Presentation geothermal market in Europe

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Electricity // Summary of key conclusions

State of Play in 2018

- Europe passes the 3 GWe threshold for installed capacity
- Sustained growth rate of 10%/year
- 2018: 352 MWe added

127 Geothermal Power Plants

- 13 new power plants in 2018 in Turkey, 1 new in Iceland
- Croatia becomes a geothermal electricity producer
New installed capacity in 2018 by country

And number of geothermal power plants

- **Turkey**: 290.3 MWe (12 plants)
- **Iceland**: 45 MWe (1 plant)
- **Croatia**: 17.5 MWe (1 plant)
Number of geothermal power plants per country

- **In operation**
- **Under development**
- **Under investigation**
Geothermal electricity capacity in Europe
Average size of geothermal electricity turbines by types of plants
Number of installed turbines by manufacturer

- Alstom/GE
- Ansaldo Tosi
- Atlas Copco
- British Thompson Houston
- Electra Therm
- Exergy
- Fuji
- Kaishan
- Mitsubishi
- Ormat
- Pratt and Whitney
- Rotoflow
- Siemens
- Toshiba
- Turboden

NEW IN 2018
District heating // Summary of key conclusions

State of Play in 2018

- Over 5 GWth of geothermal DH
- 12 new or renovated plants over the last year, 150MWth

300 Geothermal DH Plants

- 5 new project commissioned in the Netherlands
- 1 new and 3 renovated plants in France
- 1 new project in Serbia
- 1 new project in Belgium
- 1 new project in Germany
New plants for deep geothermal for heating and cooling in 2018 (capacity and number)

- **NETHERLANDS**
  - New: 5
  - 66 MW

- **FRANCE**
  - New: 1
  - 45 MW
  - Revamped: 3

- **GERMANY**
  - New: 1
  - 24.5 MW

- **BELGIUM**
  - New: 1
  - 8 MW

- **SERBIA**
  - New: 1
  - 5.7 MW
Number of GeoDH plants in operation and under development-investigation per country
Average size of deep geothermal heating and cooling plant per country
Gap to deep geothermal heating and cooling objectives in NREAPs
Typology of geothermal heating and cooling projects operators in Europe

- Public authority: 63
- Local energy company: 80
- Large private operator: 59
- Smaller private operator: 86
More than 25% of the EU population lives in areas directly suitable for geothermal district heating

Map of areas suitable for geoDH networks and actual geoDH installed capacity according to available geological data

Source: ETIP-DG, adapted from GEODH and EGEC market report
State of Play in 2018

- Total Installed Capacity in Europe: ca. 23,000 MWth
- More than 1.9 million units
Stock and sales geothermal heat pumps in 2018
Gap to completion of NREAP objectives on shallow geothermal (ktoe)
Supplying heat & power to companies

- CORPORATE (physical ad virtual) PPA (also to cooperatives and through networks)
- PPP & JOINT VENTURES: example of ECOGI (France)
- PROJECT DEVELOPERS: example of greenhouses in Netherlands
Corporate PPA

**ICELAND**
Landsvirkjun signed 35-MW hydro, geothermal PPA with United Silicon
And 58-MW PPA with PCC Bakki Silicon HF for a similar silicon metal plant

**USA**
Physical and virtual PPA
Geothermal > Apple

**MEXICO**
52 MW to Minera Monteverde (metals & mining), Elektra (retail), Axtel (telecom)
Virtual PPA

CUSTOMER (i.e. “YOUR COMPANY”)

POWER MARKET A

UTILITY OR ENERGY SUPPLIER

€/KWH

VPPA CONTRACT

SETTLEMENT TRANSFER (€/KWH)

CERTIFICATE

GEOTHERMAL

POWER MARKET B

€/KWH

Adapted from EPA Green Power Partnership
Towards a heat market design to develop geothermal heating and cooling

- End fossil fuel subsidies
- Carbon pricing
- Prevent lock-in of fossil fuel infrastructure
- Cost comparison (French ministry database)
Thank you for your attention