The Contribution of Water Technology to Job Creation and Development of Enterprises

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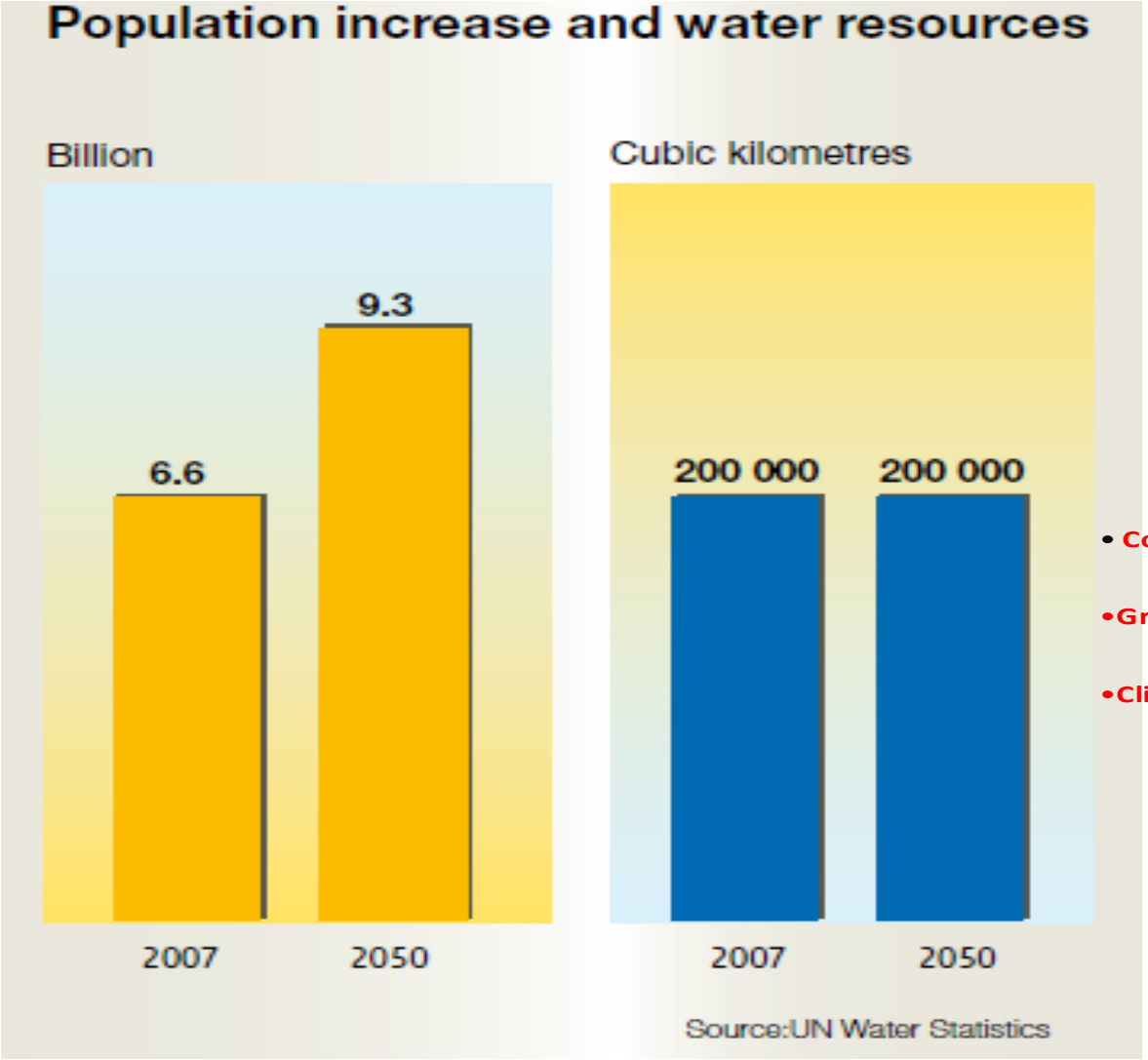
"Green technologies ... green growth ... new business opportunities, markets ... Jobs... can boost water and energy use efficiency ....Innovative water technologies ... increase the amount of water for drinking, agriculture, and manufacturing...

