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Over a decade, efficiency gains in reverse osmosis plants resulted in a 33 per cent drop in electricity consumption for water production.

World Water Day 2014: Water and Energy

This year's World Water Day seeks to raise awareness of the inter-linkages between water and energy.

The inter-linkages between water and energy in Malta include both the production of electricity, which is dependent on the provision of cooling water from marine sources, and the production of public and irrigation water by means of electrical power. This release focuses on the production of public water from groundwater sources and reverse osmosis plants, and the production of irrigation water from wastewater treatment at the Sant' Antnin plant.

Table 1 shows that the production of public water by the Water Services Corporation (WSC) averaged 30.6 million cubic metres per year between 2004 and 2013. Furthermore, 44.3 per cent of all public water originated from groundwater sources, while 55.7 per cent was produced at the three reverse osmosis plants which the corporation operates.

Data on treated wastewater (Table 2) shows that over the past decade the Sant' Antnin plant processed an annual average of 2.1 million cubic metres of wastewater. Additionally, 63.6 per cent of all water treated at this plant was mainly used for irrigation in the surrounding agricultural areas. The total amount of wastewater treated by this plant has seen a gradual decline, from 3.1 million cubic metres in 2005 to 1.7 million cubic metres in 2012. This was mainly due to a reduction in the demand for irrigation water produced by this plant.

Table 3 provides a comparison for the electricity consumption of water production from groundwater sources, reverse osmosis plant operations and wastewater treatment. During the period under review, the average power required to produce one cubic metre of water from reverse osmosis plants amounted to 4.6 kilowatt hours, considerably higher when compared to the average power required to extract groundwater, which stood at 0.8 kilowatt hours. Irrigation water produced from the Sant' Antnin plant averaged 1.3 kilowatt hours per cubic metre.

Figures presented in Table 4 show that over the past ten years, the average energy consumed for producing water from groundwater, reverse osmosis plants and wastewater treatment at the Sant' Antnin plant amounted to 4.4 per cent of the total electricity supply for Malta. Reverse osmosis operations are by far the largest electricity consumers from all three water sources. From 2004 to 2013 efficiency gains in the operations of WSC resulted in a decrease of 33.2 per cent in the electricity consumed by reverse osmosis plants. This brought down the share of electricity consumption from the total electricity supply from 4.8 per cent in 2004 to 3.2 per cent in 2013 ■

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Table 1. Public water production by the Water Services Corporation

m³

Year	Groundwater			Reverse Osmosis plants	Total water production
	Pumping Stations	Boreholes	Total		
2004	8,310,600	6,576,196	14,886,796	17,894,583	32,781,379
2005	7,670,196	6,324,364	13,994,560	17,049,042	31,043,602
2006	6,936,045	6,123,312	13,059,358	17,469,049	30,528,407
2007	7,655,538	6,302,034	13,957,572	17,007,077	30,964,649
2008	7,514,353	6,561,587	14,075,940	16,871,911	30,947,851
2009	6,780,956	5,895,871	12,676,827	16,653,689	29,330,516
2010	6,830,271	5,953,849	12,784,120	16,109,456	28,893,576
2011	7,053,880	6,006,674	13,060,554	16,722,082	29,782,636
2012	6,765,131	6,533,846	13,298,978	17,646,924	30,945,902
2013	7,395,918	6,392,516	13,788,433	16,791,994	30,580,427
<i>average 2004-2013</i>	<i>7,291,289</i>	<i>6,267,025</i>	<i>13,558,314</i>	<i>17,021,581</i>	<i>30,579,895</i>

