in international politics, on the other hand.

2.1. Water Governance in France

80 % of the French population is served by private water operators (Stadler/Hoering 2003: 92). Private companies have a long tradition in France of over 100 years. Responsibilities for water supply and sanitation historically lie with the municipalities in France. However, more than 36.000 municipalities exist in France and, in the majority of cases, these have had only little capital and technical know-how, which prompted them to merge into inter-communal associations and delegate water operations to private providers (Stadler/Hoering 2003: 92).

France is especially known for its leasing or concession model: Private operators pay a certain amount to the local government and, in return, may run the pipe system for a period of 10-20 years on average. The company is responsible for the management, maintenance and operation of the existing infrastructure, unless negotiated differently with the local government (Finger/Allouche 2002: 80; Green 2003: 7). In rural areas up to 30-40 % of infrastructure investments come from different state funds. In urban areas, benefits account for only 10-20 % (Stadler/Hoering 2003: 94).

The French model is considered to be especially susceptible to corruption. The case of Grenoble is a well known example in which the public water utility was transferred to the private Compagnie de Gestion des Eaux du Sud-Est (COGESE), a Suez subsidiary. Five years after privatization, it became known that the contract was accomplished only due to significant bribes from the company: Suez had financed the mayor’s election campaign and gave gifts worth 3 million euro (Stadler/Hoering 2003: 97).

The French companies are, however, very successful. Three French corporations dominate the global water market: Suez, Veolia und SAUR (besides Thames Water) (Bond et al. 2001: 17). All three are on the annual Fortune 500 list of the largest enterprises worldwide (see table 2)

(Deckwirth 2004: 6, 20; Finger/Allouche 2002: 115). Like most French water companies, they control the whole supply chain (BMWA 2004). The French are market leaders in the field of water services and fourth among exports of water and sewage technologies with an export turnover of 163 million euro in 2003 (Wackenbauer 2007: 19).

After the French operators had a first phase of foreign investment in Africa and the U.S. in the 1960s and 1970s, they began to access new markets in Europe when they became privatized in the U.K. and Germany, among others, in the 1980s. In the 1990s, new markets were again accessed in Asia, Latin America as well as Middle and Eastern Europe (Tauchmann et al. 2006: 32f.). Hence Suez, for example, has several subsidiaries in different countries, e. g. Aguakan, Aguas de Barcelona, Aquasystems, Australian Water Systems, Degrémont Eurawasser, LEMA, Lydec, Lyonnaise des Eaux, Macao Water, Northumbrian Water, Ondeo, Sino-French Holding und United Water (www.suez.com/metiers/english/environnement/index.php). The French corporations are indeed multi-utility corporations. For example Suez, the largest one, is also active in the energy, waste and communication sector. In 2003, the corporation had an annual turnover of 40 billion euro – of which 10 billion came from the water sector (Deckwirth 2004: 6).

In conclusion, French municipalities started giving concessions to private water operators earliest, and today France is the home of the biggest water corporations.

2.2. Water Governance in England

During this time when private water service providers had only been known in France, the Thatcher government in England initiated the privatization wave of the 1980s that has shifted the world water market. Until 1974, water supply and sanitation were provided by the municipalities in England and Wales. Thereafter ten Regional Water Authorities (RWA) were established which stood under direct state control and were eventually privatized completely in 1989. Scotland was excluded from this reform (Stadler/Hoering 2003: 98).

Different from France, the supply system in England and Wales was completely privatized, i.e. including the pipe system, for the first 25 years. With this system the Thatcher government achieved higher returns and diminished the municipalities' right to have a voice in the matter – different from the French concession model. Altogether, the water industry

was estimated to be of a value of 35 billion Pounds but, eventually, sold for 5.23 billion Pounds (Stadler/Hoering 2003: 98). Some of the British companies were bought by the leading French water companies, others by German energy corporations. Northumbrian Water, for example, now belongs to Suez (www.suez.com/metiers/english/environnement/index.php). The largest British company, Thames Water, was taken over by RWE in 2000 and sold to a consortia led by the Australian Macquarie Banc for 7.1 billion euro (and debts of 4.7 billion euro) in 2006 (Hildebrand 2006: 11). At the same time, both British companies operated on an international scale and invested themselves around the world (Stadler/Hoering 2003: 106).