Technology development ...decreasing the (effective) water footprint through increased conservation, reuse and recycling, and greater efficiency in most water using sectors, particularly agriculture. This can enhance overall poverty reduction...

Research and development (R&D) and innovation are central to the green economy since they can reduce the costs of existing environmentally sustainable technologies and deliver the new technologies that are needed to advance efforts to cut emissions, reduce waste and increase resource efficiency. In both developed and developing economies, innovation plays a critical role ....”

Less Water for More People



- Contamination
- Ground sealing
- Climate change

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SICK WATER REPORT of UNEP and UN-HABITAT, 2010

Already, half of the world's population lives in cities, most of which have inadequate infrastructure and resources to address wastewater management in an efficient and sustainable way. ...

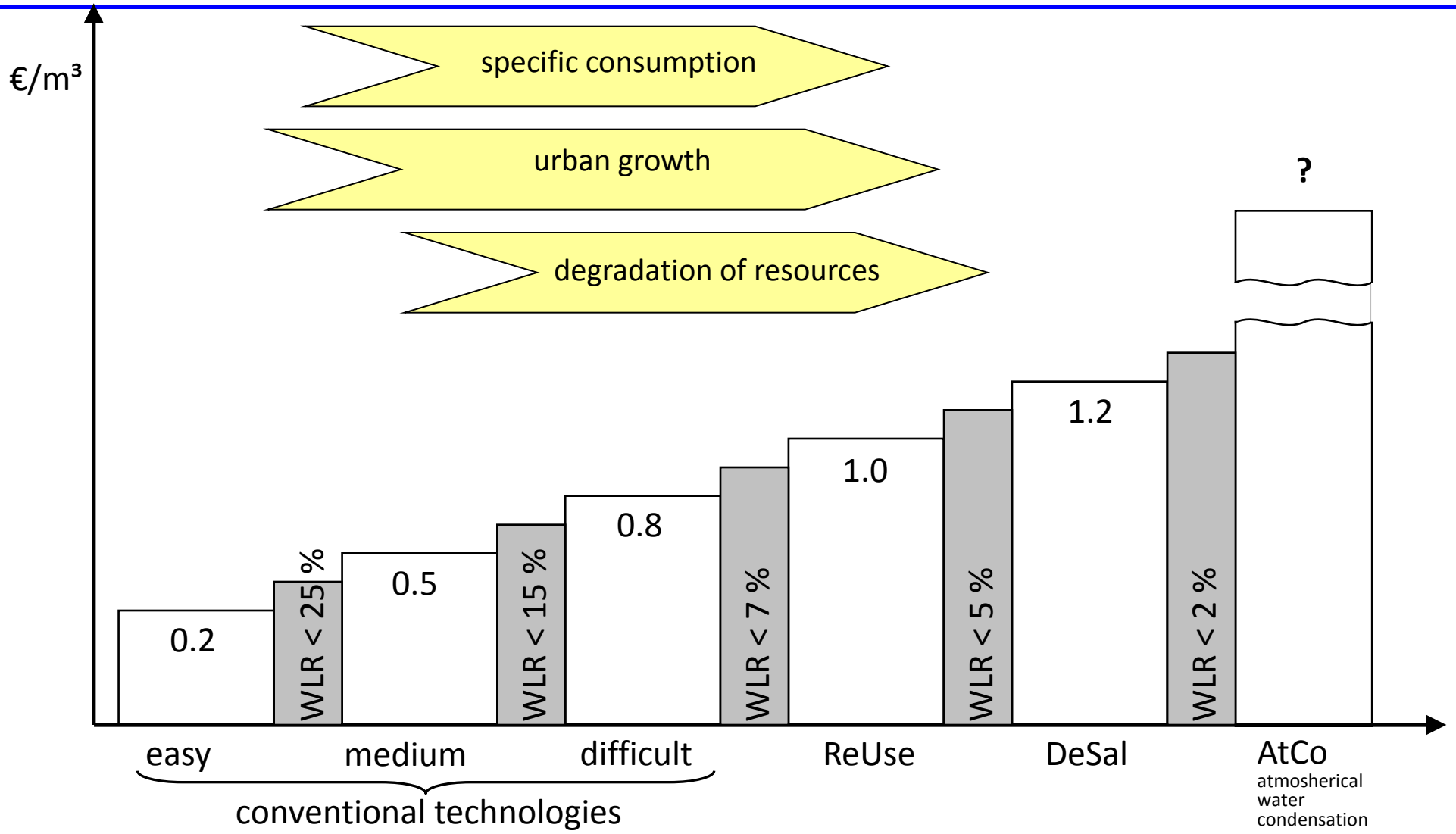
Without urgent action to better manage wastewater the situation is likely to get worse: By 2015, the coastal population is expected to reach approximately 1.6 billion people or over one fifth of the global total with close to five billion people becoming urban dwellers by 2030.
By 2050, the global population will exceed nine billion."

