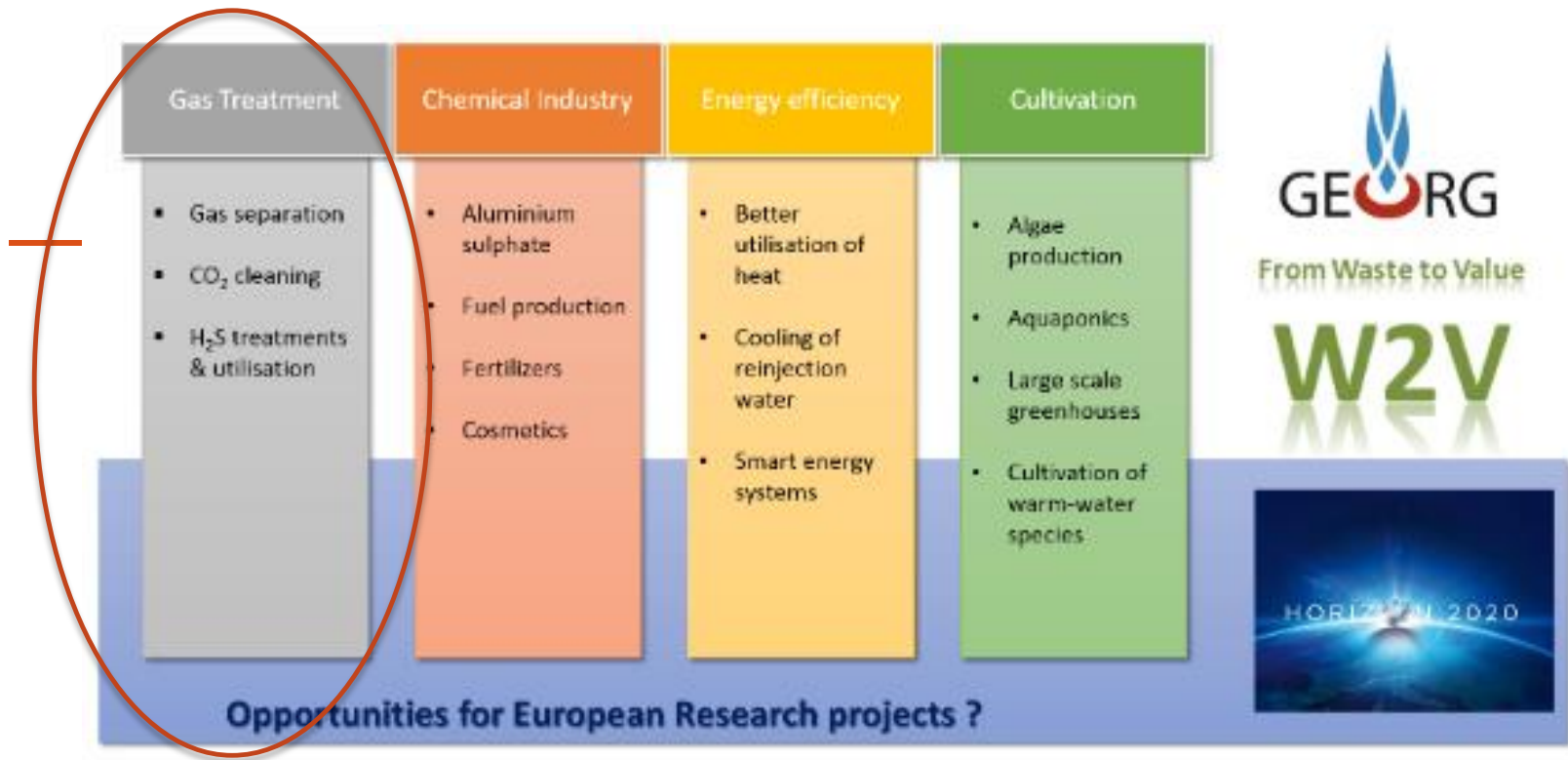


Gas separation in geothermal power plant exhaust

From Waste to Value

Bjarni Már Júlíusson



Gas Treatment

Towards Cleaner Geothermal Energy

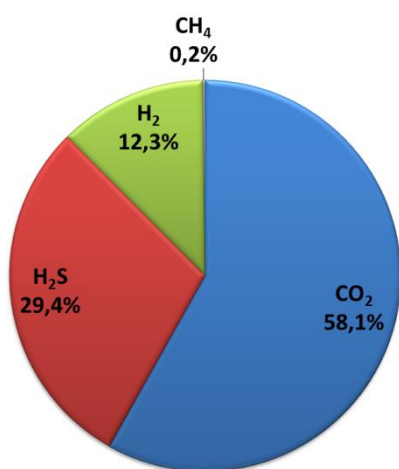
- » The gas emissions from geothermal power plants are mainly carbon dioxide (CO₂) and hydrogen sulphide (H₂S)
- » CO₂ is the primary emitted greenhouse gas and the reduction of its emissions related to human activities is one of the great challenges of this century. H₂S is a colourless, flammable gas with the characteristic odour of rotten eggs at