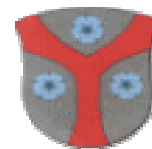




## Contribution from TOMMERUP



### Drinking water supply in Danish municipalities

#### Water Supply Structure

The Danish water supply is distinctly decentralized. In 2002 there were 2718 common utilities, of which the municipalities owned 166 and 2552 were private. The number of common utilities has been reduced by 30 per cent from 1980-2002. Over the past 23 years, the number of common utilities has been reduced by 54 utilities per year on a straight-line basis. In spite of the high number of common utilities, the greater part of the drinking water is delivered by only a few utilities.

The differences between private and public supply are large. In 2002 a public water supply abstracted on the average approx. 26 times the amount of a private one.

Approximately 99 per cent of the drinking water supply in Denmark is based on groundwater. The total water abstraction for drinking water supply in Denmark in 2002 was 412.9 mill. m<sup>3</sup>. Of this amount, public water supply abstracted 259.8 mill. m<sup>3</sup> and private water supply 153.1 mill. m<sup>3</sup>.

**Figure 10.1 Water Abstraction on Common Water Supplies 1993-2002**

Year	Municipalities		Inhabitants		Water supply plants		Water Catchment			Common Water Supplies		
					Municipal	Private	Municipal	Private	Total	Municipal	Private	Total
	(Number)	(per cent)	(Number)	(per cent)	(Number)		(mill m <sup>3</sup> )			(Number)		
1993	263	95,6	4,86	93,7	305	2868	309,2	206,7	515,9	182	2962	3144
1994	256	93,1	4,81	92,5	327	2673	295,8	183,8	479,6	178	2881	3059
1995	223	81	4,48	85,7	287	2340	276,6	142,0	418,6	178	2787	2965
1996	275	100	5,26	100	356	2768	297,1	175,0	472,1	178	2768	2946
1997	275	100	5,28	100	350	2743	298,5	165,1	463,6	176	2743	2919
1998	275	100	5,30	100	348	2712	286,3	153,3	439,6	175	2712	2887
1999	275	100	5,32	100	324	2680	267,4	167,6	434,9	171	2680	2851
2000	275	100	5,34	100	316	2625	261,0	166,8	427,9	166	2625	2791
2001	275	100	5,36	100	313	2585	254,2	162,1	416,3	165	2585	2750
2002	275	100	5,37	100	327	2552	259,8	153,1	412,9	166	2552	2718

## Water quality:

The environmental policy in Denmark is based on prevention and protection against pollution of our groundwater resources. Nearly all drinking water in Denmark is abstracted from groundwater wells, and the water quality is normally so good, that it is possible to use the water directly after a simple aeration and filtration to remove iron and manganese.

The table “*abstraction for water supply according to source*” show the different abstraction figures for some countries.

As we can see Denmark have only 2 million cubic metre of surface water compared to 455 million cubic metre of ground water. (more than 99%)

The table shows abstraction figures back in 1997. The actual total abstraction in denmark is down to about 420 cubic metre i year 2002.

The ground water wells are normally 40 to 60 metres deep in average.

## 7

### **ABSTRACTION FOR WATER SUPPLY ACCORDING TO SOURCE**

IN M CU M PER YEAR

	TRUE GROUND WATER		SPRING WATER		SURFACE WATER		TOTAL WATER ABSTRACTION	
	1980	1997	1980	1997	1980	1997	1980	1997
Austria	287	322	320	325	5	5	612	652
Azerbaijan		87		0		329		416
Belgium	435	468	0	0	217	270	652	738
Burkina Faso		6		6		14		25
Czech Republic		348		0		522		870
Congo		49		11		153		213
Denmark		455		0		2		457
Ethiopia		29		6		3		38
Finland		240		0		176		416
France	3,360			0		2,290		5,650
Gabon		1		0		41		42
Germany	4,180	3,648	570	408	1,890	1,568	6,640	5,624
Hong Kong		0		0		913		913
Hungary	297	342	60	290	443	26	800	658
Indonesia		327		554		1,637		2,518
Italy	3,290	3,975	2,535	2,385	892	1,590	6,717	7,950
Japan		4,357		178		11,820		16,355
Jordan		178		20		38		236
Lithuania		240		0		0		240
Luxembourg	2	2	27	29	16	16	45	47
Macau		0		0		53		53
Malaysia		77		0		3,531		3,608
Monaco		0		2		4		6
Netherlands	667	794			337	475	1004	1269
Romania		1,058		0		1,588		2,646
Senegal		78		0		19		96
Seychelles		0		0		1		1
Singapore		0		0		441		441
Slovakia		383		0		69		452
South Africa		270		5		4,447		4,721
Spain	684	1,000	0	124	2,426	4,848	3,110	5,972
Sweden	239	221	0	0	716	702	955	923
Tanzania		0		0		1		1
Togo		16		0		5		22
Tunisia		147		0		173		320
United Kingdom	1,910		0		5,060		6,970	7,895
Vietnam		100		0		215		315

## Drinking water production

Over the last 10 years, the water production of the water supplies has been reduced heavily from 95.9 m<sup>3</sup> per person supplied in 1993 to 74.2 m<sup>3</sup> per person in 2002. This m<sup>3</sup>/inhabitant/year.

