The Institute of International and European Affairs

LIVING WITHIN **OUR MEANS**

WATER AND RESOURCE EFFICIENCY IN THE EU

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Water and Resource Efficiency in the EU

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*If we carry on using resources at the current rate, by 2050 we will need, on aggregate, the equivalent of more than two planets to sustain us, and the aspirations of many for a better quality of life will not be achieved.**

European Commission, Roadmap to a Resource Efficient Europe, 2011

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*http://ec.europa.eu/environment/resource_efficiency/pdf/com2011_571.pdf

1. INTRODUCTION

Over the past century we have tested the limits of many of the natural resources that sustain us. The global population has grown, but our consumption of resources has grown at much higher rates. During the 20th Century, water use increased by double the rate of population growth, and, if these rates continue, it is estimated that by 2030 demand for water globally could outstrip supply by over 40%.[1] As water cannot be created or destroyed, conserving supplies and using them more efficiently is now a global imperative.

Our current patterns of water use have developed in a context where, broadly speaking, the full costs of exploiting this vital natural resource were not borne by the users. The result is that our societies have become accustomed to – and our economies grown dependent on – practices which do not make efficient use of the resource. As a simple everyday example, most European households fill their toilets with water, which after being collected has been treated to a drinkable standard, then delivered on demand through a network of pipes, only to be flushed away through another pipe network to be treated once more before being returned to nature. Put in these terms, this seems ridiculously inefficient, and yet the challenge implied in changing this practice (e.g. to use recycled or "grey" water in all toilets instead) is equally daunting.

Water efficiency is a complex field with many such challenges, which in many cases are also opportunities for improvement. In a European context, it is receiving a great deal of attention as part of an overall strategy for resource-efficient growth.

This paper sets out the European policy context for water efficiency briefly before going on to explore a number of areas where the key challenges and opportunities lie. It first looks at the balance between efficiency and environmental limits. Second, it considers targets and indicators for water efficiency. Third, it looks at water pricing policy, discusses how to upgrade technology and reduce leakage. Fourth, it takes a sectoral perspective, looking at water efficiency in the industrial, energy and agricultural sectors, before finally drawing conclusions about whether resource efficiency is the right paradigm for delivering sustainable water use.

2. BACKGROUND AND POLICY CONTEXT

The European Union's core water policy is the Water Framework Directive (WFD), adopted in 2000.[2] Its primary concern is the quality of Europe's waters and it addresses efficient use of water only tangentially. However, by way of implementing the "polluter pays" principle, the Directive mandates pricing of water and the recovery of all costs of water services. These requirements are central to the resource efficiency agenda.

Water efficiency was dealt with directly in the European Commission's 2007 communication *Addressing the challenge of water scarcity and droughts in the European Union* and in its supporting study on *EU Water saving potential* by the Ecologic Institute. A review of this policy fed into the *Blueprint for Safeguarding Europe's Water Resources,* published at the end of 2012.

The EU has made the creation of a resource-efficient Europe a flagship initiative under its broader Europe 2020 growth strategy. *The Roadmap to a Resource-efficient Europe,* published in 2011, sets out the "path to resource-efficient growth", a framework for embedding resource

1 http://www.2030wrg.org/wp-content/uploads/2012/06/Charting_Our_Water_Future_Final.pdf

2 For frequently asked questions on EU water policy and its key legislative underpinnings, see http://www.iiea.com/blogosphere/water-in-europe-faqs

efficiency in the EU's long-term strategies on energy, climate change, research and innovation, industry, transport, agriculture, fisheries and environmental policy. The Roadmap sets out the vision for 2050 as follows:

> By 2050 the EU's economy has grown in a way that respects resource constraints and planetary boundaries, thus contributing to global economic transformation. Our economy is competitive, inclusive and provides a high standard of living with much lower environmental impacts. All resources are sustainably managed, from raw materials to energy, water, air, land and soil. Climate change milestones have been reached, while biodiversity and the ecosystem services it underpins have been protected, valued and substantially restored.