low concentrations, while being toxic at high concentrations. Other emissions from Icelandic geothermal industry, in small amounts are hydrogen (H₂), nitrogen (N₂), methane (CH₄) and argon (Ar).



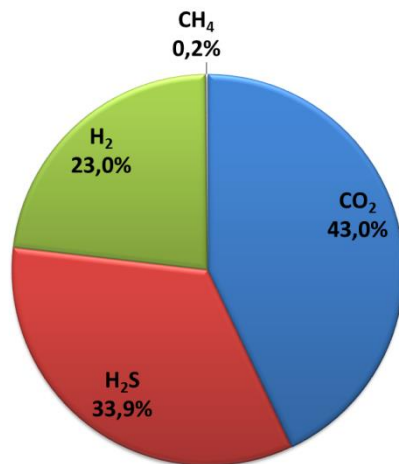
Composition of Gas and Total Emissions

- » Gas emissions have been gradually increasing
- » Total emissions from both power plants were 62000 tons CO₂ and 28000 tons H₂S in 2012
- » Equals about 5-6% of CO₂ emissions from fossil fuel power plants of comparable size.

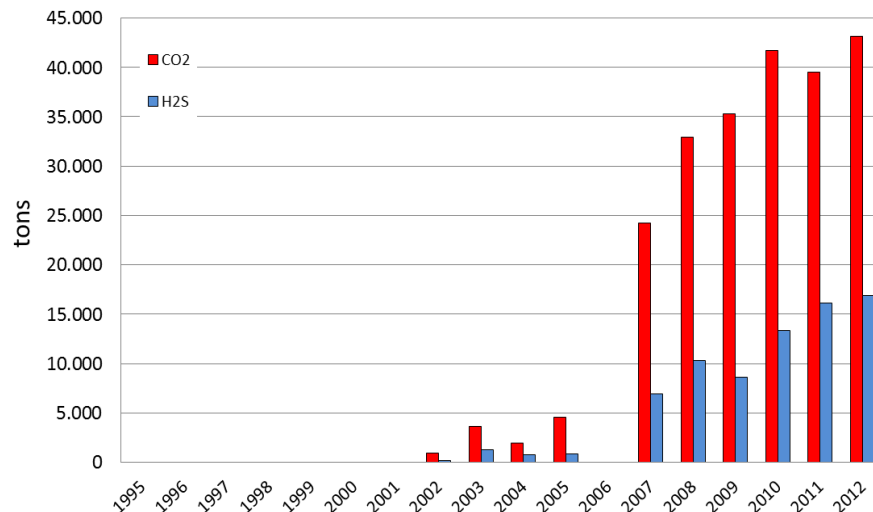
Hellisheiði power plant (% vol)