The British water providers still have exclusive rights for the core business of water supply and sanitation (sometimes only water supply) in their areas. They are still controlled by independent state authorities (Stadler/Hoering 2003: 100). The economic control is carried out by the Office for Water Services (OFWAT). It should guarantee that investments are made while companies make benefits. Every five years, an upper limit for tariffs is set, following a yardstick competition (Stadler/Hoering 2003: 100).

Another relevant state authority is the Environment Agency (EA) which carries out ecological regulation in England. It is responsible for the protection and improvement of the basins' conditions according to the EU Water Framework Directive. Reports are published on regular bases, in which companies are named that have violated laws and norms within the industry (Stadler/Hoering 2003: 101). In 2000, the highest fines had to be paid by Thames Water (when still subsidiary of RWE), 288.000 Pounds due to infringing environmental legislation (Stadler/Hoering 2003: 106). In addition to the EA which controls compliance for general environmental regulations, the Drinking Water Inspectorate (DWI) is responsible for drinking water specifically. Water operators must prepare additional reports on this issue, and authorities keep checks. The DWI informs the public and can demand technical measures from the companies if British or EU norms are not fulfilled (Stadler/Hoering 2003: 101f.).

After the privatization in the water sector, U.K. water tariffs increased by 50 % in the 1990s but externalities such as ecological and social costs have not been included. Thus, poorer households could often not afford water supply anymore (Stadler/Hoering 2003: 104). In 1991, altogether 23.670 private connections were cut, resulting in hygiene and health

problems. Since the New Labour government came into power in 1998 such cuts-offs have been banned (Stadler/Hoering 2003: 104).

Also supply for the general public was not always guaranteed. In the summer of 1995 when bad droughts hit England and Wales, over 1000 trucks were used temporarily to supply freshwater to people in West Yorkshire. Despite agreements with OFWAT, private providers had failed to repair pipes and more than a third of the scarce water was lost (Stadler/Hoering 2003: 108). The private companies were highly criticized. The biggest company, Thames Water, has therefore decided to publish reports on water losses and progress made in an effort to reassure their willingness for improvement (www.thameswater.co.uk/UK/region/en_gb/content/Section_Homepages/Multi_Download_000800.jsp?SECT=Multi_Download_000555).

In conclusion, England is clear in its consequent privatization (including the pipe system) and market liberalization. In consequence, “pure” British water companies do not exist anymore. The two biggest operators, which are also crucial global players, are Thames Water and Northumbrian Water. They have belonged to multinational corporations, RWE and Suez, or now to the consortia lead by the Australian Macquarie Banc.

2.3. Water Governance in Germany

The German water sector is first of all characterized by decentralized management and infrastructure. The German market for water supply and sanitation, with a volume of 17 billion euros, is the strongest in Europe (Enquete-Kommission 2001). A million private end customers relate to 88 water operators on average – compared to two in England and Wales. In France, one operator even serves 7 million inhabitants (BMWA 2004: 24). There are only a few big and many small operators in Germany (Dalkmann et al. 2004: 58). The 140 biggest companies discharge over 50 % while the 3.500 smallest operators only discharge 2.5 % of total water volume (Dalkmann et al. 2004: 58).

The political and economic structures of the German water market result from the institutional setting. Water services are the autonomous subject of municipalities. Only municipalities are allowed to give permission for water use and connection. Municipalities are allowed to protect the service area against other providers what is an exemption from the Law Against

Restraints on Competition – the so called “locality principle” (Dalkmann et al. 2004: 59). Traditionally, water has therefore been managed publicly, and still, public management makes ca. 85 % compared to ca. 15 % private management in Germany (BMWA 2004: 25). A lack of competition is hence characteristic for the German water services. However, water technologies linked to these services are offered by private, mainly middle-size, enterprises (Wackenbauer 2007: 14, 20). Also, there are small to middle-size companies offering consultancy and planning. They mostly operate on a regional scale according to the municipalities’ responsibility for water (Wackenbauer 2007: 21).

Each municipality manages its resources within its own parish area. In rural and semi-urban areas, still, a crucial number of inhabitants are not connected to central assets (Dalkmann et al. 2004: 60). There are also still differences among former West and East Germany. For instance, in the federal state of Thuringia (East Germany) which has a rural structure with low population density, 36 % of sewage is not discharged by central infrastructure and treated adequately (Thüringer Landesanstalt für Umwelt und Geologie: www.tlug-jena.de/umweltdaten/umweltdaten2005/ub2005/wasser.htm, 05.07.2007).

