POLICY MAKER'S AWARNESS AND PUBLIC ACCEPTANCE OF GEOTHERMAL PROJECTS IN THE PARIS BASIN

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OUTLINE

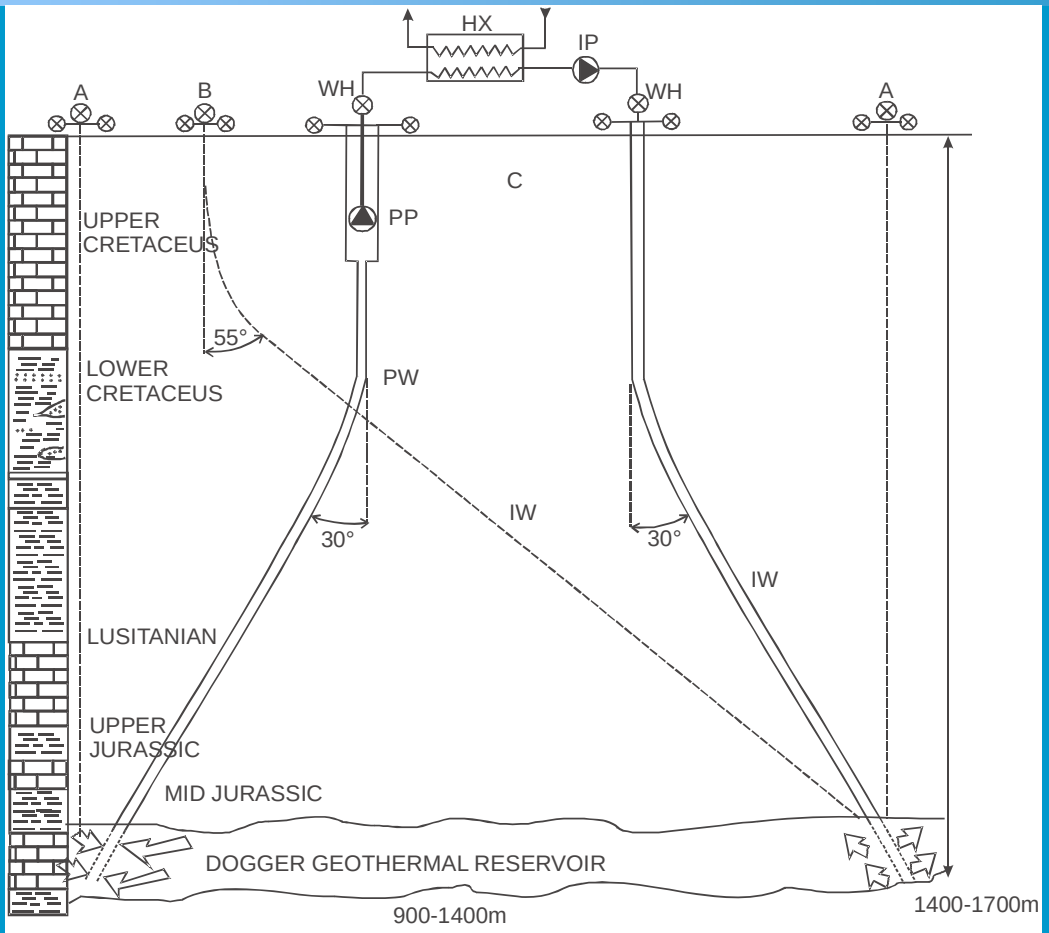
- SCOPE
- MILESTONES
- ACTORS
- AWARENESS/ACCEPTANCE
- WHERE ARE WE NOW?
- WHERE TO GO NEXT

SCOPE

- GEOTHERMAL UNDERTAKING/ACHIEVEMENTS
  - GEOTHERMAL DISTRICT HEATING (GDH)
    - 54 completed GDH doublets
    - 34 on line @ 2007
    - 200 MWt installed capacity
    - 1,000 GWht/yr heat production
    - 100,000 heated equivalent dwellings (#400,000 end users)
    - ca 500,000 t saved CO2 emissions
    - 19 natural gas (combined cycle) cogeneration doublets
  - HEAT PUMPS
    - GDH back-up - abandoned
    - Groundwater (GWHP) - fast growing
    - Ground source (GSHP) - booming