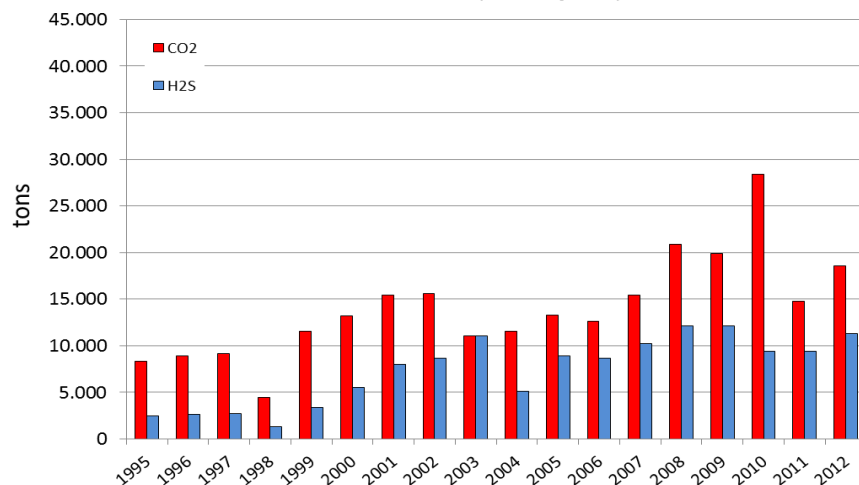
Nesjavellir power plant (% vol)



Hellisheiði Power plant
Gas emission (tons/year)



Nesjavellir Power plant
Gas emission (tons/year)



Great Potential lies in geothermal GeoPark

» From waste to value

- » The CarbFix and SulFix gas treatment processes together with electricity, hot and cold ground water, opens opportunities to change the geothermal power plant exhaust from waste to value.
- » The vision is to utilize the geothermal resource in the most sustainable and energy efficient way, creating valuable products from electricity, heat and fresh water produced at the power plant together with utilizing the waste streams in an environmentally friendly way.
- » CO₂ especially is a valuable gas once separated from the geothermal steam and gives opportunities for fuel production and cultivation opportunities:
 - » Algae production
 - » Bio-fuel production (Power storage)
 - » Large scale greenhouses
 - » Cultivation of warm-water species (Warm water aquaculture)

Gasskijlustöð - gasdæla



Hólaskrá			
Partur	K	X	H
1	302 270 890	304 742 630	298 30
2	302 284 270	304 647 500	297 30
3	302 298 130	304 608 530	296 30
4	302 309 290	304 600 700	295 30
5	302 318 500	304 598 000	295 30
6	302 688 220	305 091 430	296 30
7	302 346 460	305 146 050	297 30
8	302 354 570	305 241 000	297 30
9	302 358 140	305 157 000	296 30
10	302 372 620	305 171 800	297 30
11	302 374 020	305 121 600	297 30
12	302 387 360	305 352 640	299 30
13	302 390 120	305 421 580	299 30
14	302 392 350	305 421 200	299 30
15	302 392 230	305 489 150	299 30
16	302 394 020	305 530 000	299 30
17	302 393 600	305 641 000	299 30
18	302 396 710	305 649 860	300 30
19	302 398 380	305 708 870	300 30
20	302 400 300	305 742 320	299 30