The prognosis on investment needed in Germany differ and partly contradict each other, depending on numbers used and targets set, or on the line of argumentation used. In this way, the German Federal Ministry for Economics and Technology believes that the German water market is saturated and therefore recommends foreign investment to German enterprises (BMWA 2005: 98). To the contrary, the potential high need for investment in Germany, especially in the sewage system, is altogether over 150 to 250 billion euro in Germany within the next 15-20 years (Tauchmann et al. 2006: 17), a fact that has recently been cited as a reason for privatization and liberalization strategies. Municipal budgets would be stretched too far if water investment are financed publicly (Dalkmann 2004; Habermann et al. 2003).

Besides public financial deficits, high water tariffs in Germany are used as evidence for the need for stronger competition and the abolition of European market constraints (Wackenbauer 2007: 16). German consumers indeed pay very high water tariffs. On average German private consumers pay however only 0.4 % of their income for drinking water (Dalkmann et al. 2004: 60). But the water is also of good quality, and there is little loss of water because pipes are in good condition. In addition, monitoring and control mechanisms, fees for farmers who assign reservation areas and cooperation programs with organic farming are included in the costs

(Dalkmann et al. 2004: 64). The Berliner Wasserbetriebe, for example, use cleaned sewage water in order to stabilize the regional eco-system and preserve natural fens (Feddersen 2007: 105).

Stronger liberalization and enforcement market mechanisms in Germany, including the polluter pays principle, are likely to result in the externalization of costs such as fees for assigned reservation areas. However, if water services are provided privately, it cannot be assumed, that this results in decreased tariffs, but rather in higher benefits for private shareholders. Also, the market will probably be more centralized; a trend towards more centralized market structures is already observable, taking in consideration that Veolia now supplies already 450 municipalities and industrial enterprises in Germany (www.velolia.de).

The German sewage market, which was formerly considered an exclusive public task, has been partly opened to private operators with the amendment of the Federal Water Resource Act in 1996. Municipalities have now been allowed to delegate this task to third parties. However, the Federal Act has to be implemented before hand by each federal state (Dalkmann et al. 2004: 60).

While the monopolies have been formally kept, market for the market has established in recent years. Not only big water operators such as Berliner Wasserbetriebe and Rhenish-Westphalian Wasserwerke, serving 3.5 and 1 million customers, relatively, have been fully or partly privatized. Also smaller cities such as Kassel, Frankfurt, Nuremberg, Duisburg and Hanover have merged their operators into private corporations (Musiolik 2006: 50, 88). The water operators have been bought by either the French market leaders or German energy or multi-utility corporations such as E.ON and RWE. For example, E.ON took over the water provision for the city of Lueneburg (www.eon.de); RWE holds shares in the Berlin and the Westphalian-Weser-Ems waterworks (www.rwe.com).

Private companies able to provide the whole supply chain, including the supply of private end customers, have not been generated in Germany due to the specific structures. This is different from France. German water operators do not achieve the critical size and financial power of global players (Wackenbauer 2007: 22). They are too small for adapting their products to different market needs and selling on a worldwide scale, and they lack experiences abroad (BMWA 2004: 15; Wackenbauer 2007: 22). German water business, developed locally, is hence not considered to be competitive at the global market in terms of

objectives, mode of operation as well as because of legal, financial and logistic restrictions (BMWA 2004: 21; Deckwirth 2004: 6).

In consequence the German government tries to directly support German water business, especially by providing export credits and securing risk (BMWA 2004: 13). Another instrument of support is public-private partnership (PPP) which aims for more coherence between the sectors of foreign economic and development policies (BFAI 2003; Deckwirth 2004: 16, 25; Stadler/Hoering 2003: 126). With investment guarantees provided by the Federal Ministry of Economics and Technology, for example, six water projects in Russia, China, Croatia and Albania have been secured with an over-all volume of 624 million euro (BMWA 2004). For the first time, in these projects, the so called “mayor’s risk” was applied, which means that costs are recovered even when they are due to a violation by the foreign municipality, and not only by the national government (BMWA 2004). This is especially crucial for water supply and sanitation which often rely in the hands of the local municipalities.

The German government cooperates not only with German water operators but, especially in the case of PPP, also with the French global market leaders. Examples are a project for sewage recycling in Windhoek/Namibia with an affiliate of Veolia, and a project for water supply in Dakar/Senegal where SAUR got a concession contract until 2006 (BFAI 2003: 10, 31, 122). German operators are not really at stake for this sort of project type due to their limited size and public ownership (BMWA 2004: 25).