The specific policy proposals for water under the Roadmap are contained in the 2012 Blueprint. This document is a strategy for improving implementation of water policy including the WFD, increasing the integration of water policy with other relevant EU policies, and filling policy gaps, including in the area of water efficiency.

In respect of water efficiency, the Blueprint sets out a series of actions and measures to be taken by 2014, including:

- Implementation of pricing policies that incentivise efficient use of water, including greater adoption of water metering and full recovery of the costs of water services.
- Creation of water efficiency targets on a river basin level, for those river basins subject to water stress.
- Development of a voluntary EU Ecolabel for efficient water appliances and Green Public Procurement criteria.
- Inclusion of water-related products in the Eco-design Working Plan.
- Requiring improvements in irrigation efficiency as a pre-condition of funding under the reformed Common Agricultural Policy (CAP).
- Development of best practice guidance on leakage in water infrastructure.
- Development of guidance on water trading.

The implementation of water resource efficiency policy will be guided by the Resource Efficiency Platform, an advisory body with membership drawn from key stakeholder groups including EU institutions as well as Member States, regional governments, industry and civil society.[3] One of the first questions being considered by the group is what targets and indicators should be used to track progress on the resource efficiency agenda, informed by a public consultation undertaken in 2012.[4]

Against this background, the following section explores where the key challenges and opportunities lie in the sphere of water efficiency.

3. CHALLENGES AND OPPORTUNITIES FOR WATER EFFICIENCY

3.1 RESPECTING ENVIRONMENTAL LIMITS

Water efficiency can't be about simply doing more with less. There are hard environmental limits which must be respected if we are to protect natural

3 See http://ec.europa.eu/environment/resource_efficiency/re_platform/
4 http://ec.europa.eu/environment/resource_efficiency/targets_indicators/stakeholder_consultation/index_en.htm

systems, avoid biodiversity loss, and protect human health. For example, the policy of pricing water will drive efficient use of water but will not necessarily keep us within environmental limits if the economic benefits of consuming an unsustainable level of the resource exceed the economic costs. Increasing the efficiency of irrigation systems, for example, has been shown in some cases to have the effect of increasing the area under irrigation rather than reducing overall water use.[5]

As the European Environment Agency states in its 2012 report, *Towards efficient use of water resources in Europe:*

> Clearly, economic production cannot be sustained if it implies excessive water use and burdens natural systems. Future economic growth must therefore be decoupled from environmental impacts. And this process of decoupling requires a dual focus: on resource-efficiency innovations and instruments, and on environmental sustainability boundaries.[6]

"Decoupling" might not be the right word here. All of our best efforts to increase the productivity of the water we use will not create a truly decoupled scenario, where we can continue to increase the quantities of food and other products we consume while placing no extra stress on water resources. Water efficiency then must be understood not as a goal in itself, but as one of the opportunities available to bring our use of water back within sustainable limits. In the case of water, these limits are encountered at a local (river basin) level as well as at the global level. The Blueprint proposes to implement a system of water accounts to inform those responsible for river basin management of the ecological and human-induced flows of water in their basins. It also proposes that water efficiency targets should be set at the level of river basins – this allows for more ambitious targets to be set depending on the risk of water stress.

3.2 AIMING FOR THE RIGHT TARGETS

To set the right targets and track progress against them the right indicators must be chosen and measured. This is particularly challenging in the case of water, where most of the indicators used or in development are acknowledged to be imperfect to a greater or lesser extent.

As mentioned above, one of the first tasks for the EU's overall resource efficiency agenda is to choose an appropriate set of indicators. The Commission is proposing as lead indicator the ratio of GDP to Direct Material Consumption, backed up by a "dashboard" of indicators on water, land use and carbon.[7] For water, the main indicator is the Water Exploitation Index (WEI), a metric developed by the Commission with the European Environment Agency. The WEI measures the total freshwater abstracted annually as a percentage of total available freshwater resources. It is acknowledged by the EEA as an imperfect indicator providing only a broad picture of water use at a national level and only in some cases at river basin level. We cannot tell by reference to the WEI alone whether the water use of any country or region is damaging ecosystems or contributing to water

5 Candela L., Dominga F., Berbel J. and Alarcon J. J. (2008), An overview of the main water conflicts in Spain: Proposals for problemsolving. Available at http://ressources.ciheam.org/om/pdf/a83/00800935.pdf

6 EEA (2012), Towards Efficient Use of Water Resources in Europe. Available at http://www.eea.europa.eu/publications/towards-efficient-use-of-water

7 See http://ec.europa.eu/environment/resource_efficiency/targets_indicators/roadmap/index_en.htm

scarcity, however it can indirectly suggest where such risks might arise. The EEA is working with Member States to produce more finely grained data which will enhance the usefulness of the indicator.