Source: Water Services Corporation

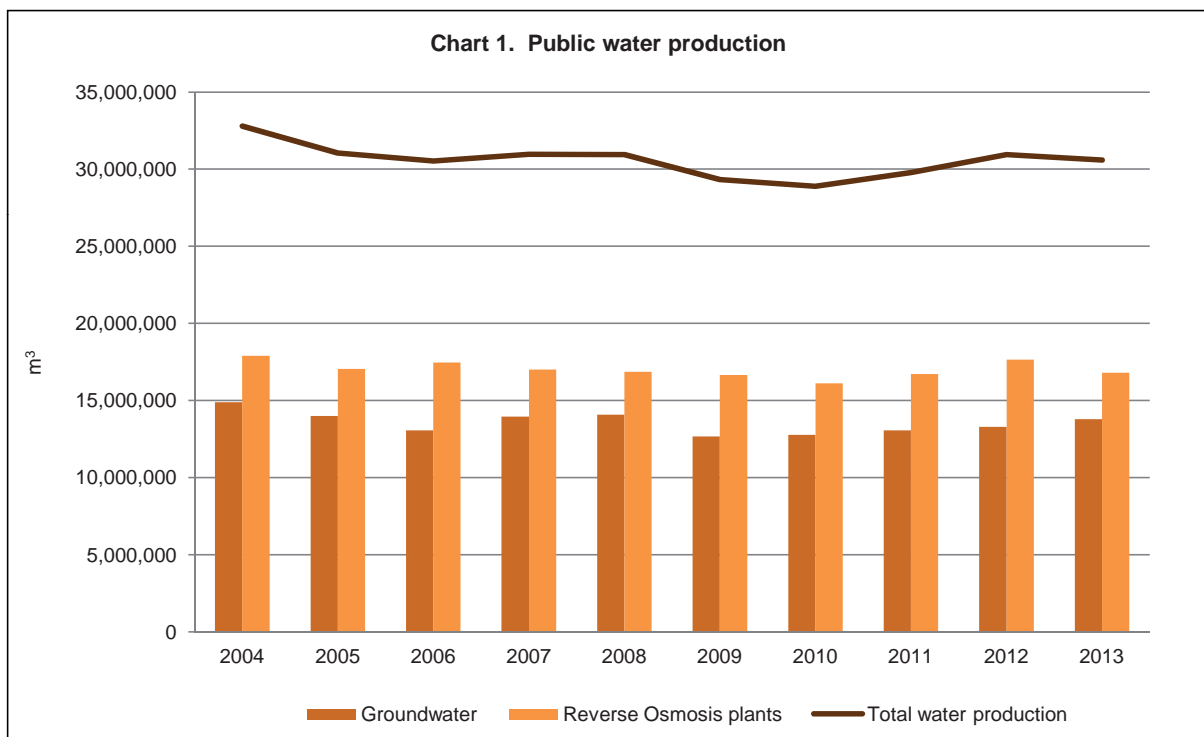


Table 2. Wastewater treatment at the Sant' Antnin sewage treatment plant

m³

Year	Wastewater input	Irrigation effluent production	
		Used irrigation effluent	Unused irrigation effluent
2004	2,585,804	1,878,696	707,108
2005	3,102,941	1,798,138	1,304,803
2006	2,261,927	1,386,675	875,252
2007	2,079,262	1,066,087	1,013,175
2008	2,048,855	1,164,119	884,736
2009	2,004,198	1,273,657	730,541
2010	1,831,364	1,273,007	558,357
2011	1,721,617	1,290,808	430,809
2012	1,661,673	1,239,360	422,313
2013	1,895,856	1,113,121	782,735
<i>average 2004-2013</i>	<i>2,119,350</i>	<i>1,348,367</i>	<i>770,983</i>