Endur í minkum $\phi 315/\phi 180$ og flöns DN 150, sjá teki 220-MW-2115

Lögn undir nýverandi tek
sjá snið F teki 200-FJA-6121

Niðurrensliðala HN-14

Þéttvatnslögn frá gasskijlustöð
 $\phi 315$ PE SDR 17,6

Nýverandi niðurrensli DN 700/ $\phi 900$

Hóspennistengir

Tenging

Niðurrensliðala HN-9

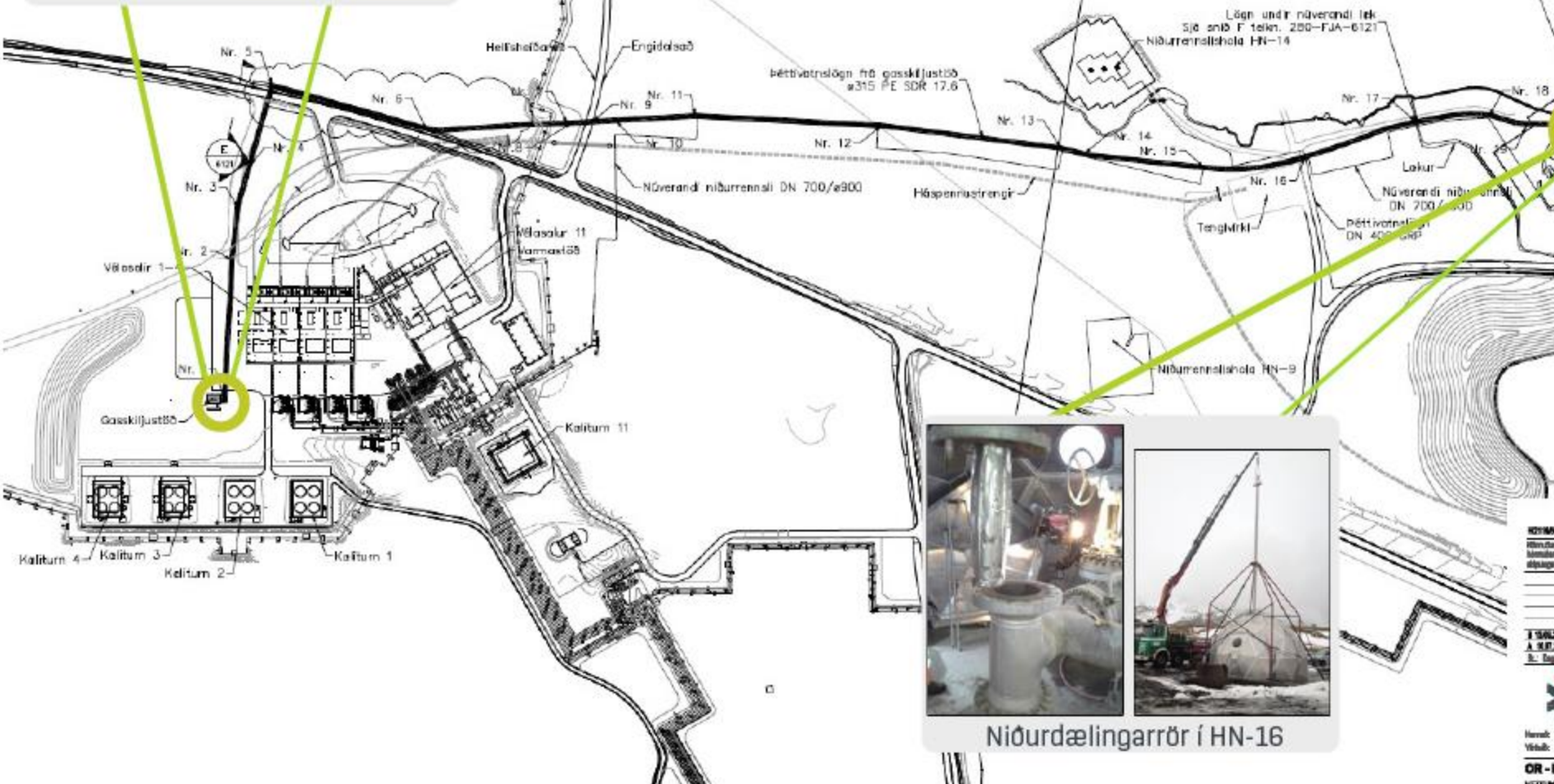