A fundamental question is whether we should be tracking water efficiency on the basis of water directly used within the EU, or in terms of the total demand for water embodied in all of the products we consume. There is a contradiction in striving for efficient use of water within Europe while taking no account of how our consumption patterns drive water inefficiencies elsewhere in the world. Increasing the cost of water in Europe implies higher prices for water intensive products such as food, but we can avail of the cheaper water prices elsewhere in the world simply by importing their food, as we currently do in large quantities. Our diets and way of life create demand for products that are water intensive.[8] Importing these products allows us to displace this intense water use to other countries, without any regard for whether this places stress on water supplies in these countries.

The Blueprint does mention this global perspective but there's no doubt that the strategy is squarely based on water savings within Europe. None of the substantive policy measures will have any impact on water use in countries from which we import agricultural and other products.

There is a parallel here with the issue of climate change targets, and whether they should be based on emissions associated with production or consumption. However we should be careful not to draw a false equivalence: in climate terms, the atmosphere doesn't care where in the world emissions reductions are achieved whereas the environmental benefits of water efficiency vary depending on the catchment area.

The "water footprint" concept, pioneered by Arjen Hoekstra of the University of Twente in the Netherlands, is an emerging methodology for quantifying the total water inputs of various categories that go into producing the food and other products we consume. By assessing the water footprint of traded products, we can develop a picture of the flows of "virtual water" – a global trade in water *use* embodied in physical products rather than trade in water itself.

The water footprint works well as an indicator to reveal resource inefficient practices. It also helps to make the link between consumption and resource use – it's all very well to seek more efficient production but if the products we consume are intrinsically water intensive then altering consumption patterns must be part of the effort to stay within environmental limits.

The water footprint of a product measures water consumption and pollution in litres per unit of product. It thus measures resource use intensity. It does not measure local environmental impacts of water use, like reduced biodiversity or increased local competition or conflict over water. Neither does it measure the costs of changing practices to use less water. For this reason, the water footprint needs to be complemented with other measures to track progress on the water efficiency agenda. Put in the proper context, the water footprint may ultimately prove to be a powerful tool for managing our water use within sustainable levels.

8 See Vanham, D., Mekonnen, M. M., Hoekstra, A. Y. (2013), "The water footprint of the EU for different diets," Ecological Indicators, Vol. 32. Available at: http://www.sciencedirect.com/science/article/pii/S1470160X13000940

3.3 SETTING THE PRICE AND RECOVERING COSTS

That free or cheap water ends up being wasted is no surprise. This does not mean, however, that setting an appropriate price for water is a simple matter.

The Blueprint reaffirms the WFD principles of water pricing and cost recovery. Further, it reiterates the Commission's position that cost-recovery must not be interpreted narrowly by Member States, but must include the full economic, environmental and resources costs of all water services. The Commission has launched enforcement action against nine Member States which it says are interpreting cost recovery too narrowly. For example, Germany has taken the view that only the costs of supplying drinking water and disposing of wastewater need be recovered in its pricing policy. However, the Commission's view is that it should recover the cost of all water services. This would include, for example, hydropower generation, water abstraction for industrial cooling and agricultural irrigation. The Commission's action is aimed at establishing a uniform definition of cost recovery as envisaged in the WFD.

