

Appendix IV Results of partners’ questionnaire, part D, Regulation elements for SGEs installation, implementation and operation			# Partner acronym country code	P01 GBA AT	P02 NERC UK	P04 HGI-CGS HR	P05 CGS CZ	P06 BRGM FR	P07 GSI IE	P08 RBINS-GS8 BE	P09 GeoZS SI	P10 IGME ES	P11 SGU SE	P12 TNO NL	P13 PIG-PIB PL	P14 SGIDS SK	P16 GEUS DK		yes n	no n	case to case decision n	no reply n	total replies n	total respondents* n	yes %	no %	case to case decision %	no reply %	total replies %	total respondents* %			
#	Specific regulation elements																																
BOTH SYSTEMS OPEN-LOOP (GWHP) AND CLOSED-LOOP (GSHP)	1.	Is the drilling below the groundwater table allowed?		Yes	Yes	Yes	Case to case decision	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		13	0	1	0	14	14	92,86%	0,00%	7,14%	0,00%	100,00%	100,00%		
	2.	Is the certification for the designers, planners and installers mandatory?		Yes	No	Yes	No	No	No	No	Yes	No	Yes	Yes	No	No	No	5		9	0	0	14	14	35,71%	64,29%	0,00%	0,00%	100,00%	100,00%			
	3.	Is the certification for drilling companies mandatory?		Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	11		3	0	0	14	14	78,57%	21,43%	0,00%	0,00%	100,00%	100,00%			
	4.	Are the numerical simulations/ models required?		Case to case decision	No	No	No	No	No	Yes	No	Case to case decision	No	Yes	Case to case decision	Case to case decision	Yes	3		7	4	0	14	14	21,43%	50,00%	28,57%	0,00%	100,00%	100,00%			
	Subtotal 1.-4.																			32	19	5	0	56	56	57,14%	33,93%	8,93%	0,00%	100,00%	100,00%		
OPEN-LOOP SYSTEMS (GWHP)	5.	Is the minimum distance (m) to the neighbouring ground plot defined?		Yes	No	No	No	No	No	Case to case decision	Yes	No	Case to case decision	Yes	Yes	No	No	No		4	8	2	0	14	14	28,57%	57,14%	14,29%	0,00%	100,00%	100,00%		
	6.	Is the minimum distance (m) to the neighbouring buildings defined?	Yes	No	No	No	No	No	Case to case decision	Yes	No	Case to case decision	Yes	No	No	No	No	3		9	2	0	14	14	21,43%	64,29%	14,29%	0,00%	100,00%	100,00%			
	7.	Is the minimum distance (m) to the neighbouring groundwater wells defined?	Case to case decision	Yes	No	No	Yes	No	Yes	Case to case decision	Yes	Yes	Yes	Case to case decision	Case to case decision	No	No	6		4	4	0	14	14	42,86%	28,57%	28,57%	0,00%	100,00%	100,00%			
	8.	Is the minimum distance (m) between the wells defined?	No	Yes	No	No	No	No	Yes	No	No	Yes	Yes	Case to case decision	No	No	No	4		9	1	0	14	14	28,57%	64,29%	7,14%	0,00%	100,00%	100,00%			
	9.	Is the minimum distance (m) between the pumping and reinjection wells defined?	Yes	Yes	No	No	No	No	Yes	Yes	No	No	Yes	Case to case decision	No	No	No	5		8	1	0	14	14	35,71%	57,14%	7,14%	0,00%	100,00%	100,00%			
	10.	Is the minimum distance (m) to the neighbouring closed loop systems defined?	Yes	No	No	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	4		10	0	0	14	14	28,57%	71,43%	0,00%	0,00%	100,00%	100,00%			
	11.	Is the reinjection of used groundwater allowed?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Case to case decision	Yes	No	No	12		1	1	0	14	14	85,71%	7,14%	7,14%	0,00%	100,00%	100,00%			
	12.	Is the maximum allowed temperature difference (°C, K) between extracted and reinjected water defined?	Yes	Yes	No	No	No	No	No	No	Case to case decision	No	Yes	Case to case decision	No	No	No	3		9	2	0	14	14	21,43%	64,29%	14,29%	0,00%	100,00%	100,00%			