Source: Water Services Corporation

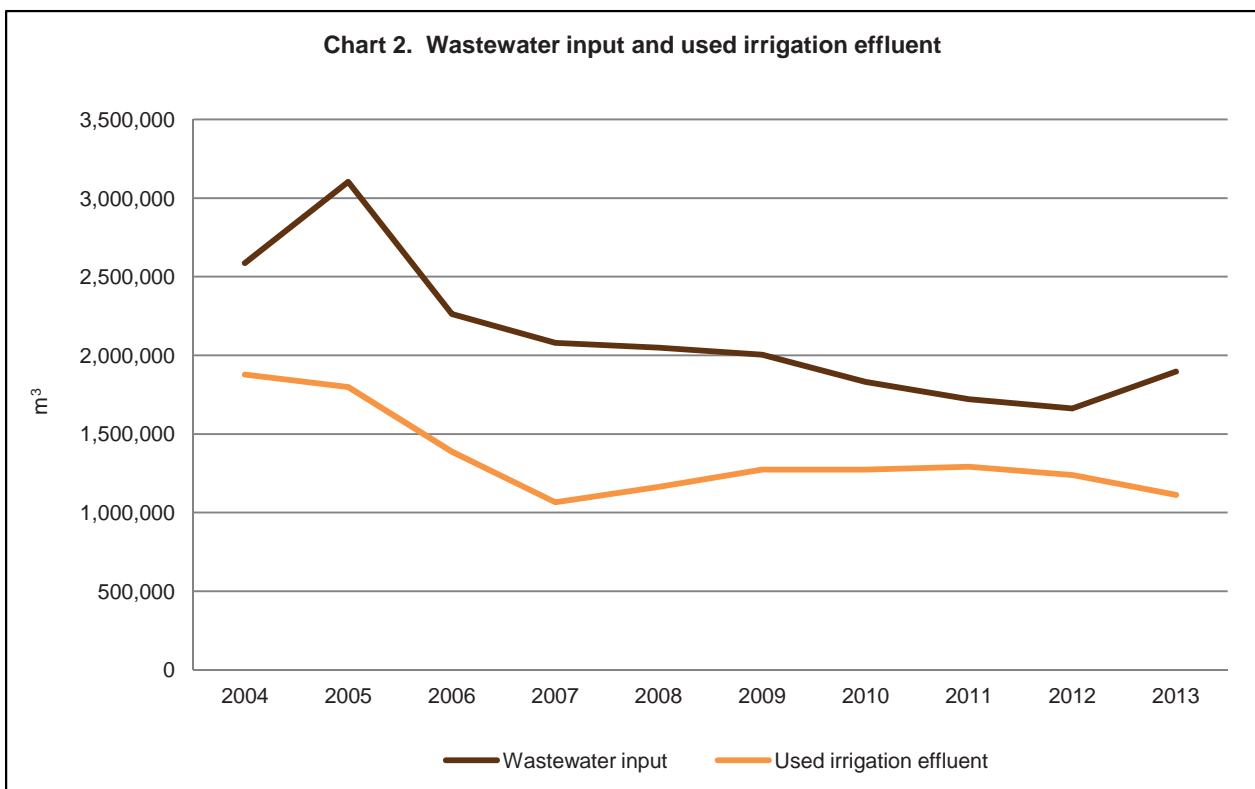


Table 3. Electricity consumption for water production by the Water Services Corporation

Year	Groundwater			Reverse Osmosis plants			Wastewater treatment		
	Production in m ³	Electricity consumption in kWh	Specific power kWh/m ³	Production in m ³	Electricity consumption in kWh	Specific power kWh/m ³	Production in m ³	Electricity consumption in kWh	Specific power kWh/m ³
2004	14,886,796	10,300,306	0.7	17,894,583	101,125,657	5.7	2,585,804	3,497,936	1.4
2005	13,994,560	10,558,513	0.8	17,049,042	89,659,759	5.3	3,102,941	4,351,984	1.4
2006	13,059,358	10,829,154	0.8	17,469,049	92,808,953	5.3	2,261,927	2,963,055	1.3
2007	13,957,572	10,569,217	0.8	17,007,077	86,545,960	5.1	2,079,262	2,661,385	1.3
2008	14,075,940	10,534,962	0.7	16,871,911	80,790,899	4.8	2,048,855	2,611,168	1.3
2009	12,676,827	10,939,855	0.9	16,653,689	66,685,517	4.0	2,004,198	2,537,417	1.3
2010	12,784,120	10,908,805	0.9	16,109,456	65,069,209	4.0	1,831,364	2,251,983	1.2
2011	13,060,554	10,737,874	0.8	16,722,082	67,222,315	4.0	1,721,617	1,799,616	1.0
2012	13,298,978	10,895,038	0.8	17,646,924	71,276,528	4.0	1,661,673	2,173,461	1.3
2013	13,788,433	10,573,869	0.8	16,791,994	67,520,920	4.0	1,895,856	2,427,890	1.3
<i>average 2004-2013</i>	<i>13,558,314</i>	<i>10,684,759</i>	<i>0.8</i>	<i>17,021,581</i>	<i>78,870,572</i>	<i>4.6</i>	<i>2,119,350</i>	<i>2,727,589</i>	<i>1.3</i>

Source: Water Services Corporation

Note: Electricity consumption data for groundwater sources and wastewater treatment is estimated for 2004-2010.