Even if the Commission is successful, the result won't necessarily clear up the question of how and to what extent to include environmental and resource costs in the overall cost calculation. This is likely to remain a difficult and contested question. A Centre for European Policy Studies (CEPS) taskforce, set up under the patronage of the President of the European Parliament Water Group, Richard Seeber MEP, identified the need to come to conclusions on these methodological questions as an important starting point to the design of pricing policies.[9]

Pricing and cost recovery are not just about creating incentives to reduce water use, but also to finance necessary investment in water services. Recovery of capital and operational costs provides the basis for investment in many necessary efficiency actions, particularly the repair of leaking pipes, but recovering environmental and resource costs opens up the prospect of financing broader measures such as payment for eco-system services, wetland restoration and installation of water re-use systems.

However, as the CEPS taskforce report also points out, "Full-cost recovery of investments in public infrastructure through price may prove to be socially untenable or even economically not viable, in particular in poorer regions of the EU." The report suggests that cost-recovery need not be achieved entirely through pricing, but that transfers from local, national or European budgets can form part of the cost-recovery calculation, "to acknowledge the public good character of some water-related services." This pragmatic approach allows pricing policies to be set with the necessary flexibility to take into account all social, economic and resource-efficiency considerations, while ensuring that the essential water services are not being run down through lack of investment.

Whichever models are adopted, the net impact of recovery of a wider range of costs through pricing will be to increase the cost of water to consumers and businesses. As we have seen in other areas including carbon, there is a strong tendency towards backlash where consumers perceive that they are paying more than necessary due to environmental concerns. Pricing policies should be accompanied by appropriate campaigns to increase awareness of the need to conserve water resources.

9 CEPS (2012), Which economic model for a water-efficient Europe? Available at http://www.ceps.eu/book/which-economic-model-water-efficient-europe

3.4 UPGRADING TECHNOLOGY

When we run up against environmental limits, hope is always held out that human ingenuity will somehow produce a technological fix that will allow us to continue on more or less as before. In the case of water it is not a question of scanning the horizon for high-tech breakthroughs, but figuring out how to promote adoption of the many water-saving technologies and techniques that already exist.

In homes, offices and public buildings dramatic reductions in water demand can be achieved by the installation of modern water-saving technologies and devices. The potential for water savings in the domestic sector through the adoption of water efficient devices and appliances was assessed in the Ecologic Institute report *EU Water saving potential in 2007*[10] and the policy options for saving water in buildings were considered in some detail in the BIO Intelligence Service report for the European Commission, *Water Performance of Buildings (2012).*[11] The Ecologic Institute found that improving the technological performance of household devices, including toilets, showers, washing machines and dishwashers, had water saving potential of up to 25%. Case studies of rainwater harvesting showed possible savings ranging from 30-80%, and a domestic wastewater re-use scheme in Australia was shown to have reduced demand for drinking water by 3%.

The Blueprint's vision for encouraging the take-up of such technologies is the labelling of water products according to their water efficiency, on a voluntary basis. The idea is that existing appliances will be replaced over time with more efficient versions, as consumers will naturally want to reduce their water demand, particularly where pricing and metering are in place. However, the experience of encouraging householders to adopt energy-efficient appliances and building techniques demonstrates that, even with a defined pay-off in reduced utility bills over a number of years, consumers can be reluctant to increase their up-front investment. Although water saving devices pay off relatively quickly, it cannot be taken for granted that labelling alone will drive the widespread adoption of these technologies. Of course Member States are free to take more directive action, for example mandating the use of such devices in national building codes – in 2008 Ireland made dual-flush toilets mandatory in all new installations as a requirement of its building regulations.[12]

It is important to link the availability of water saving devices with the issue of pricing policy discussed above. Obviously in cases where water is priced on a metered basis, water saving devices should be attractive for their cost-saving potential. However, in cases where prices are being introduced or increased to drive greater efficiency, it is helpful from a public acceptance point of view to ensure consumers have ready access to methods to reduce their water bills. Using a portion of the increased revenue to subsidise water saving works or devices is one option, as is providing such services and products on a "pay as you save" basis whereby the water provider meets the upfront cost and claws it back in instalments on the customer's water bill. The issues are similar to those encountered in energy efficiency, and there is a great deal to be learned from experience in this area.