	13.	Is the absolute allowed temperature range (°C, K) of the reinjected water defined?	Yes	Yes	No	No	Yes	No	Yes	No	Case to case decision	No	Yes	No	No	No	Yes	6		7	1	0	14	14	42,86%	50,00%	7,14%	0,00%	100,00%	100,00%			
	14.	Is the allowed temperature change (°C, K) defined?	Yes	Yes	No	No	Yes	No	No	No	No	No	Yes	No	No	No	No	4		10	0	0	14	14	28,57%	71,43%	0,00%	0,00%	100,00%	100,00%			
	15.	Is the groundwater table drawdown (m) defined?	Case to case decision	No	No	No	No	No	No	Case to case decision	No	Yes	Yes	Case to case decision	Case to case decision	No	No	2		8	4	0	14	14	14,29%	57,14%	28,57%	0,00%	100,00%	100,00%			
	16.	Are the groundwater investigations (dynamics, hydrochemistry, etc.) mandatory?	Case to case decision	No	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	9		4	1	0	14	14	64,29%	28,57%	7,14%	0,00%	100,00%	100,00%			
	17.	Is the pumping test mandatory?	Case to case decision	Case to case decision	Yes	Case to case decision	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Case to case decision	Yes	Yes	8		2	4	0	14	14	57,14%	14,29%	28,57%	0,00%	100,00%	100,00%			
		Subtotal 5.-17.																			70	89	23	0	182	182	38,46%	48,90%	12,64%	0,00%	100,00%	100,00%	

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CLOSED-LOOP SYSTEMS (GSHP)	18.	Is the minimum distance (m) to the neighbouring ground plot defined?	Yes	No	No	No	Yes	No	No	Yes	No	No	Yes	Yes	No	No											5	9	0	0	14	14	35,71%	64,29%	0,00%	0,00%	100,00%	100,00%									
	19.	Is the minimum distance (m) to the neighbouring buildings defined?	Yes	No	No	No	Yes	No	No	Yes	No	Case to case decision	Yes	Yes	No	No											5	8	1	0	14	14	35,71%	57,14%	7,14%	0,00%	100,00%	100,00%									
	20.	Is the minimum distance (m) to the neighbouring groundwater wells defined?	No	No	No	No	Yes	No	No	No	No	Yes	Yes	Case to case decision	No	Yes											4	9	1	0	14	14	28,57%	64,29%	7,14%	0,00%	100,00%	100,00%									
	21.	Is the minimum distance (m, % of well depth) between the borehole heat exchangers defined?	Yes	No	No	No	No	No	No	No	No	Yes	Yes	Yes	No	No											4	10	0	0	14	14	28,57%	71,43%	0,00%	0,00%	100,00%	100,00%									
	22.	Is the target value for the average initial and input temperature (°C, K) of the heat carrier fluid defined?	Yes	No	No	No	Yes	No	No	No	No	No	Yes	No	No	No											3	11	0	0	14	14	21,43%	78,57%	0,00%	0,00%	100,00%	100,00%									
	23.	Are there any specific regulations on the heat carrier fluid type?	Yes	No	No	No	Yes	No	No	No	No	Yes	Yes	Yes	No	Yes											6	8	0	0	14	14	42,86%	57,14%	0,00%	0,00%	100,00%	100,00%									
	24.	Are there any specific regulations on the refrigerant type?	Yes	No	No	No	Yes	No	Yes	No	No	No	Yes	Yes	Yes	Yes											7	7	0	0	14	14	50,00%	50,00%	0,00%	0,00%	100,00%	100,00%									
	25.	Are there any regulations for the grouting of the borehole heat exchanger?	Yes	No	No	No	Yes	No	Yes	No	No	Case to case decision	Yes	Yes	No	Yes											6	7	1	0	14	14	42,86%	50,00%	7,14%	0,00%	100,00%	100,00%									
	26.	Is the flow test of the closed-loop and refrigerant tubing mandatory?	No		No	No	No	No	Yes	No	No	No	Yes	Yes		No											3	9	0	2	12	14	21,43%	64,29%	0,00%	14,29%	85,71%	100,00%									
	27.	Is the tightness test of the closed-loop and refrigerant tubing mandatory?	Yes		No	No	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes											8	5	0	1	13	14	57,14%	35,71%	0,00%	7,14%	92,86%	100,00%									
