

GENERAL INFORMATION

PETUS description of tool in use						
Name of the case	Water savings in Copenhagen.					
Name of the tool	Indicators on water consumption					
Country	Denmark					
City / region	Copenhagen					
Total area (km ²)	89 km ²					
Population	502.000					
Density (people/km ²)	5640 people/km ²					
Tool user's profile	<p>a. The water saving campaign was run by the municipal water supplier, Copenhagen Water (CW). CW is owned by the municipality. In 2001 it was merged with the municipal energy supplier, Copenhagen Energy (under the name of Copenhagen Energy)</p> <p>b. Water supplier for the Copenhagen Municipality, and elsewhere in the region.</p> <p>c. Københavns Energi, Vognmagergade 8, DK 1149 København K. Tlf.: 3395 3395 http://www.ke.dk/portal/page?_pageid=59.1&_dad=portal&_schema=PORTAL Contact: Jens Peter Brenøe</p>					
Reviewer, date	Jesper Ole Jensen, January 2005					
Short description of the case						
<p>The case study concerns the efforts for water savings in Copenhagen since 1989, where the average water consumption in households has been used as a main indicator. The water saving campaign included many different efforts: Information campaigns about water savings and the water cycle, promoting of water saving devices, providing consultancy on water saving for consumers, demonstrating alternative ways of using water locally, collaboration with intermediary actor groups and other initiatives). The average water consumption in the municipality (litres/person/day) was used as a primary measuring point to define goals, to monitor the process and evaluate the results. The water saving campaign was a major success; from 1989 to 1994 the average water consumption in Copenhagen was reduced by 18%, from 168 to 138 liters per person per day. Since that time, the progress has decreased, and the water consumption seems to have stagnated around 127 l/p/d. The initiatives for water savings have been reduced since Copenhagen Water was merged with Copenhagen Energy in 2001. Today, there is a wider range of possibilities to increase a sustainable water management in the region that need to be considered and assessed.</p>						
<p>The case was chosen, as the quantitative goals for water reductions had a central place in the Water planning for Copenhagen, and have been often referred to in local initiatives on water savings. The drivers for sustainable water management have been very strong in the Copenhagen Region, due to the physical and organisational context. The case is related to PETUS key problems "The water resource quality and availability", and "Sustainable management of water in cities"</p>						
Sector	Waste	Energy	Water	Transport	Green/blue	Building & Land Use
			X			
Scale of project	Component	Building	Neighbourhood	City	Region	
				x	(x)	
Status of project	Starting up	Ongoing	Finished	Start date	End date (exp.)	
		x				
Key words						
<i>water savings, water consumption, indicators</i>						
Project	<p>a. Object (building, city park, wind farm, etc.)</p> <p>b. Type of activity (regeneration, renovation, new development, etc.)</p> <p>c. Type of product (plan, scheme, design project, etc.)</p>					
	<p>a. To reduce water consumption</p> <p>b. Changing users attitudes and actions</p> <p>c. Campaign.</p>					
Tool	<p>a. Character (according to WP3final0704.doc)</p> <p>b. Benchmarks (qualitative or quantitative)</p>					
	<p>a. Indicators and monitoring / generic tool.</p> <p>b. Indicators were used and quantitative goals were defined. They were not related to "best practice", for instance from</p>					

c. Availability (paid/ free)	other cities or countries. c. Freely available (generic).
Decision-making process a. Stage of the tool implementation (preliminary, midterm, etc.) b. Level (political, technical, etc.) c. Public participation	a. The indicator is used in the preliminary, monitoring and evaluation phases. b. The indicator has been used to inform politicians, technicians and citizens. c. The public have been involved in the decision making process, as they were the primary target of the campaign.