10 Dworak, T., Burlund, M., Laaswer, C. et al (2007), EU water saving potential, report for the European Commission. Available at: http://www.ecologic.eu/2175

11 BIO Intelligence Service (2012), Water Performance of Buildings, report for the European Commission, DG Environment

12 See http://www.build.ie/construction_news.asp?newsid=81081

3.5 REDUCING LEAKAGE

Leakage is a feature of all water delivery systems, although the rates of water lost through leakage vary widely – from 7% to 50% by some estimates. Finding and repairing leaks on a large scale is an expensive and complex undertaking, leading water suppliers to ask the question, what is a sustainable level of leakage, taking into account both economic and environmental impacts?

The Blueprint recognises that leakage is something which must be tackled by water suppliers in Member States on a case-by-case basis, taking account of local conditions, including social, environmental and economic costs. It proposes only to work with the water industry to develop and spread best practices in this area, particularly in the assessment of what level of leakage can be tolerated.

The UK's water regulator, OFWAT, has led the way in developing methodologies for assessing the "sustainable economic level of leakage" (SELL).[13] "Economic level of leakage" (ELL) refers to the point at which it becomes more costly to repair leaks than to tolerate loss of supply within the system. SELL adds sustainability to this calculation by including the social and environmental costs and benefits associated with leakage and its reduction.

One of the key questions in assessing SELL is putting a cost on the environmental externalities associated with leakage. In the UK, the regulator recommended that the Environment Agency develop and provide estimates of the environmental benefits of leakage reduction on a catchment basis. These fine-grained data will be required for river basins across Europe if SELL is to be more widely adopted. Although the Commission and/or the EEA are unlikely to take on this task on a Europe-wide basis, clear guidance will have to be provided to national or local authorities on how such data should be gathered and calculations made.

Water suppliers need a simple toolkit to assess SELL, backed up by credible data on social and environmental costs. They must also expect the SELL to reduce over time, as water supplies come under greater stress and water prices increase. Although action on leakage will ultimately be taken at local level, there is a role for the EU in providing both the technical guidance and leadership necessary.

13 See http://www.ofwat.gov.uk/sustainability/waterresources/leakage/

4. SECTORAL PERSPECTIVES

4.1 UNDERSTANDING THE DRIVERS FOR THE INDUSTRIAL SECTOR

All productive sectors require water and industry, with its cycles of capital investment and continuous process improvement, should be a key agent of water efficiency. Appropriate pricing policies can clearly promote efficiency across all sectors, but on their own may not be sufficient to get the maximum possible improvements. It's important to understand the other drivers which can influence businesses to invest in more efficient processes and reduce the overall water footprint of their products.

In the box below, one example of a company engaged in efforts to improve water efficiency is discussed:

WATER EFFICIENCY IMPROVEMENTS BY DIAGEO IN IRELAND

For the beverage industry, water is an essential ingredient as well as a key input into industrial processes. For this reason, this sector has been sensitive to water management and conservation issues. The leading global beverage companies participate in an environmental stewardship programme, which benchmarks the water use embedded in their products.[14]

Diageo is the global drinks group that produces spirits, beers and wines including the Guinness, Baileys and Bushmills brands. Environmental stewardship and sustainability is a key element of the group's public narrative, which has led to the adoption of carbon and water efficiency targets.

Globally, Diageo has set a target of improving its water efficiency by 30% in the period 2007 to 2015. In Ireland, a 17% improvement has already been achieved, saving 1.3 billion litres of water. During 2012 the company achieved 260 million litres of saving through leak repair and optimisation of its cleaning processes.

A new brewhouse under development at the iconic St James's Gate site in Dublin will achieve greater efficiency while increasing production. Efficiency gains were aggressively sought during the design process for the plant, applying energy efficiency methodologies to improve water efficiency.

Cost efficiency is not the only driver of these efforts. Companies producing consumer goods, like Diageo, will be concerned with the effect environmental stewardship has on brand value. Large water users will act on concerns about security of supply, and companies who operate in water stressed markets will want to improve efficiency in order to safeguard the potential for further growth in these markets.