PARIS BASIN GDH

THE GEOTHERMAL WELL DOUBLET OF HEAT EXTRACTION

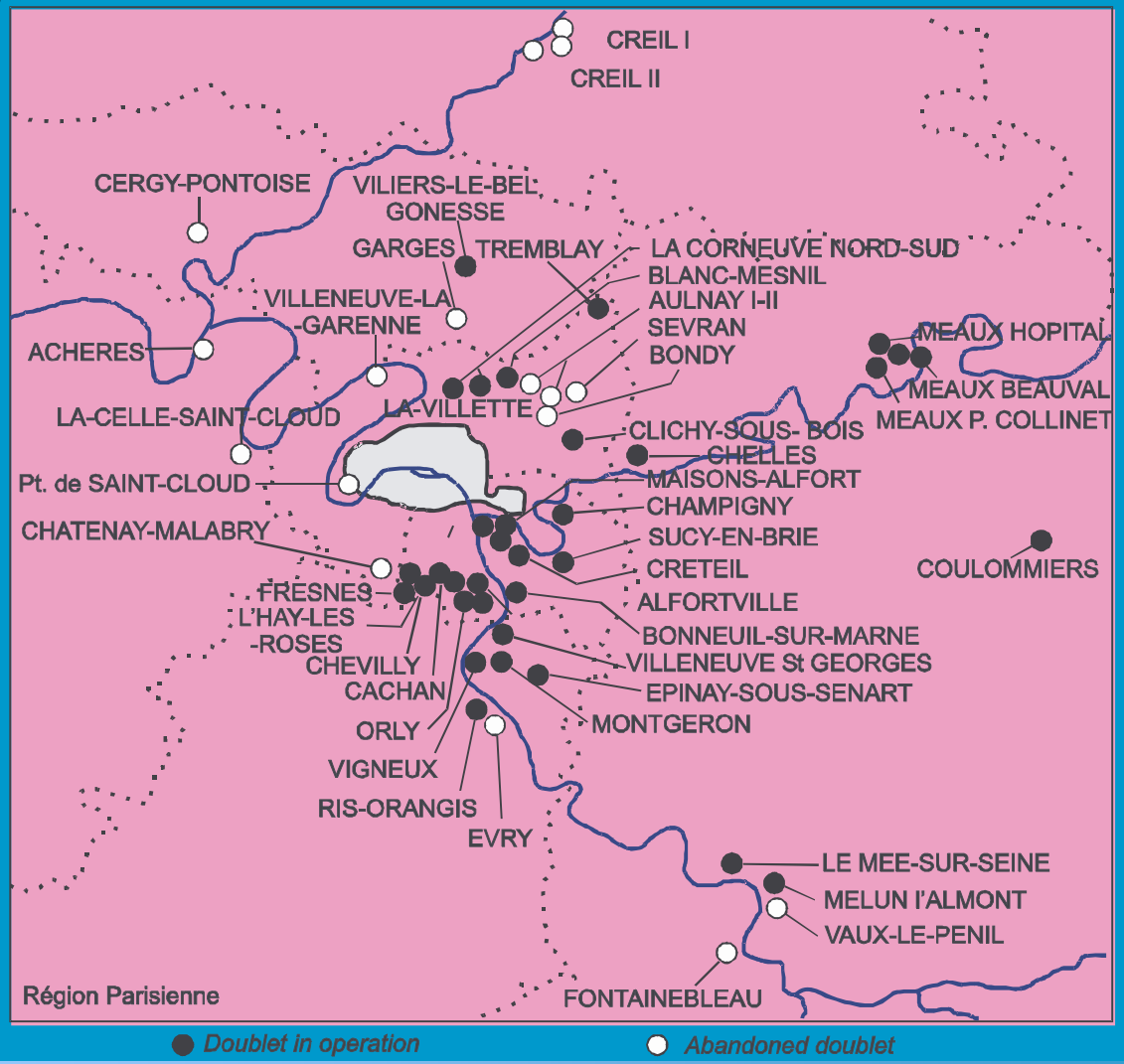


A - two vertical wells
B - 1 vertical, 1 deviated
C - two deviated wells

PP production pump
IP injection pump
HX heat exchanger
PW production well
IW injection well
WH wellhead