When focusing on water operators and supply services, it is easy to lose sight of the fact that there are some German technology corporations such as Siemens, Linde und ThyssenKrupp which participate successfully in the global market for water technologies (BMWA 2004). Furthermore, German energy corporations have recently entered the water business. Thus RWE hold Thames Water, one of the biggest global water operators, from 2000 to 2006 (Hildebrand 2006: 11), and since 2003, RWE owns American Water, the biggest water operator in North America (www.amwater.com). In difference to the German water companies, the German energy giants have reached the ‘critical size’ of global players.

3.4. Water Governance in the U.S.

Besides corporations from EU, especially France and Germany, corporations from the U.S. are crucial global players in water business. U.S. enterprises are market leaders in the field of water and sewage technology with an export peak of 691 million euro from 2000 to 2003 and eventually 454 million euro in 2006 (Wackenbauer 2007: 19). This made the U.S. the first country in terms of total exports of assets and components, having a share of 20.3 % (Wackenbauer 2007: 20).

While water services in the United States have been characterized by public and decentralized structures, water technologies have always been offered by private enterprises here. Still, water supply is considered a job to be carried out by the municipalities. Since 1974 national drinking water standards have been in place and enforced by the Environmental Protection Agency (EPA), a federal authority, in cooperation with the states' governments (Safe Drinking Water Act). Those standards hold for 250 million consumers who are supplied by public systems in the U.S., they do not apply for private wells (ca. 50 million users) (www.epa.gov/ebtpages/water.html). Due to an increasing basin contamination and hence health risks, legislation (Safe Drinking Water Act, Clean Water Act) has continually been strengthened in the past and will probably still tighten in future (National Research Council 2002: 37).

Local governments and private providers are responsible for the quality of pipe water. There are controls by EPA and the states which can take legal action in case of non-compliance (www.epa.gov/ebtpages/water.html). Most assets are bought by urban authorities – even though up to 90 % of investment needed for sewage plants come from the federal government (National Research Council 2002: 36). Most assets in the U.S., especially the large ones, are under public ownership – even though the privatization wave of the 1990s' also hit North America (National Research Council 2002: 37). Within the international realm, the U.S. Agency for International Development (USAID) is the key player as it makes international investments in the water sector (www.usaid.gov/our_work/environment/water/water_investments.html) – often under the condition of delivery by U.S. enterprises only (BFAI 2005).

The U.S. water treatment industry is heterogeneous and mostly consists of small enterprises (BFAI 2006). Three big companies control however 40 % of the market – those are General Electric Water & Process Technologies, US Filter (Siemens) and Pall. Other enterprises are

crucial for certain market segments, for instance, in the field of active coal, well-known American firms are Calgon Carbon, Mead Westvaco and NORIT Americas (BFAI 2006). Like the U.K., the U.S. water market was targeted by French and German corporations. US Filter, one of the U.S. top enterprises, was bought, first, by the French market leader Vivendi/Veolia and, later, German Siemens (www.siemens.de). American Water, the biggest contractor for water supply and sanitation in North America, has been part of RWE since 2003 (www.amwater.com). Thus, USAID projects are strictly conditioned to U.S. delivery can indirectly support foreign enterprises as well (BFAI 2005). Foreign corporations can possibly also benefit from this rule through their U.S. subsidiaries, for example Siemens through US Filter. While markets have globalised, political structures still refer to nation-states. The U.S. and German government have started to consider how cooperation of European and U.S. enterprises can be improved in the field of eco-technology (Wirtschaftswoche 25.01.2007b).

2.5. Comparing Water Governance

We have seen that water supply and sanitation were originally organized locally in leading provider countries (see table 3). Even in France, home of the biggest water corporations, municipalities have been responsible for water supply (Stadler/Hoering 2003: 92). Structures that were previously highly fragmented, though, now have water operations that have been increasingly centralized and delegated to private enterprises. Only in England and Wales were structures intentionally centralized and privatized by the state (Stadler/Hoering 2003: 98).

Market concentration might be favorable in terms of economic efficiency but it is not necessarily favorable for integrated water resource management (Dalkmann et al. 2004: 64). For environmental reasons of resource protection, local structures are often more adaptable. If competition is limited, it is possible to internalize environmental costs, such as assignment of reservation areas, into water tariffs.