DETAILED INFORMATION

A. Detailed description of project and tool	
1. Description of context (existing strategies, laws, policy, action plans, etc.): EU, national, regional, municipal	Water supply is regulated and influenced by a number of laws; the Act on water supply (national), Region plans (regional), Municipal plans (municipal). The strategy of the water supply and aims for sustainable water management is described in the Municipality's "Water Supply Plan". The water saving campaign has also been indirectly influenced by other regulation, especially the first "Action Plan on Nutrient Pollution of the Danish Aquatic Environment" from 1987, that caused the water prices to rise drastically (app. 300% from 1987 to 1992), as the costs for an improved sewage treatment were put on the water price. In Denmark, 99% of the water supply consists of groundwater.
2. Description of project a. Background (What caused the initiation of the project?; What was the problem? Who initiated the project?);	<p>In 1989 the water supplier Copenhagen Water (CW) started a water saving campaign. The water saving campaign came as a part of pressure for sustainable management, from different sides: groundwater resources are limited and still shrinking due to pollution (primarily pesticides and fertilisers). The effects from water extraction on nature are very visible and have direct consequences for other actors such as "users" of nature, e.g. farmers, fishers, citizens etc.. There is an annual extraction of 62 mill. m³ groundwater from the hinterlands (counties and municipalities surrounding Copenhagen). Although app. 2/3 of this water is used as supply to other municipalities, it is often regarded as Copenhagen's water consumption, and the environmental impact on local nature is therefore regarded mainly as a result of the water consumption in Copenhagen. Water consumption in Copenhagen, and Denmark, has always been restricted to local (regional) resources, as water import has been politically unwanted, so has purification of polluted water.</p> <p>A main part of the campaign was directed towards consumers, especially households who accounts for app. 2/3 of all water consumption in Copenhagen. Using the average water consumption (in litres/person/day) in Copenhagen as an indicator and as a way of making consumers aware of their own consumption, was a central part of the campaign. The campaign consisted of a number of initiatives, including:</p> <p>Campaigns and information Making the users aware of their consumption was created through campaigns, consisting of newspaper ads, streamers on busses and taxis, TV-spots, leaflets send to households, exhibitions etc. As an example, a large "Water-O-Meter" was established outside Copenhagen Water's headquarter,</p>

<p>b. Objectives/aims (sustainability statement – what issues of sustainability were attacked);</p>	<p>showing the present consumption of water in households, and the future goal for the consumption (see picture).</p> <p>Consultation Copenhagen Water offered consultation service to housing associations, industries, institutions and others, on how to reduce the water consumption, technical and behavioural. By surveying the water consumption in single estates, CW were also able to seek out blocks or districts where the consumption was significant larger than the average, and discuss it with owners and users, giving them advices on how to reduce consumption.</p> <p>Children Special efforts were directed towards schoolchildren, through campaigns and teaching on water and water savings. This later developed into an independent education-place and exhibition, where children can go on excursion (Vandværk-stedet).</p> <p>Pilot projects on water savings and urban ecology Pilot projects were conducted in selected buildings, where several different possibilities of reducing water consumption was explored, including leakage control, information, individual water meters etc. This revealed large potentials, as the consumption was often reduced by 25-40% in such cases. Another recent initiative has been to develop a PC-program for estimating the households average water consumption, so that households who haven't got individual meter can get an idea about how much they consume compared to the average of the city. This will placed on CE 's web-site. CW has also been involved in a number of projects on urban ecology, typically projects that tested methods for alternative water management, including collection and use of storm water (for toilets and washing machines), re-use of grey wastewater, local percolation of rainwater etc. However, their possibilities for promoting such projects have been limited.</p> <p>Co-operation with intermediaries Another type of initiatives included co-operation with "intermediaries", i.e. certain groups or organisations having certain possibilities to influence the households' consumption through their contact with them. This included meetings with the plumbers association the inform them about the technical possibilities to reduce water consumption, and about possible water loss in the households. Similarly, there was established a co-operation with home-helpers, who were supposed to look after possible water leakages in the households they visited (typically leaking taps or toilets), and report back to CW, who would contact a caretaker.</p> <p>b. The aim was to reduce the user's consumption of water. This is due to limited and shrinking groundwater resources, caused by pollution (pesticides, herbicides and fertilizers). Moreover, the effects from water catchment on the nature are very visible and have direct consequences for other actors ("users" of the nature, e.g. farmers, fishers, citizens etc.). Securing clean groundwater and reducing the water</p>
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<p>c. Time interval and stages of project realisation;</p> <p>d. Financing – amount, sources, institutions involved, partnerships, levels.</p> <p>e. Other sectors involved in the particular project/problem (conflicts and/or links)</p>	<p>consumption are related: As more and more sites are closed down, the water resource becomes more limited. And harder extraction of the remaining sources increases the pollution, as some pollutants are developed when they become oxidised (as a result of sinking groundwater level).</p> <p>c. The water saving campaign started in 1989, and has continued. However, since Copenhagen Water in 2001 was merged with Copenhagen Energy (under the name of Copenhagen Energy), and the main agenda has been the liberalisation of the energy market in Denmark, the efforts and budgets for water savings have become limited.</p> <p>d. The water saving campaign was financed by Copenhagen Water, and organised in a separate unit, “The water saving office”. In the 1990ies, the office employed 5 full-time persons. Today, the water saving unit employs 1½ persons. Since 2001, the water saving office organisationally, has become an independent unit in Copenhagen Energy, selling its services to other parts of CE.</p> <p>e. Aims for reducing water consumption is related to pollution of ground water (reduces available ground water resources), which is related to agriculture and land use, which Copenhagen Water traditionally has had little influence on.</p>
<p>3. Description of tool</p> <p>a. Character (according to WP3final0704.doc) - calculation tools, process tools, assessment methods, generic tools, simulation tools, guidelines, framework tools, schemes, indicators and monitoring, checklists, case-specific tools;</p> <p>b. Availability of the tool (web-based / paper, paid / free, etc.)</p> <p>c. Based on existing tool or newly elaborated;</p> <p>d. Adaptation of the tool to the local context (are there local experts involved in tool’s development?)</p> <p>e. Other tools implemented to support the project development</p>	<p>a. Indicators and monitoring / generic tool. Using an indicator as a part of a program or policy is a general tool, which does not require specific expertise. The indicator (on water consumption) was used to define a baseline, targets for the water savings, to monitor and assess the results of the campaign, and as a communication device towards consumers.</p> <p>b. Freely available / generic.</p> <p>c. Indicators is a generic tool. The indicators are being used to monitor the strategy for water savings, to set up goals for it, and to evaluate it.</p> <p>d. The Indicator was defined locally, by Copenhagen Water.</p> <p>e. Using the water consumption as an indicator was part of the water saving strategy. A number of other initiatives were included in the campaign.</p>
B. Tool implementation	
<p>1. Argumentation for choosing the tool</p> <p>a. What were the reasons for the implementation of the tool? (voluntary or requested by what local, national, etc regulation)</p> <p>b. Who took the initiative for choosing /elaboration the tool?</p> <p>c. What were the criteria for choosing the tool?</p> <p>d. Was there knowledge of other tools and were they considered?</p>	<p>a. There were different environmental and organisational pressures to reduce water consumption. The water saving campaign carried out by Copenhagen Water was not directed from any national or international regulation,</p> <p>b. The water saving campaign was run by the Copenhagen Water.</p> <p>c. The data on water consumption were accessible, and made sense as an indicator.</p> <p>d. No. Copenhagen Water have been interested in experiences from other municipalities on how to achieve water savings, but they have found no similar experiences</p>