STATUS

PARIS BASIN. LOCATION OF GDH DOUBLETS

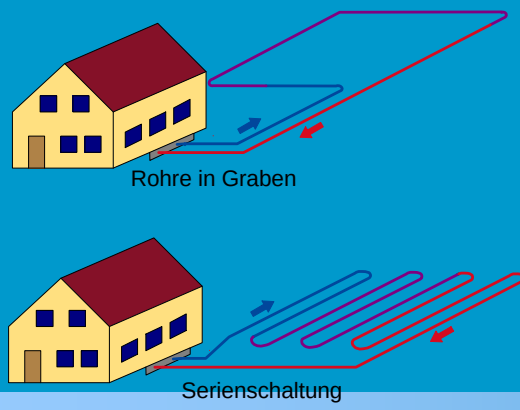


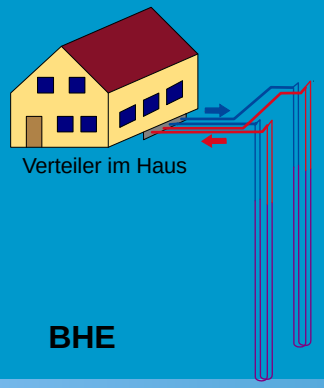
Source: GPC, 2003

HEATING AND COOLING
HEAT PUMPS
SHALLOW GEOTHERMAL ENERGY FOR HEAT AND COLD

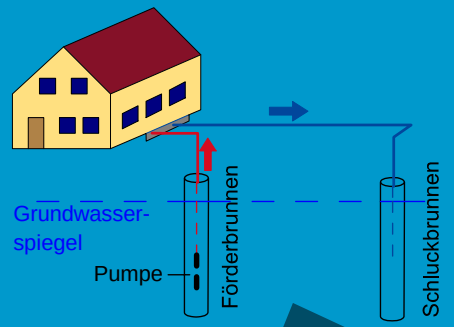
The various shallow geothermal methods

- horizontal loops — 1.2 - 2.0 m depth
- borehole heat exchangers (vertical loops) — 10 - 250 m depth — **about 80 % of all systems**
- energy piles — 8 - 45 m depth
- ground water wells — 4 - 50 m depth
- water from mines and tunnels





BHE



Groundwater wells

source Sanner, 2006

MILESTONES

YEAR(S)	EVENT(S) / PHASE	STATE INVOLVEMENT	PUBLIC RESPONSE
Late 1960s	1st GDH doublet	Low	Curiosity
1973-1978	1st Oil shock Regulatory framework GDH commissioning	High	Positive
1979-1986	2nd Oil shock GHD full scale development first damaging symptoms	Very high	Wait and see
Late 1980s	Early exploitation Learning curve	Wait and see	Sceptic & hostile
1990s	GDH restructuring Maturation	Very high	Neutral
2000s	Kyoto Protocol/sustainability issues Gas cogeneration Routine GHD exploitation	Steady	Sympathetic/positive
2010	Redeployment Sustainable resource management Absorption/cooling/GWHP/GSHP	Sustained?	Enthusiastic?

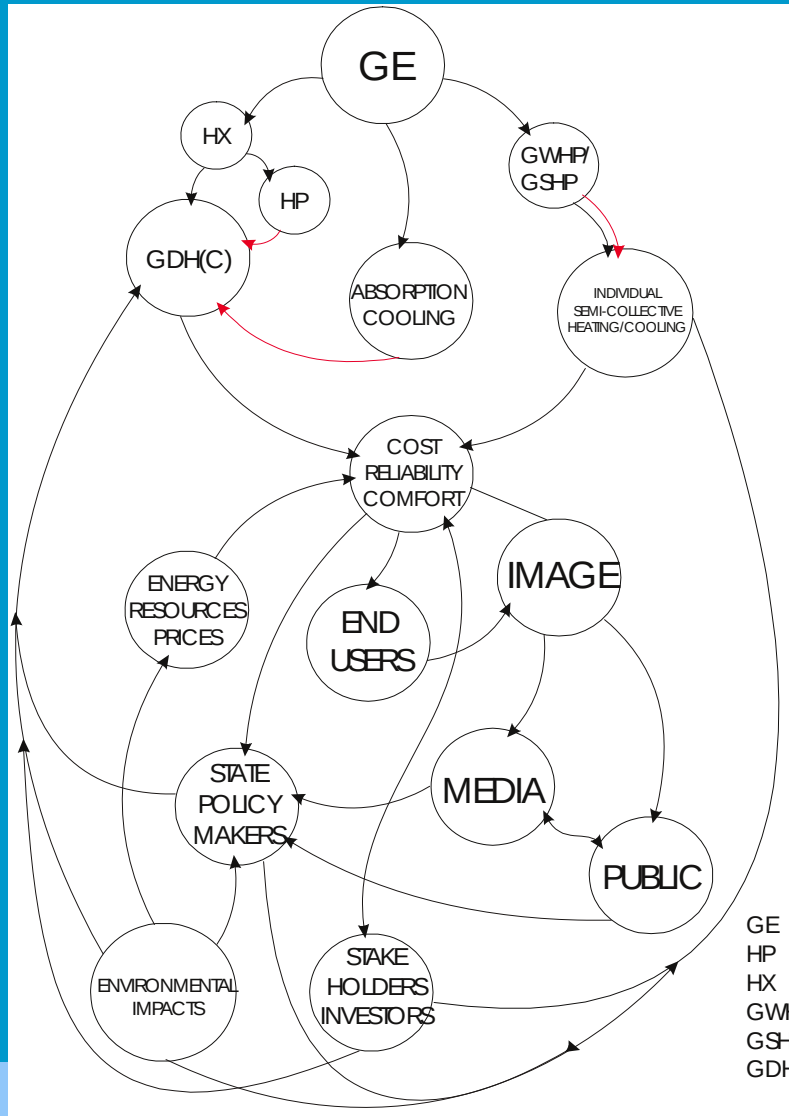
GDH COSTS (M€ @ 2007)