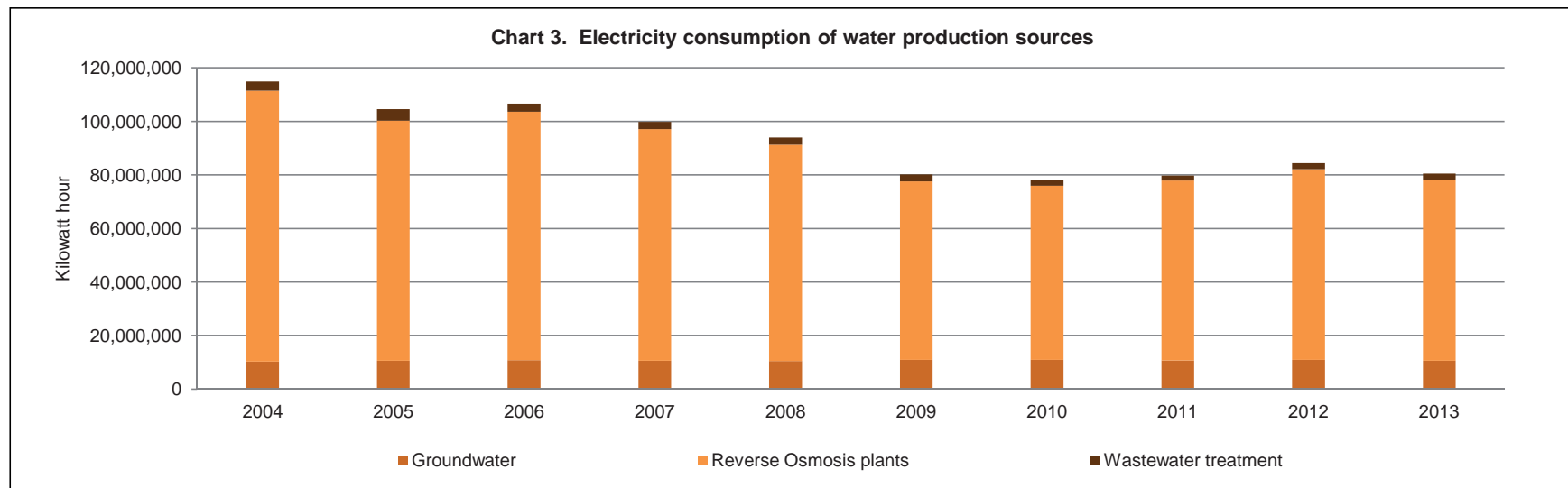


Table 4. Electricity consumption for water production

Year	Total electricity supply - mWh	Total electricity consumption of GW, RO and SASTP - mWh	% of total electricity supply	Electricity consumption of RO - mWh	% of total electricity supply
2004	2,088,313	114,924	5.5	101,126	4.8
2005	2,132,410	104,570	4.9	89,660	4.2
2006	2,128,194	106,601	5.0	92,809	4.4
2007	2,163,131	99,777	4.6	86,546	4.0
2008	2,184,929	93,937	4.3	80,791	3.7
2009	2,045,921	80,163	3.9	66,686	3.3
2010	1,991,484	78,230	3.9	65,069	3.3
2011	2,043,117	79,760	3.9	67,222	3.3
2012	2,144,463	84,345	3.9	71,277	3.3
2013	2,106,581	80,523	3.8	67,521	3.2
<i>average 2004-2013</i>	<i>2,102,854</i>	<i>92,283</i>	<i>4.4</i>	<i>78,871</i>	<i>3.7</i>

Source: Water Services Corporation

Notes:

GW: Groundwater sources; RO: Reverse osmosis; SASTP: Sant' Antnin sewage treatment plant.

Total electricity consumption data of GW, RO and SASTP is estimated for 2004-2010.

Methodological notes

1. Data in this news release refers to the operations of the Water Services Corporation only and does not include the operations of private entities. The Water Services Corporation operates facilities for the production of the public water supply and the treatment of urban wastewater.
2. Public water supply is the water supplied into the national distribution network by economic units engaged in the collection, purification and distribution of water. In Malta only the Water Services Corporation is licensed to produce and distribute this water.
3. The total water production in Table 1 is inclusive of the rejects arising from the Gozo groundwater polishing plant.
4. Data on electricity consumption of reverse osmosis plants published in News Release 054/2011 is higher than that which is provided in Table 3 since it is inclusive of the electricity consumption for water distribution. Data provided in Table 3 refers exclusively to the electricity consumption of water production from reverse osmosis plants and groundwater sources.
5. All the wastewater input into the Sant' Antnin wastewater treatment plant is treated to produce second class water (effluent) which is fit for irrigation. Effluent which is not used for irrigation purposes is discharged at sea. Small amounts of treated water are also used by neighbouring industrial areas. These amounts are included with the used irrigation effluent in Table 2.
6. Data for the electricity consumption of the Sant' Antnin wastewater treatment plant refers to the consumption used to treat all wastewater input into the plant and the consumption of water pumps which transfer the water from the plant to reservoirs in agricultural areas.
7. The total electricity supply refers to the amount of electricity which is fed into the national grid from power stations.