<p>2. Barriers for the tool implementation What were the main problems in the tool implementation? (Regulation, information available, public awareness, lack of clear SD definitions and benchmarks, communication etc.)</p>	<p>or tools.</p> <p>There were no main problems related to the use of indicators. In general, however, it is difficult to regulate the water consumption as it is decided by a lot of different factors. As a regulator, Copenhagen Water can, through its initiatives, only influence a elements, for instance the habits of the consumers and leakages from water pipelines.</p> <p>Another problem is that relatively few households in Copenhagen have individual water meters, and therefore have no knowledge about their water consumption. For this reason, installation of water meters is being promoted. Another initiative is to develop a tool to assess the water consumption of a household, based on the consumers own information on water habits. This tool will enable consumers without water meters to get an idea about his or her water consumption, and compare it to the average consumption in the municipality, or the goals for the future consumption.</p>
<p>C. Influence of the tool on the decision-making process</p>	
<p>1. Description of the decision-making process/ procedures</p> <p>a. Stages b. Levels (political, technical, etc.) c. Sources of information used during the dmp;</p> <p>d. Who are the decision-makers? e. Who made the final decision for the project implementation? Was it political or technical decision?</p>	<p>a. The indicators were used in all stages of the decision making process (for instance monitoring and evaluating the success of the water saving campaign, defining goals for coming years, using benchmark on a local scale). b. The indicators were used at all levels (municipal and regional, political and technical). c. The water saving campaign and the goals were suggested by Copenhagen Water / Copenhagen Energy, and decided politically by the Municipality of Copenhagen. d. see above e. see above</p>
<p>2. Tool in decision-making process</p> <p>a. At what stage was the tool implemented? By whom? (experts, politicians, etc.)</p> <p>b. How did the tool output influence the process (added or skipped levels/stages in the existing decision-making process, etc.)?</p>	<p>a. The indicators were used in all stages of the process. b. The aim of the indicators was to influence different actors.</p> <p>The influence on <u>consumers</u> is very difficult to assess, as the indicator on water consumption was just one of many initiatives in the water saving campaign. Other possible reasons for a declining water consumption are:</p> <ul style="list-style-type: none"> • Consumption reflects the rising water prices, • Awareness on water savings amongst residents has spread, as a result of many years' campaigns, • More individual water meters installed, • Technological development of household technologies, making toilets, taps, dishwashers, washing-machines etc. more water-effective, and almost "standard-solutions". <p>The <u>internal influence in Copenhagen Water</u>: It is obvious that the goal for water consumption has been defined from what was regarded as politically realistic, and not from what was seen as a sustainable consumption level. When the fall in consumption started to fade in the middle of the 90's, it did not lead to more resources being invested in water saving initiatives. Instead the goal from 2001 was postponed to 2010. In this respect, using an indicator and defining a goal was not really enough to change the way things were decided.</p> <p><u>Influence on other actors.</u> The average consumption has</p>

