Reykjavík Energy

2023 Annual Report

Appendices

District heating utilities, hot water supply, water quality and water levels in low-temperature geothermal fields

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LJÓSLEIÐARINN
REYKJAVÍK FIBRE NETWORK

ON POWER

VEITUR

Table of contents

Cover photo: Íris Eva Einarsdóttir

Reykjavik Energy and subsidiaries' area of operations

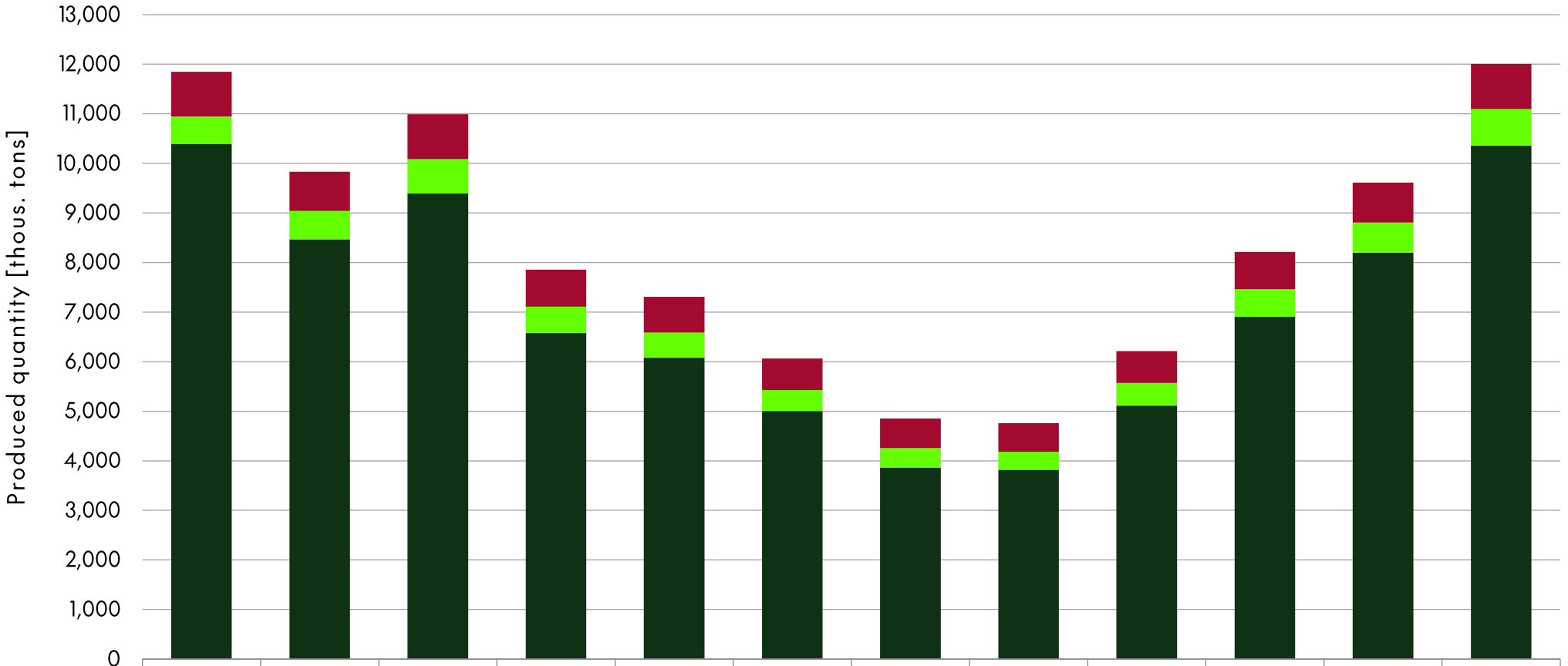
District heating utilities of Veitur Utilities 2023

Veitur's heating utilities with quantities of water produced, comments and improvements. Some actions were undertaken in West and South Iceland to ensure the operability of district heating utilities. Numbers in table are rounded to the nearest thousand tons.