The Technological Challenges

Water supply is **a regional issue, with shortcoming depending on location and time** (season). This is a significant difference to energy supply, with problems not related or limited to regions, like the greenhouse gas emission.

The **need for improved technologies** to expand supply-water production, and to enhance water efficiency (the latter can be understood as driver of the green growth) is visualised in the following figure "Hierarchy of Water Production Costs".

WLR efforts must increase with Costs of SWP



The Technological Challenges

Besides water efficiency
(water saving technologies and water demand management, water loss reduction, water reuse, utilisation of unused water resources as with rainwater harvesting etc. etc.),
there are technologies contributing to a non-greentech growth
(seawater desalination, especially if oil- or coal- or gas-powered, or high-energy consuming water reuse technologies, like multi-stage membrane technologies with reverse osmosis).

However, even for those technologies, a **trend towards greentech** is happening (like for solar-powered desalination).

The Technological Challenges

Another issue is the improved comfort and welfare leading to water consumption in the "health and wellness sector" with a wide range from necessary medical application **to luxury application**, such as private pools and spa in arid and water scarce settlements.

This bears a "green image", but is often coming along with extensive water use, and can not be regarded as "green growth" element, at least not in water scarce locations and seasons.

The Technological Challenges

Overall, the **technical challenge in the water sector is pushing a multi-colour growth**, with strong elements of green-growth.

Depending on market prices and the political costs of raw water resources and environmental pollution through wastewater discharge the development will focus either on **GREEN** or **UNGREEN** growth.

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The Barriers

	Water Sector Specifics	Greentech as a "State-Guaranteed Market"
1.	The water sector (in the utmost of all countries) is state-guaranteed (especially wastewater, sanitation, which cannot survive without enforcement of environmental standards).	According to environmental standards set and (!) enforced by the state (e. g. wastewater treatment plants for natural water body protection), greentech can be profitable or not.
2.	The water sector (in utmost all countries) is state-regulated (the state defines, which standards, which rules, which organisational structures, which technologies are admitted to that market).	Wastewater treatment is seldom serving the final beneficiary (this would be the water consumer, not the municipal utility or so, asking for private technology providers, operational services etc.).
3.	The water sector is dominated by public entities (only 5 to 10 % of water services are provided by private industry, nearly 98 % of water resources worldwide are owned, governed by the public).	Water greentech is working mostly for public customers (municipalities, water associations, municipal companies).

	Water Sector Specifics	Greentech as a "State-Guaranteed Market"
4.	Due to the "natural monopoly" of network-bound infrastructural services (supply or disposal), there is no, little or limited competition.	Greentech providers have to obey public procurement procedures (in developing countries strongly influenced through donor banks).
5.	Water tariffs, wastewater charges are no "real" prices, due to the lack of competition under the economic balance of supply and demand.	Greentech provider is mostly a contractor in a service market fed through state-set "prices" (water and wastewater fees, solid waste charges, carbon credits, subsidies for regenerative energies ...)
6.	The need for better water services is not the same like the demand for better water services.	Wherever the public water utility does not fulfil the demand, customers which can afford, seek for other "inofficial" services.
7.	There is a great difference between customer-driven markets (CDM) and donor-dominated markets (DDM) (the latter existing especially in developing, emerging countries).	Greentech in DDM is pioneering, but in CDM it is usually more efficient and financially sustainable.

The Barriers

Furthermore, greentech is seldom a "stand-alone-business":

- Sometimes,environmental protection is the main purpose
  (e. g. a sewage sludge incineration plant)

- More often, environmental protection is one of several purposes of an investment
  (e. g. for a solid-waste-fed combined power plant)

- Very often, environmental protection is just a side-purpose of an investment
  (e. g. for energy- and valuables-recuperation from wastewaters).