Less fragmented, more concentrated water operators are however a precondition for competitiveness in a liberalized global market (Schwenker 2006: 30; Wackenbauer 2007: 22). Empirically, this holds true for France as the pioneer country (Deckwirth 2004: 6). The French leasing or concession model has been diffused on a worldwide scale – whereby France

as lead market firstly introduced this model and made it visible (Jänicke 2005: 130; Dobner 2006). Market (and political) concentration and liberalization did not absolutely work as applied in England, where structures were actively decentralized. British enterprises Northumbrian Water and Thames Water are among the leading global players but they were bought by foreign corporations, likely because they were not yet large enough to compete (Hildebrand 2006: 11; www.suez.com/metiers/english/environnement/index.php). In practice, only French operators profit from the diffusion of the French concession model and PPP because of first-mover advantages – at the expense of other models which combine economic and ecological aspects.

3. Results and Conclusion

Water markets have truly globalised. There has been a trend towards the liberalization of local and national markets (Conca 2006; Dalkmann 2004). Water enterprises face stronger competition due to these new framework conditions. National governments such as those in Germany or France strive to support domestic business in this context. On the one hand, efforts are made to secure domestic market positions against foreign competitors. On the other hand, foreign markets are meant to be targeted by domestic business (BMWA 2005: 96; Wackenbauer 2007).

So what does a reasonable pioneer policy look like? What does ecological modernization mean to the water sector? Ecological modernization is about establishing win-win situations in which enterprises invest in cleaner technologies in order to be the first mover at emerging markets or market segments, and hence profit from first mover advantages while protecting environmental characteristics. Thus, first, technologies or eco-innovations which are worth supporting should be identified for the water sector. This is closely dependent on a greater understanding of the needs for and outcomes from sustainable water management, such as the reduction of water consumption and basin pollution

In Germany, water is of high quality and infrastructure is in good condition (few water losses), on the one hand, while on the other hand consumers pay relatively high prices (Dalkmann et al. 2004: 64). In order to diffuse German technology, the German government should therefore take an interest in worldwide promotion of high standards – not necessarily

focus on ways to reduce water prices. Similar conclusions can be drawn for the assignment of reservation areas and cooperation programs with organic farming (Dalkmann et al. 2004: 64). To the contrary, however, the German government's current strategy focuses too heavily on modeling the water sector after the French model and supporting innovation diffusion at the same time. Only large German energy or multi-utility corporations such as RWE und E.ON, which have entered into water business in recent years, are able to compete with the French. The largest German technology corporations (Siemens, Linde, and ThyssenKrupp) are present in the global water market. These corporations are increasingly depending on demands from few private (French) enterprises which take the place of public operators (Tauchmann et al. 2006: 29). In the future, there will be less demand for single technologies but for complete services (and technology) from consultancy and planning to asset construction and operation (BMWA 2005: 106), and complete services are currently only offered by the French market leaders.

The French concession model is applied and promoted on a worldwide scale, which gives the French clear first-mover advantages. In the case of PPP, the model aims to combine economic and development aspects. Water infrastructure is meant to be expanded (MDGs, JPoI) by mobilizing private capital, i.e. donor countries support private investment (of their domestic enterprises) in developing countries. Aspects of water quality and ecosystem protection are generally not considered in PPP bidding. Development departments should therefore not only work together more closely with economic but also environmental departments. Clear short- and middle-term targets can assist with generating the needed dynamics for industrial innovation in this process. They have proved to make sense in the field of renewable energy, and the same may prove to be true for water management. Targets for protecting water quality and quantity should be formulated and broadly communicated by pioneer countries. Moreover, reference projects (beacons) should be realized with public funding in systematic support of launching innovative technologies on the market. Such a coherence of domestic and foreign policies would bring higher credibility and better reputation for governments and business abroad. Foreign water policy should not only aim for a lead but indeed eco-pioneer role. This way, ecological modernization approaches can lead to a more sustainable water use.