Utility	Production field	No. of wells	Annual production thous. tons	Annual production L/s	Comments	Improvements
Capital area						
Capital area	Laugarnes	9	2,401	76	Field rested for part of summer	
	Ellidaar	8	2,179	69	Field rested for part of summer	Tracer test 2024
	Reykir	21	11,952	379	Field rested for part of summer Wholesale to Mosfellsbaer	
	Reykjahlid	12	13,306	422	Field rested for part of summer Wholesale to Mosfellsbaer	New pumps in 3 wells
	Nesjavellir	21	34,260	1086		Nesjavellir pipeline cleaned
	Hellisheidi	47	20,006	634		
West Iceland						
HAB	Deildartunga hot spring	1	4,433	141		New well, 3 km of HAB-pipeline renewed
	Wells at Baeir	2	193	6		
Skorradalur	Well in Stora Drageyri	1	237	8		
Munadarnes	Well in Munadarnes	1	192	6		New well pump
Nordurardalur Utility	Wells at Svartagil	1	477	26		
	Well at Bifrost	1	48	2		New well pump
Stykkisholmur	Wells in Stykkisholmur	2	812	26	One injection well and back-up power	
South Iceland						
Hveragerdi	Wells in Hveragerdi	4	1,245	39	Steam utility and closed-circuit systems	Work on heat exchanger improvements
Olfus	Bakki II	1	395	13		
Thorlakshofn	Bakki I	2	1,526	48		
Austurveita Utility	Wells in Gljufurarholt	3	494	16	Water too hot for pipelines	New well drilled for lukewarm water production
Grimsnes Utility	Wells in Ondverdarnes	3	1,907	60		
Hlidarveita Utlity	Wells at Efri-Reykir	1	472	15	Sale of utility prepared	
Ranga Utility	Wells at Kaldarholt	2	2,297	73		Work on production capacity and prepare research to provide hot water
	Wells at Laugaland	3	660	21	One injection well and back-up power	

Hot water supplied by Veitur Utilities per month in its distribution area in 2023

Granting everyone access to a hot water utility with negligible outages is one of the prerequisites for the health of residents and flourishing economic activity in a modern society, as stated in the Sustainable Development Goals (SDGs) of the United Nations.



	January	February	March	April	May	June	July	August	September	October	November	December
South Iceland	906	792	903	748	725	636	598	578	640	754	805	910
West Iceland	548	568	695	532	509	423	392	360	458	559	610	736
Capital area	10,396	8,470	9,391	6,576	6,076	5,002	3,864	3,819	5,112	6,902	8,197	10,360

Chemical analyses of hot water in the capital area 2023

By analysing the chemical properties in wells, it can be monitored how production fields react to utilization.

	Unit	Laugarnes RV-19	Elliðaar RV-23	Reykir MG-24	Reykjahlid MG-39	Nesjavellir Heated groundwater	Hellisheiði Heated groundwater
Date		26.1.2023	26.1.2023	27.1.2023	31.1.2023	17.10.2023	25.10.2023
Sample no.		23-5016	23-5012	23-5018	23-5020	23-5244	23-5249
Water temp.	°C	123.6	87.5	78.1	92.1	80	80
Flow rate	L/s	34	43.1	60.86	78.8	-	-
pH (acidity)		9.51	9.61	9.78	9.82	8.42	8.35
CO_2	mg/kg	17.5	26.3	23.0	25.5	46.2	24.4
H_2S	mg/kg	0.47	0.02	0.51	0.88	0.54	0.49
SiO_2	mg/kg	144.0	81.0	72.4	98.5	40.1	32.3
Na	mg/kg	62.1	38.0	34.6	42.2	20.3	8.8
K	mg/kg	2.71	0.87	0.58	1.00	3.98	1.61
Ca	mg/kg	3.40	2.68	2.57	1.85	8.94	4.56
Mg	mg/kg	0.005	0.010	0.0030	0.0010	4.64	2.51
Fe	mg/kg	0.019	0.023	0.004	0.011	0.16	0.004
Al	mg/kg	0.188	0.134	0.12	0.174	0.07	0.01
Cl	mg/kg	55.5	25.6	15.0	13.3	17.6	13.5
SO_4	mg/kg	28.0	12.2	16.9	17.9	11.6	5.3
F	mg/kg	0.910	0.250	0.510	0.750	0.150	0.100
B	mg/kg	0.053	0.013	0.030	0.031	0.140	0.020
Dissolved O_2	µg/kg	0	300	0	0	0	0

Chemical analyses of hot water in South and West Iceland 2023

By analysing the chemical properties in wells, it can be monitored how production fields react to utilization.