Approaches to Deal with Green-Growth Potentials

The Importance of Success Stories

Taking the view and the needs in day-to-day operations of water utilities (which must take care of a reliable and safe, continuous water service and must try to avoid risks and experiments) and taking the situation of political decision-makers governing the water sector and local utilities (which want to be re-elected and tend to avoid to introduce promising technologies, solutions unless all related political risks are eliminated), it is obvious what the water sector needs:

Green growth must be explained, yes,
but much more valuable than general explanations are success stories from locations, situations, site-conditions, cultures, which seem comparable or transferable to the case under discussion.

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Approaches to Deal with Green-Growth Potentials

Considering exceptions

There may be some important exceptions, like
(1) biological water process technologies, as the activated sludge process, forest removal, algae production or no-dig-pipe rehabilitation with robot-driven underground machines - as well as
(2) the anaerobic process technology for biogas generation from organic waste. These technologies have been developed pre-dominantly in and for the water+sanitation sector, with a spill-over of inventions, technical progress to other sectors of industries.

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Approaches to Deal with Green-Growth Potentials

Learnt from other sectors

Envisaging this background, water technology researchers, project developers and project takers may be advised, in general, to have a closer look at other sectors of industry, technologically somehow higher developed than the water sector,
like e. g. (1) network construction and management for precious chemical gases,
like (2) the technological set-up of the supply change in automotive industry,
like monitoring and control systems in industry etc. etc.

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Approaches to Deal with Green-Growth Potentials

Choosing technologies

In the past, as long as water was not scarce and precious, it has been reasonable to apply low-tech plus low-cost technologies in the water sector, even when neglecting certain negative side effects like secondary contamination (such as emissions of volatile organic compounds from water plants) and like energy consumption (such as for robust pumps or aerators with limited efficiency, but easy maintenance and reliability, cost-efficient in times when power was cheap).

Nowadays, as the transition to greentech is needed and turns to become economically viable, there is a lot to do in the water sector.

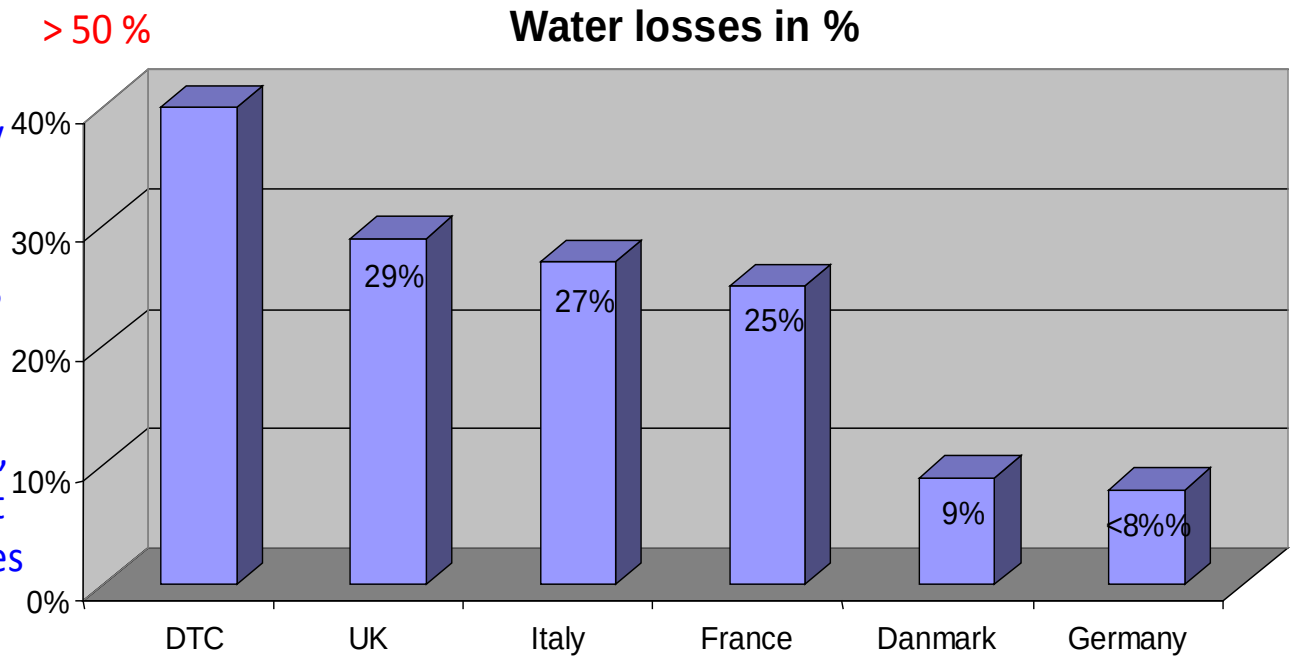
International Comparison of Water Losses