	28.	Is the borehole drilling report mandatory?	Yes	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes											10	4	0	0	14	14	71,43%	28,57%	0,00%	0,00%	100,00%	100,00%									
	29.	Is the sampling of the cuttings mandatory?	Case to case decision	No	No	No	No	No	No	No	No	No	No	Yes	Yes	No	Yes											3	10	1	0	14	14	21,43%	71,43%	7,14%	0,00%	100,00%	100,00%								
	30.	Is the sampling of the drilling core mandatory?	No	No	No	No	No	No	No	No	No	No	No	Yes	No	No	No											1	13	0	0	14	14	7,14%	92,86%	0,00%	0,00%	100,00%	100,00%								
	31.	Is the thermal response test (TRT) mandatory?	Case to case decision	No	No	No	No	No	Yes	No	No	No	No	No	Case to case decision	No	No											1	11	2	0	14	14	7,14%	78,57%	14,29%	0,00%	100,00%	100,00%								
	32.	Is the exact measurement of the borehole depth mandatory?	No	No	No	No	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes											6	8	0	0	14	14	42,86%	57,14%	0,00%	0,00%	100,00%	100,00%								
	33.	Are the groundwater investigations (dynamics, hydrochemistry, etc.) mandatory?	No	No	No	No	Yes	No	Case to case decision	No	No	No	Yes	No	No	No	Case to case decision											2	10	2	0	14	14	14,29%	71,43%	14,29%	0,00%	100,00%	100,00%								
Subtotal 18.-33.																																															
TOTAL 1.-33.																															TOTAL	176	247	36	3	459	462	38,10%	53,46%	7,79%	0,65%	99,35%	100,00%				
*total number of respondents is constant and equals 14, though, for calculations of percentage values in case of subtotal and total values the number of respondents was multiplied by a number of questions		yes	20	9	6	2	19	2	18	10	10	10	32	16	8	14	176																														
		no	6	21	27	29	14	31	12	21	20	19	1	7	21	18	247																														
		case to case decision	7	1	0	2	0	0	3	2	3	4	0	10	3	1	36																														
		no reply	0	2	0	0	0	0	0	0	0	0	0	1	0	3																															
		total replies	33	31	33	33	33	33	33	33	33	33	33	33	32	33	459																														
		total respondents	1	1	1	1	1	1	1	1	1	1	1	1	1	14																															

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	19.	Is the minimum distance (m) to the neighbouring buildings defined?															
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	21.	Is the minimum distance (m, % of well depth) between the borehole heat exchangers defined?															
	22.	Is the target value for the average initial and input temperature (°C, K) of the heat carrier fluid defined?															
	23.	Are there any specific regulations on the heat carrier fluid type?															
	24.	Are there any specific regulations on the refrigerant type?															
	25.	Are there any regulations for the grouting of the borehole heat exchanger?															
	26.	Is the flow test of the closed-loop and refrigerant tubing mandatory?															
	27.	Is the tightness test of the closed-loop and refrigerant tubing mandatory?															
	28.	Is the borehole drilling report mandatory?															
	29.	Is the sampling of the cuttings mandatory?															
	30.	Is the sampling of the drilling core mandatory?															
	31.	Is the thermal response test (TRT) mandatory?															
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