<p>c. Quantitative goals or benchmarks defined? (If YES, which – and what were they compared to?)</p> <p>d. Was the tool used to support argumentations?</p>	<p>served as a signal to the municipalities and counties where groundwater is extracted, that people in Copenhagen really do what they can to save water. This reduces the environmental effects in the hinterlands, and is a good help for Copenhagen Water in the negotiations with counties on permissions for groundwater catchment. Copenhagen Water is totally dependent on permissions for water catchment from places in the surrounding counties. These permissions have to be negotiated with the counties each five to ten years.</p> <p>c. Benchmarks and goals were formulated during the campaign. In 1994 the goal was to reduce the consumption to 110 litres/person/day in 2001. In 2001 the goal was re-formulated to 120 l/p/d in 2005 and 110 l/p/d in 2010 (see figure 2).</p> <p>d. The indicators for water consumption strongly supported the success of the water saving campaign.</p>
<p>3. Transparency of decision-making process</p> <p>a. How was the information of the dmp disseminated? - directly (decision makers – public) or indirectly (decision makers - NGO, PR company, etc. - public); sources of dissemination used (mass media, internet, brochure, etc.)</p> <p>b. How was the public involved?</p> <p>c. Was there a public discussion over the project and at what stage of the project development?</p>	<p>a. Information has been disseminated through a mixture of direct and indirect information; mainly, information about water savings was disseminated broadly using brochures, newspaper articles, TV-spots, activities for children and other. Also, some groups have been contacted directly, for instanced consumer groups, housing estates or neighborhoods with a high consumption.</p>  <p>Figure 1. As a part of the campaign, this "Water-O-meter" was placed outside Copenhagen Water's headquarter. The tubes illustrates how the water consumption in Copenhagen has developed, and what the goals is.</p> <p>b. The public was the target of the campaign, and was involved through information efforts, rising water bills, technical possibilities to reduce water consumption etc..</p> <p>c. The water saving campaign managed to create big public awareness about water consumption and sustainable water management. This included all stages.</p>
<p>D. Expert assessment/analysis/comment of the tool effectiveness</p>	
<p>1. Assessment by tool users</p> <p>a. Were there measurable improvements as a result of the tool implementation? If YES, what? If no: why not?</p>	<p>a. Yes. From 1989 to 1994 the average water consumption in Copenhagen was reduced by 18%, from 168 to 138 litres per person per day. This was not only due to using the indicators and the campaign – also the raising price on water had a main impact. Based on the current success, a goal for water consumption in 2001 of 110 liters/person/day was formulated as a part of the Water Supply Plan in 1994. This was basically a projection of the development from the former 5 years. Right after the plan was accepted, however, the fall in consumption started to decrease. In the following years the consumption only fell by 7 liters, to 131 l/p/d, whereas in the first five years it fell with 30 l/p/d. In 2001, when the Water Supply Plan from 1994 had to be revised, it was clear that the goal of 110 l/p/d in 2001 could not be reached, as the average consumption was 127 l/p/d, or 15% above the goal. In the revised plan it was therefore decided to postpone this goal on 110 liters to for 2010, and insert a</p>

goal on 120 l/p/d in 2005 (see figure below).