We're not short of water,

we're short of water management!

The UN Water Working Group on Water Efficiency has raised the issue of SURPLUS COSTS through poor Water Efficiency, exceeding direct productivity losses considerably.

often > 50 %



Theses from the Conference Board, exemplified

*International cooperation and local **collaboration on research and development** (e. g. through networks or clusters) contributes to developing, absorbing, adapting, nurturing and diffusing innovation and green technologies.*

One example, well known in the water and sanitation sector, is the progress with small scale biogas plant technologies for rural farm estates, delivering gas for cooking and heating. This could not have happened without research collaboration in process and tank construction technologies, including international as well as local players, and strongly supported through multi-lateral donors for implementation

Theses from the Conference Board, exemplified

The least developed countries' (LDCs) early stage of industrialization offers avenues for ***leapfrogging*** *and adopting technologies which offer greater energy and resource efficiency. They* ***can adopt latest state-of-the-art technologies****.*

One very important example is the advances analysis technology for metering water toxicity on-line, to locate harmful substances like pesticides, hormones, heavy metals and all kinds of non-degradable xenobiotics etc. Even though clearly high-tech and expensive, the analyser can bring enormous savings (a) for factory owners to detect and eliminate spill-overs of precious chemicals (like in factories producing or mixing chemicals for agriculture) and (b) for environmental monitoring, to eradicate hazardous pollution near-to- source.

Theses from the Conference Board, exemplified

*The experience with **information and communication technologies** is revealing of the capacity of poor countries and poor communities to achieve a jump in the technological development process“*

One good example, although under political controversy, is the development and implementation of computer based remote controlled pre-paid systems technologies, allowing water utilities to serve poor income zones, without having to provide water without revenues from tariff payment, and without powers to prevent excessive waste of water. Pre-payment systems allow to limit free water service to e.g. 6 kl per connection and month.

Lessons Learned from the Case Studies

1. Political governance and donor finance have been able to open up opportunities to unlock greentech development potentials
like through launching pilot projects for water loss reduction under a public-private partnership scheme, generating savings for the benefit of the utility which exceed the expenses (even though, due to low water tariffs, the utility has not yet reached the level of financial sustainability).

Lessons Learned from Case Studies

2. **Greentech developments have generated technologies**, which have proved to be strong enough and **tear down barriers and governance-deficits** well-known in the water sector .

One deficit is the huge gap between environmental law and the environmental situation, as can be found in many developing and emerging countries due to poor law enforcement.

Online monitoring of wastewater effluents, with real-time data transmission preventing manipulation in sampling and analysis data as a contribution to introduce transparency in an emerging country with poor law enforcement.

Or, decentralised technologies for water treatment, wastewater reuse, allowing for small-scale investment and development outside of fixed network structures, setting a strong benchmark in water and economic efficiency producing "virtual competition" to non-efficient utilities.

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General and Overall Conclusion - for Discussion

1. In this world, there is no lack of water (resources), there is a lack of water management.

(Once, the implemented level in water efficiency is equal to good technical practice, the utmost of regions suffering water scarcity will find themselves served, sufficiently; Donors: take **WLR efforts as pre-condition for financing** new water production facilities !).

2. Subsidised water tariffs suppress green growth

(From the author's view, it would be wise to **subsidise the poor, not the tariffs**).

3. Green business needs business structures.

(Develop **from charity to investment**, include **PSP options**, to unlock the managerial and financing potentials and serve the need for greentech-based water sector development).

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