Nr. 17

Nr. 18

Lokur

Nýverandi niðurrensli
DN 700/ $\phi 900$

Þéttvatnslögn
DN 400/SDP



Niðurdælingarrör í HN-16

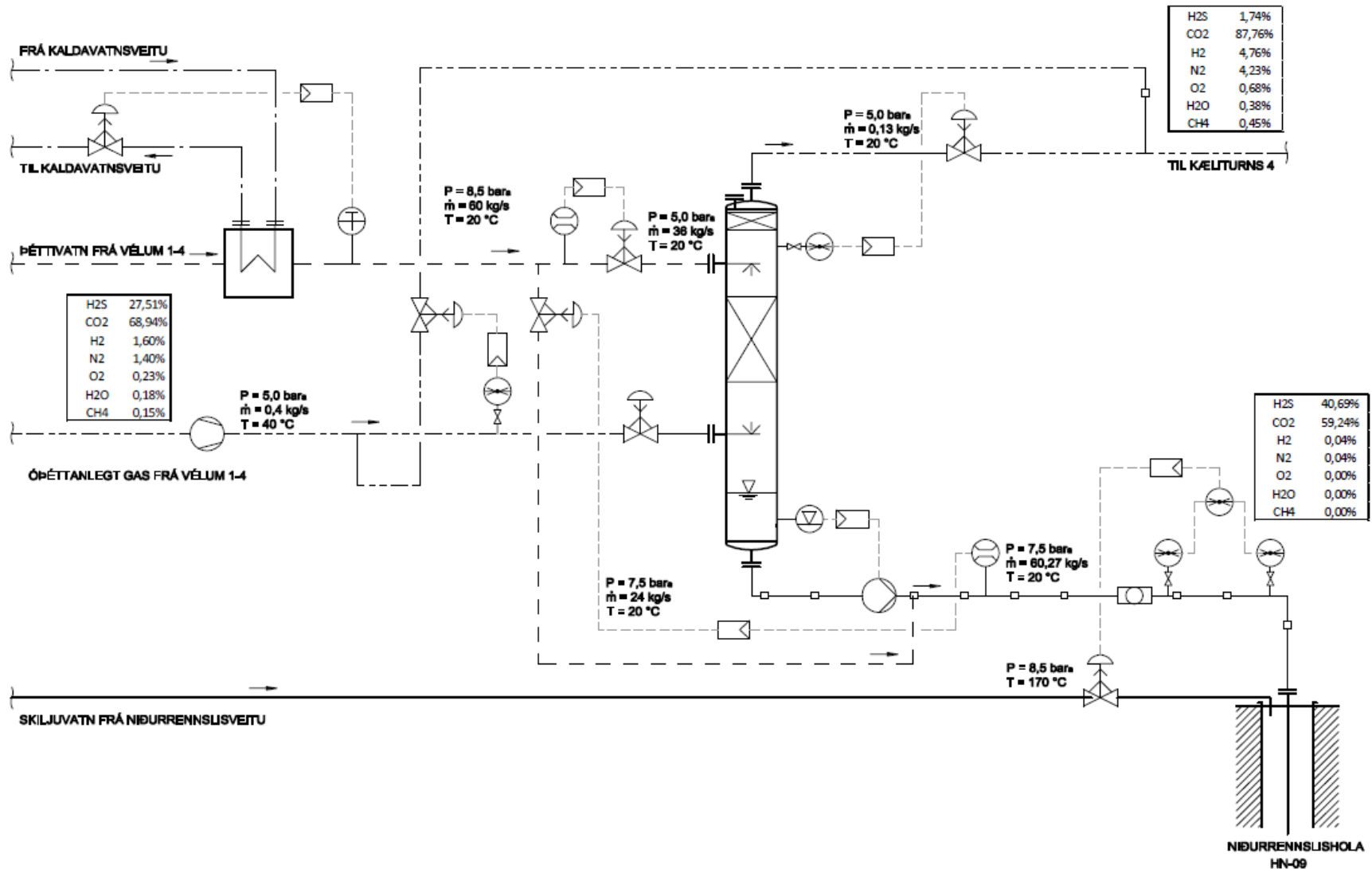
NOTA
Miklar og
smáar
hléar

1. SÍÐUR
A. SÍÐUR
B. SÍÐUR



Heim: Kóp.
Vélar: Au.
OR - HE
VERUR

SulFix , water absorption system



Gas pump and the scrubber column