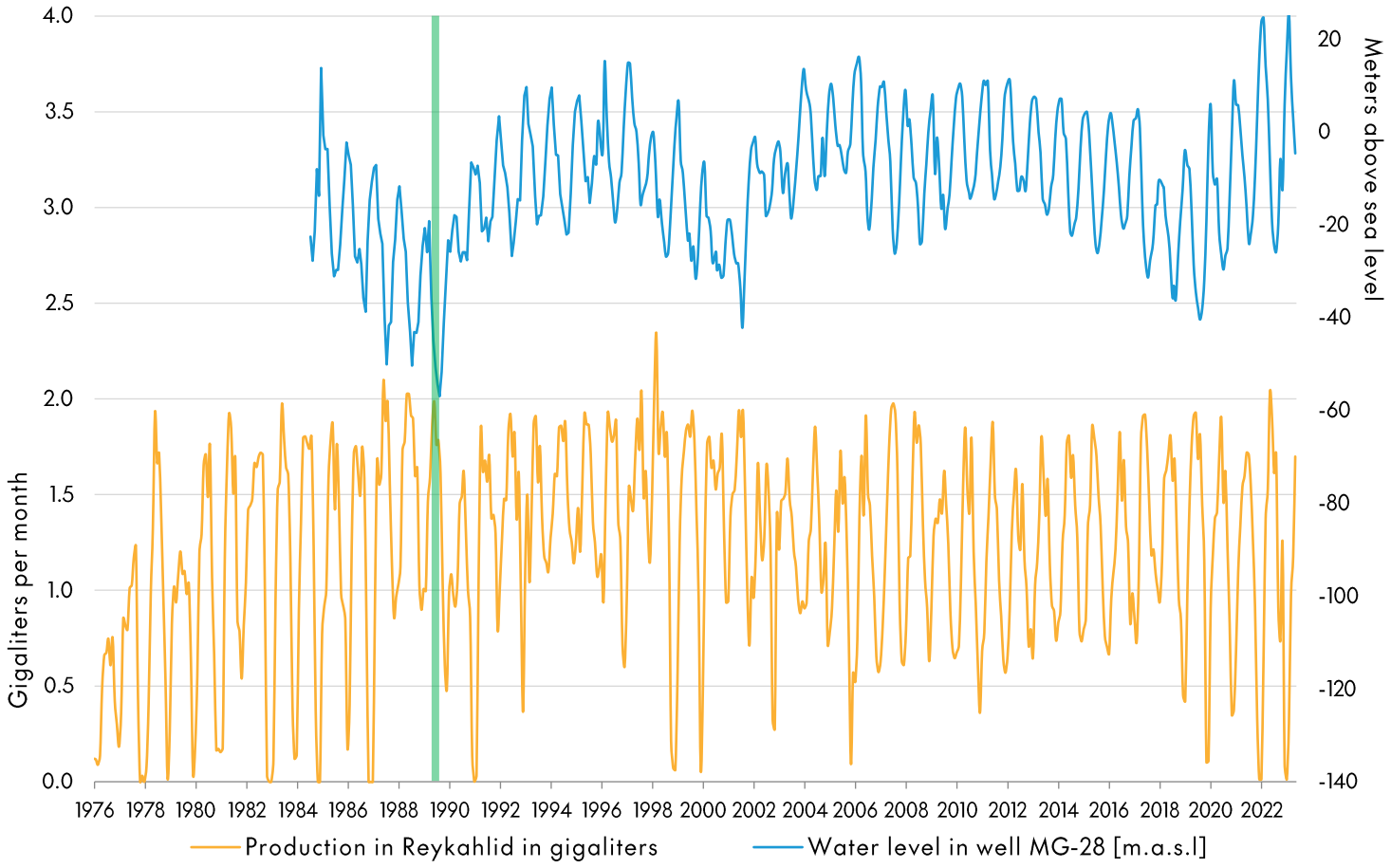
	Unit	Akranes and Borgarfjördur heating utility		Rangá utility		Thorlaks-höfn utility	Ölfus utility	Austur-veita utility	Grimsnes utility	Hlidar-veita utility	Munadar-nes utility	Norðurár dalur utility	Stykkis-holmur utility
		Deildartunga hot spring	BB-03	KH-37	LL-4	BA-01	EB-01	GH-4	ÖN-29	ER-23	MN-8	SG-3	HO-1
Date		08.03.2023	08.03.2023	22.3.2023	22.3.2023	12.1.2023	19.1.2023	3.2.2022	14.3.2023	19.1.2023	4.2.2023	8.3.2023	1.2.2023
Sample no.		23-5098	23-5099	23-5134	23-5132	23-5002	23-5004	22-5045	23-5120	23-5005	23-5040	23-5100	23-5025
Water temp.	°C	90.5	90	62.8	77.9	124.6	121.6	115.5	79.7	82.2	88.7	69.6	84.5
Flow rate	L/s	168	46.1	48.8	33.1	24.7	9.5	9.8	57.9	25.73	6.3	14.5	33.5
pH (acidity)	pH	9.53	9.24	10.44	9.88	8.77	8.91	8.95	9.52	9.54	9.43	8.9	8.22
CO_2	mg/kg	28.15	14.3	12.1	20.9	9.1	11.05	41.2	17.0	27.5	15.8	85.05	5.4
H_2S	mg/kg	1.122	0.772	0.14	0.09	0.56	0.18	0.19	0.08	2.81	0.51	0.05	0.06