**Figure 10.2 Water Production 1993-2002**

Year	Supplies	Consumers	Abstraction	Abstraction proportional to supply	Abstraction proportional to consumers	Delivered water	Delivered water proportional to consumers
	(Number)	(mill.)	(mill. m <sup>3</sup> )	(m <sup>3</sup> /supply.)	(m <sup>3</sup> /pers.)	(mill. m <sup>3</sup> )	(m <sup>3</sup> /pers.)
1993	195	3,22	321,9	1,65	100,0	309,2	95,9
1994	184	3,20	307,7	1,67	96,2	294,9	92,1
1995	181	3,16	295,1	1,63	93,4	282,3	89,3
1996	191	3,26	308,5	1,62	94,5	297,1	91,0
1997	202	3,36	301,4	1,49	89,7	292,1	87,0
1998	170	3,23	280,4	1,65	87,0	266,3	82,6
1999	177	3,28	276,3	1,56	84,1	265,0	80,7
2000	162	3,23	269,5	1,66	83,4	256,3	79,3
2001	164	3,32	265,1	1,62	79,8	255,7	77,0
2002	142	3,23	251,0	1,77	77,7	239,7	74,2

### Drinking water consumption

The consumption of water from the water utilities is distributed into 61.1 per cent to households; 25.6 per cent to industry; 7.5 per cent to institutions and 5.8 per cent is water losses.

**Figure 10.3 Distribution of consumption, 1993-2002 (p: person, l: litre)**

Year	Utilities (No.)	Consumers (mill.)	Consumption									
			Total	Households		Industry		Institutions		Losses		
			(m <sup>3</sup> /p/year)	(l/p/24-h)	(per cent)	(m <sup>3</sup> /p/year)	(per cent)	(m <sup>3</sup> /p/year)	(per cent)	(m <sup>3</sup> /p/year)	(per cent)	
1993	72	2,10	90,3	56,5	155	62,6	19,4	21,5	7,6	8,4	6,8	6,8
1994	79	2,09	87,4	54,3	149	62,1	18,7	21,4	7,4	8,5	7,0	7,0
1995	77	2,26	85,9	52,9	145	61,6	18,5	21,6	6,9	8,0	7,6	7,6
1996	86	2,17	84,9	50,8	139	59,8	19,1	22,5	7,2	8,5	7,8	7,8
1997	99	2,18	82,3	49,7	136	60,4	18,6	22,6	7,0	8,5	7,1	8,6
1998	96	2,14	79,8	48,6	133	60,9	19,3	24,3	6,2	7,8	5,6	7,1
1999	116	2,37	80,4	48,3	132	60,1	20,4	25,4	6,0	7,4	5,6	7,0
2000	107	2,41	76,7	47,6	131	62,1	18,6	24,2	5,9	7,6	4,7	6,1
2001	106	2,45	76,8	46,5	128	60,6	20,2	26,3	5,6	7,3	4,5	5,8
2002	102	2,62	72,6	44,4	122	61,1	18,6	25,6	5,4	7,5	4,2	5,8

The great decline in water consumption over the last 10 years is primarily caused by a great reduction in the water consumption of households. In 1993, the household consumption was 155 litres/capita/day. In 2002, it was as small as 122 litres/capita/day. From 1993 to 2002 the household consumption has declined by 21 per cent. I.e. in 2002 each consumer uses 12,100 litres less per year on the average.

Over the 10 year-period the household consumption has declined on a linear basis by 1.2 m<sup>3</sup>/capita/year on an average. Since 1989 the household consumption has declined 30 per cent. Water savings by new installations (e.g. shower and toilets), water saving

campaigns and a higher awareness of the environment among the consumers, combined with a rise in the water price, are among the reasons for the large reduction in the household consumption.

Since the implementation of the legislation of compulsory instalment of water metres in houses a large number of meters have been installed. In 2002 0.24 meter/consumer was connected to a common utility on an average. With water meters in every house the loss was made visible, and the green tax on water has put an economic incentive on the utilities to make an effort to reduce the losses.

### **Drinking water loss (Unaccounted For Water)**

The loss, which is the unmetered consumption, has declined over the past 10 years from 7.3 m<sup>3</sup>/capita in 1993 to 4.4 m<sup>3</sup>/capita in 2002.

In percentage of the total production this is a decline from 8.2 per cent to 6.1 per cent or a specific loss from 3.0 to 1.8 m<sup>3</sup>/km<sup>2</sup>/24 hours. After a maximum in 1996 the loss has now declined heavily.

Within 7 years the loss has declined by 2.9 percentage points, in spite of a reduction of the specific water production of 19.3 per cent in this period.

The considerable reduction in both water consumption and loss of water is mainly due to the total rising in water price, which gives more attention to savings.

### **Local status in the municipality of Tommerup**

In the municipality of Tommerup we have 7 private water supply utilities. All together the abstraction for water supply amounts to 586.092 m<sup>3</sup> / year. The municipality of Tommerup has approximately 8000 inhabitants.

All the water is ground water, and the quality is so good that we can use the water directly as drinking water after a simple aeration and filtration.

In Tommerup we have a number of ground water wells that supply the near by city of Odense with approximately 5,5 mill. M<sup>3</sup> /year. The number of inhabitants in Odense is approximately 180.000.

The fact that the municipality of Tommerup supplies the city of Odense with a great deal of drinking water does not mean that we profit financially from our resources of drinking water.

The ground resources of drinking water in Denmark are common property and is administrated by the county authorities who issues permits for abstraction of drinking water.