Every industry sector is different, and will respond to different drivers to optimise its water efficiency. Ultimately businesses exist to generate profits, and many companies will still perceive action on sustainability as a negative in terms of profit growth.[15] However understanding what drives existing action in various industry sectors is an important first step.

14 http://bieroundtable.com/index.htm

15 A Carbon Trust survey of 475 senior business executives undertaken in 2012 found that 47% of respondents believed that acting on sustainability issues such as water scarcity would decrease profits. http://www.carbontrust.com/news/2013/03/why-business-needs-to-wake-up-to-water-waste

4.2 MONITORING CHANGING WATER USE IN THE ENERGY SECTOR

Energy is already the largest user of water, with water abstracted for cooling in energy production accounting for 44% of total water abstraction in Europe. The energy sector is subject to huge change over the coming decades, in response to climate change as well as the need for renewal, and the water impact of these changes needs to be monitored. There may be additional energy-related pressures in the future, for example if the use of pumped storage increases as a means of balancing supply from renewable energy sources. Taken in aggregate, the National Renewable Energy Action Plans (NREAPs) drawn up by Member States under the Renewable Energy Directive include a doubling of pumped storage capacity from 2005 to 2020, as well as many thousands of new hydropower schemes, mostly on a small scale (10 MW or less).[16] Additionally, hydraulic fracturing (fracking) for shale gas is much more water-intensive than traditional drilling techniques. Although it is still doubtful if this technique will become a significant feature of fossil fuel exploration in Europe, careful attention will have to be paid to the water impact.

4.3 INTEGRATING WATER EFFICIENCY IN THE AGRICULTURAL SECTOR

Agriculture is the second biggest user of water after the energy sector, accounting for 24% of water abstraction in Europe, only a third of which is returned to nature. In some southern Member States, agriculture accounts for 80% of water abstraction.

The Blueprint's objective of reducing water use in agriculture through the Rural Development Programme (RDP) faces a stiff challenge in the ongoing negotiations on the reform of the Common Agricultural Policy. The Commission's proposals for a reformed RDP include a stipulation that irrigation projects would only be eligible for funding if they lead to at least a 25% reduction in previous water use. In adopting its negotiating position on the package, The European Parliament's Agriculture Committee voted to remove this condition entirely, stating only that new irrigation investments must comply with the environmental objectives of the relevant river basin management plan.[17] For its part, the Agriculture Council has adopted a position which would soften the 25% requirement to "between 10% and 25% according to the technical parameters of the existing installation or infrastructure" but would include several other conditions including a requirement for metering of water use and additional restrictions for water bodies with less than good status.[18]

While the Parliament's proposal fails entirely to integrate water efficiency in the RDP, either the Commission's or Council's wordings would represent an improvement on the current position. The latter weaves in useful linkages with the status of water bodies under the WFD but represents a much lower level of ambition to the Commission's original proposal – in practice a "minimum of between 10% and 25%" water savings is a minimum of 10%.

16 EEA (2012)
17 http://www.europarl.europa.eu/meetdocs/2009_2014/documents/agri/am/921/921535/921535en.pdf
18 http://register.consilium.europa.eu/pdf/en/13/st07/st07303.en13.pdf

5. CONCLUSION

Resource efficiency is an urgent necessity for both economic and environmental reasons. Some believe that the imperative to do more with less is what will drive the next long wave of innovation – what the Australian authors James Bradfield Moody and Bianca Nogrady call "The Sixth Wave".[19] As we have seen above, there are numerous opportunities for water savings which will need innovation and leadership to realise.

However, in the case of water, as with other essential resources, a vision of unchecked economic growth facilitated by ever-greater advances in efficiency does not accord with reality. While we have ample opportunity to use water efficiency measures within Europe to stabilise our own demand and prepare ourselves for future risks such as climate change, future growth is still subject to environmental limits which we cannot safely breach. Neither can we continue to "outsource" unsustainable water use by importing virtual water embodied in food and other products. In addition to water efficiency, the overall effort to achieve sustainable water use must include much more difficult issues such as land use and consumption patterns. For all its complexity, water efficiency may just be the "low-hanging fruit" of sustainable water use.

19 See http://sixthwave.org

www.iiea.com/environmentnexus

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