SiO_2	mg/kg	126.0	107.0	83.4	87.4	131.5	119.1	138.1	82.3	230.2	107.0	107.0	68.3
Na	mg/kg	78.4	111.0	67.9	91.3	367.0	270.2	119.1	108.0	100.6	88.5	85.4	641.4
K	mg/kg	1.81	2.46	0.73	1.67	22.7	15.6	3.74	2.5	7.02	2.02	1.08	13.34
Ca	mg/kg	2.99	12.60	2.88	3.01	65.1	42.2	4.53	6.11	1.99	6.44	3.71	945.0
Mg	mg/kg	0.005	0.009	0.026	0.009	0.016	0.045	0.005	0.007	0.013	0.004	0.019	0.460
Fe	mg/kg	0.032	0.024	0.064	0.025	0.028	0.039	0.006	0.017	0.067	0.007	0.034	0.029
Al	mg/kg	0.143	0.029	0.179	0.211	0.063	0.085	0.143	0.073	0.498	0.057	0.037	0.028
Cl	mg/kg	35.2	114.6	28.2	48.3	613.2	407.06	116.0	105.0	57.8	73.2	26.5	2804.56
SO_4	mg/kg	55.7	72.4	22.7	65.4	111.4	125.13	53.1	39.5	56.3	56.7	31.1	326.01
F	mg/kg	2.5	2.0	2.14	0.99	0.53	0.56	0.949	0.59	2.66	1.8	0.6	1.07
B	mg/kg	0.235	0.205	0.112	0.225	0.242	0.244	0.292	0.111	0.177	0.201	0.204	0.082
Dissolved O_2	µg/kg	0	0	0	0	0	0	0	0	0	0	0	0