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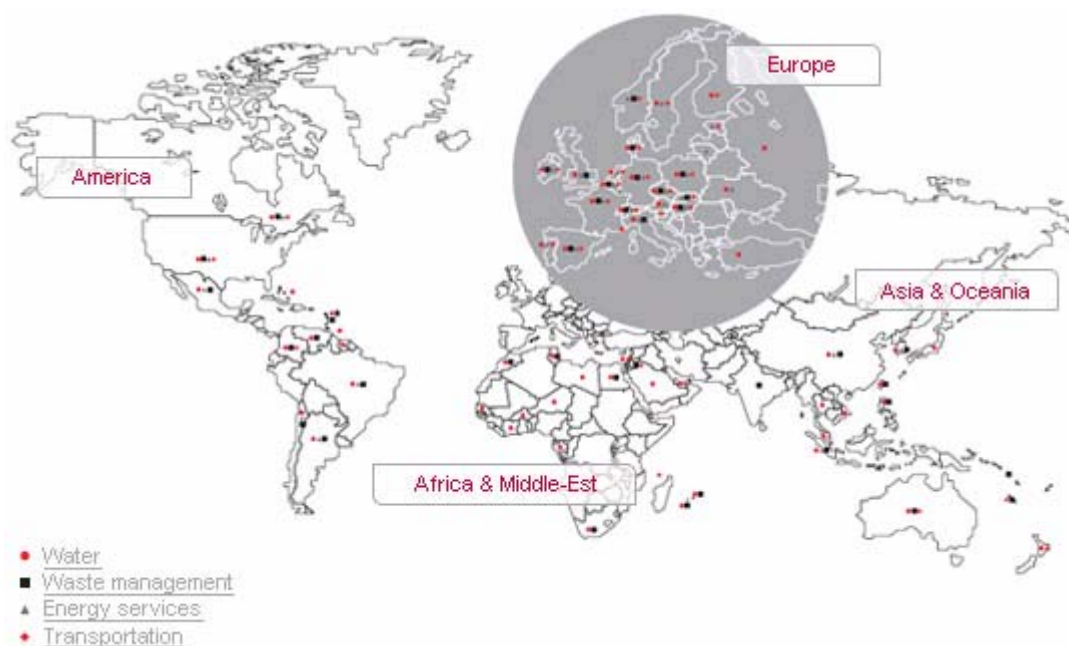
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Figure 1: UN Water Targets

UN Water Target	Monitoring
Halve the proportion of people without access to potable water and sanitation until 2015, including technology transfer	Millennium Development Goals Indicator 30, water supply http://mdgs.un.org/unsd/mdg/Metadata.aspx?IndicatorId=30 Indicator 31, sanitation: http://mdgs.un.org/unsd/mdg/Metadata.aspx?IndicatorId=31
Prepare plans for integrated water resource management and improved water efficiency in all countries (actually until 2005)	World Water Forum 2006: www.worldwatercouncil.org/index.php?id=1403&L=0

Figure 2: Veolia Environment subsidiaries worldwide

Veolia offers water services in 48 countries.

Source: www.veoliaenvironnement.com/en/group/locations, 05.02.2007.

Table 1: Market volume for environmental friendly technologies

Sector	Market volume 2005 (trillion EUR)
Energy efficiency	300
Mobility	250
Water business	200
Energy production	150
Green material/products (e.g. biofuels)	30
Waste management	20
Total	1.040

The market for environmentally friendly technologies is big.

Source: Schwenker 2006: 13.

Table 2: The biggest water corporations

Corporation	Turnover (billion EUR)	Turnover water sector (billion EUR)	Number of customers (million)	Global Fortune List
Suez-Ondeo	40,2	10,1	125	74
Vivendi-Veolia Water	30,8	11,3	108	42
RWE-Thames Water	46,6	2,9	70	82
Bouygues-SAUR	22,2	2,3	36	211

Three of the four biggest water corporation stem from France.

Data for 2003, source: Deckwirth 2004: 6 (after Fortune Magazine)

Table 3: Water Structures in the Lead Market Countries

Country/ Water Structure	France	England, Wales	Germany	United States
Start of privatization	19 th century	1989	1990s	1970s
Share of private operators	80 %	100 %	15 %	No number
Model for privatization	“French” concession model	Complete privatization, incl. infrastructure assets	“French” concession model	“French” concession model
Degree of political centralization	Very decentralized	Very centralized	Decentralized	Decentralized
Degree of economic centralization	Centralized	Centralized	Decentralized	Decentralized
Market leaders	Suez, Veolia and SAUR are market leaders	Thames Water and Northumbrian Water are market leaders (but owned by foreign corporations)	Siemens, ThyssenKrupp and Linde for water technologies; RWE for water supply	General Electric Water & Process Technologies, US Filter (Siemens) and Pall for technologies