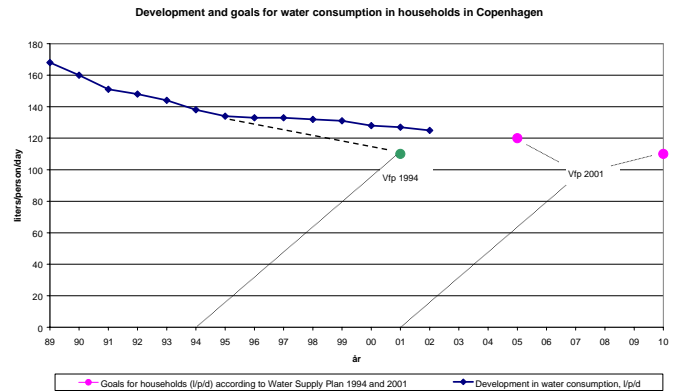


Figure 2. The development of water consumption in Copenhagen 1989-2001, also showing the goals for water consumption for 2001, 2005 and 2010.

These goals were decided in relation to, what was considered as “realistic” and “politically acceptable”, and not based on considerations on sustainability, e.g. what was necessary to maintain the state of the nature in the water catchment areas. In 2003, the average water consumption was 127 l/p/d, the same as for 2001.

b. no.

c. The end-users express a need for evaluations, and means to prioritise different efforts for a more sustainable water management. This includes a prioritisation between different water saving methods and initiatives, and prioritisation between water savings and other efforts for protection of the groundwater. At the moment, there is little overview over the costs and effects of different possible initiatives, and therefore it is difficult to prioritise between the different initiatives.

d. The indicator on water consumption will still be used as an important measure for sustainable water management in Copenhagen. Since the merge of Copenhagen Water and Copenhagen Energy, the liberalisation of the energy market in Denmark has had considerably influence on the efforts for water reductions; budgets have been reduced, and the number of people employed on water savings has been reduced to 1½. Organisationally, the water saving unit has become an independent unit in Copenhagen Energy, selling its services to CE. The main focus is implementing individual water meters in households. At the moment, only about 8000 households have individual water meters (out of app. 240.000 households in Copenhagen). By supporting each household by 1.000 DKr (app. 150€) for installing water meters, Copenhagen Energy hopes to increase this number. For those who have individual meters, the average consumption is 108 l/p/d, indication that individual meters has an effect, and that the goal on 110 l/p/d is not unrealistic.

e. Using this indicator is evidently an advantage. It is also being used on a local scale to monitor local initiatives and policies for water savings.

b. Were there any spin-off's or unintended consequences?

c. General view on the tool? Lessons learned?

d. Potentials for further use of the tool?

e. Will the actors recommend it or use it in other

cases - why / why not?	
2. Reviewer's assessment of the tool (usefulness, sustainability relevance, who are the actors excluded? etc.) Suggestions and needs for further development of the tool	<p>The water saving campaign has focused on consumers habits, and has been quite successful. Other indicators to monitor the success of sustainable water management in Copenhagen should be included, for instance:</p> <ul style="list-style-type: none"> - Available groundwater resources in relation to different goals for the local nature, - The use of fertilisers and pesticides within catchment areas, - Number of farms converted to organic farming, - Area of forest raised in the catchment areas, - Number of water catchment plants renovated, - State of nature and biodiversity in catchment areas, - The diffusion of water saving washing machines, dishwasher, low-flush toilets etc. in Copenhagen households, - The number of households with individual meter, - Average household size in Copenhagen. <p>Such indicators would enable monitoring the actions of other relevant actors in relation to sustainable water management, and turn more attention to this.</p>
E. Additional information on the case study available	
Websites	http://www.eaue.de/winuwd/80.htm http://www.watersave.uk.net/Presentations/ (WATERSAVE Network Fourth Meeting 11th December 2002 Loughborough University).
References concerning the case but also the key words or problem (papers, articles, reports, etc.)	Copenhagen Municipality (2001). <i>Water Supply Plan 2001</i> . Copenhagen Energy, annual reports
Other sources (Interviews, conferences, discussions, etc.)	Interview with mr. Jens Peter Brenøe, CE Market, d. 12.08.03 Interview with mr. Allan Broløs, CE Supply, d. 22.08.03 IDA (Danish Engineer Association), conference d. 11.09.03. <i>Do we have enough fresh water, and what do we do?</i>
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