* Samples not collected in winter 2022-23

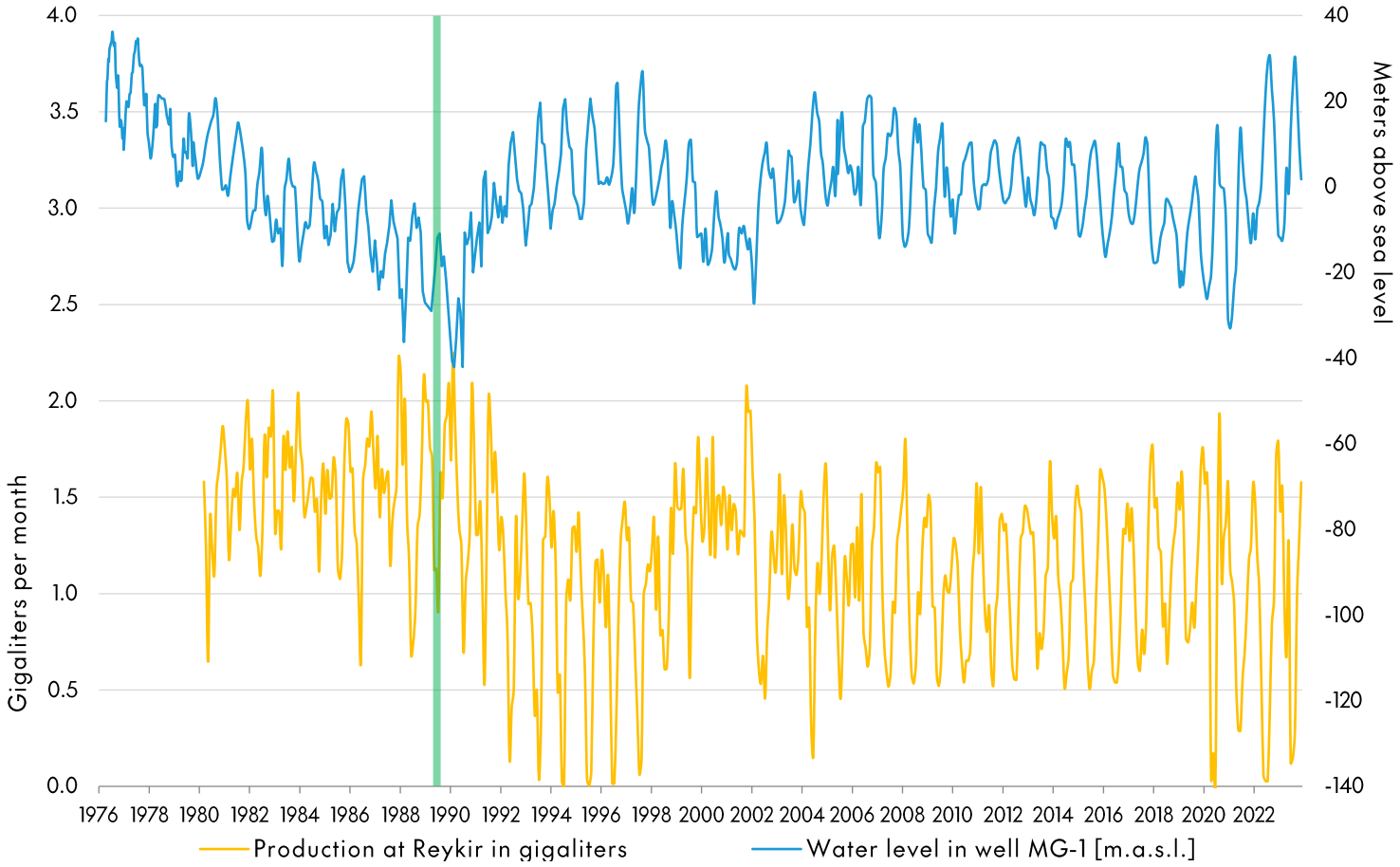
Water production and water levels in wells in the low-temperature fields of Veitur Utilities in the capital area

By measuring water levels and quantity of water produced it is monitored how production fields react to utilization. In the greater capital area, there are the production fields of Reykjahlid and Reykir in Mosfellsbaer and Ellidaardalur and Laugarnes in Reykjavik. The vertical green line marks when the thermal plant at the Nesjavellir geothermal power plant began operations. As a result, water production in low-temperature fields in the capital area was significantly reduced, which positively affected water levels in production fields.

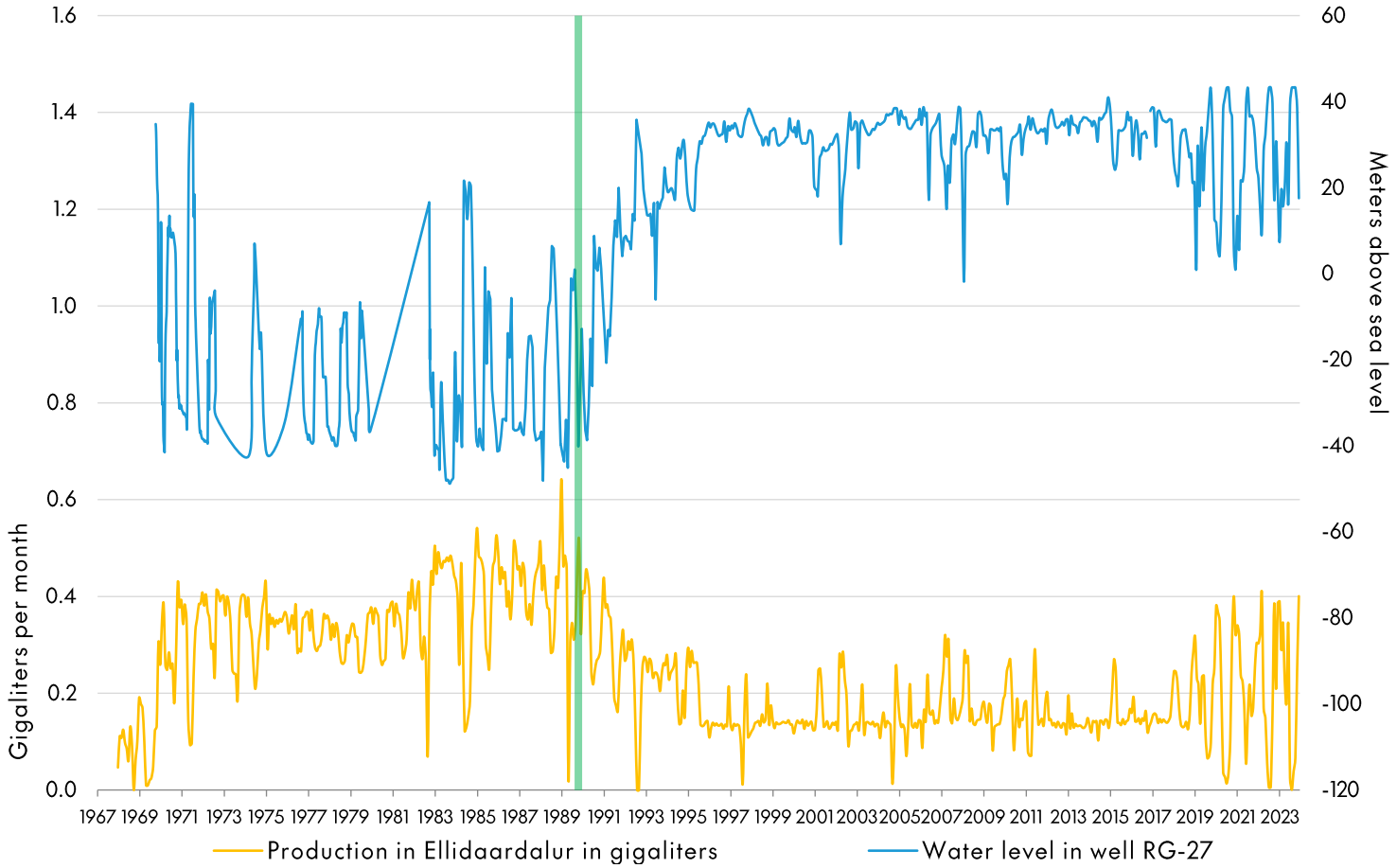
Reykjahlid

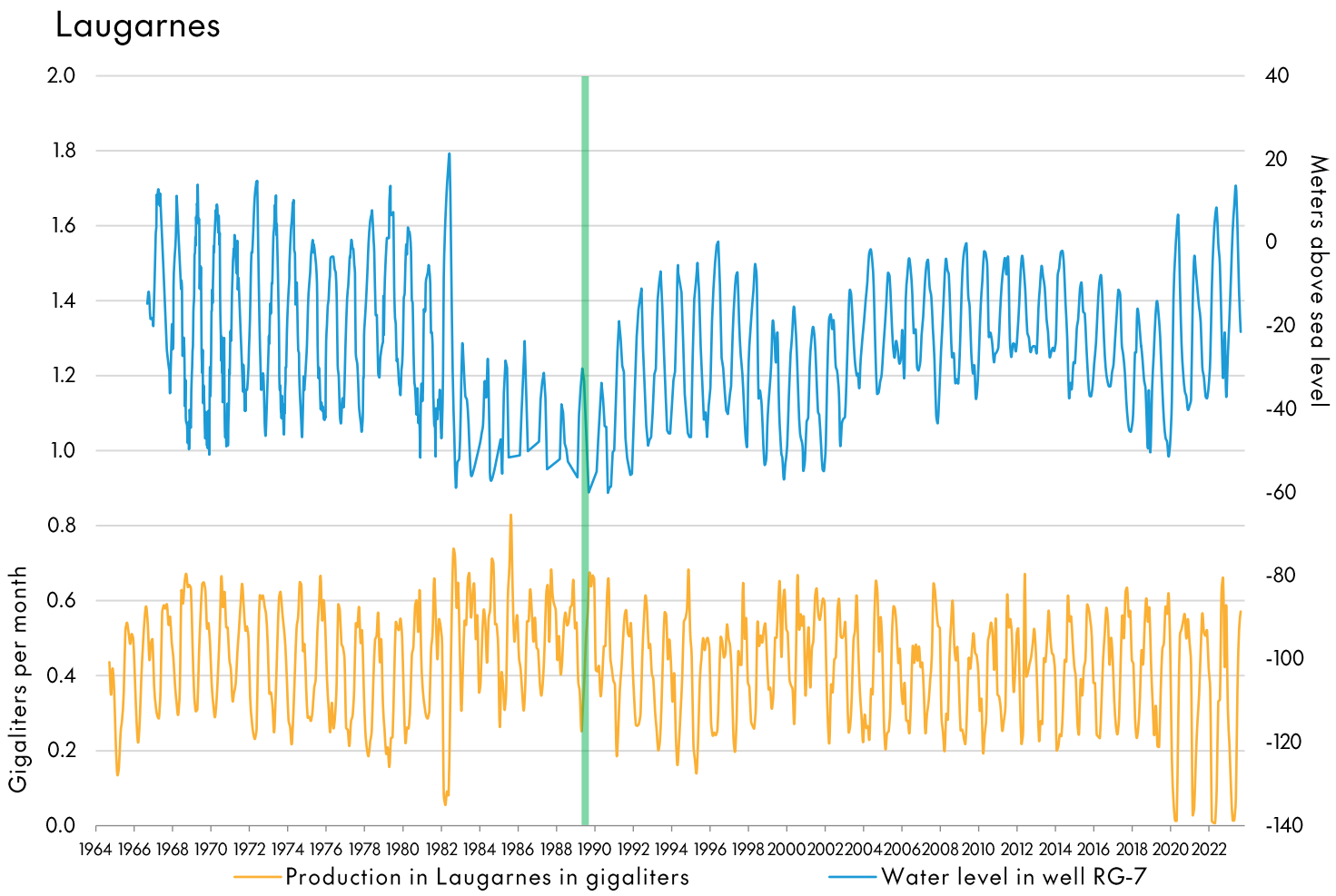


Reykir



Ellidaar




Laugarnes
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Gigaliters per month
40
20
0
-20
-40
-60
-80
-100
-120
-140
Meters above sea level
1964 1966 1968 1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022
Production in Laugarnes in gigaliters
Water level in well RG-7