WELLS	8-10
Geothermal loop/heat plant	1
Heating grid/substations	9-12
Miscellaneous	1
TOTAL	19-24
OM costs	0.4-06

GWHP/GSHP COSTS (H&C) (10^3 € @ 2007)

GWHP	
150 kWt	150-200
OM	20-25
GSHP	
10 kWt	20-25
OM	<2.5

GDH AN INTERACTIVE & MITIGATING MINING/ TECHNOLOGICAL/ECONOMICAL/ENVIRONMENTAL/ COMMUNICATION PROCESS



GE	Geothermal energy
HP	Heat pump
HX	Heat exchange
GWHP	Ground water heat pumps
GSHP	Ground source heat pumps
GDH(S)	Geothermal district heating (cooling)

OPERATORS/END USERS

- OPERATORS (HOLDERS OF MINING RIGHTS)
  - **Public** – townships, social dwelling agencies
  - **Private** – district heating (DH) service companies (either owners of mining rights and installations or delegate of public service GDH duties and rights)
- END USERS
  - **Private** – building owners, dwelling co-owners and tenants
  - **Public** – State-owned building and facility occupants (administrative, educational, cultural, sportive, fiscal ...)

GDH STAKEHOLDERS

- ENERGY UTILITIES
  - Power supplier/buyer (feed-in tariffs natural gas cogenerated GDH plants) – EDF
  - Natural gas supplier. GDH back-up/relief loads, NG cogenerated GDH plants. GDF
- CENTRAL/DISTRICT HEATING SERVICE COMPANIES
  - operate and maintain the heat distribution grid and, eventually, the GDH heat plant
  - may be awarded a farming/concession/public service delegation contract
- EQUIPMENT SUPPLIERS
  - piping (casing and grid)
  - pumping (downhole, surface)
  - hydraulics (valves, wellheads)
  - electronics/regulation (frequency converters, automation)
- FLUID MONITORING/PROCESSING
  - fluid handling/thermochemical inhibition
  - solution gas abatement
  - monitoring/maintenance/rehabilitation of production/injection facilities

GDH IMAGE

- GDH difficult to apprehend & comprehend
- GDH remains esoteric and somewhat exotic compared to other RE and fossil fuel sources
- A heavy past record. GDH was regarded, in the early days, as a poorly reliable, expensive and, occasionally, hazardous technology
- *More efforts required to attract a wider social acceptance and public/policy makers' awareness.*

WHERE ARE WE NOW? (1)

- GDH
  - Paid a severe tribute to a somewhat chaotic past record;
  - Restored an upgraded image, thanks to evidence of mature, technological, entrepreneurial and managerial skills;
  - Gained credibility, from both the Public and State, despite a wait and see, more or less opportunistic, attitude of the media;
  - Benefited, at large, from a recently favourable energy (persistently high fossil fuel prices) and environmental (clean air concerns, GHG emissions, global warming and climatic changes) context;

WHERE ARE WE NOW? (2)

- **GDH still suffers from structurally limiting factors**
  - GDH is **heat** (and, at the best, cold) addicted;
  - GDH addresses settings combining both a dependable hot water source and a surface, economically viable, heat load;
  - GDH is, therefore, highly site specific and subject to **local** political issues;
  - GDH, due to its local character escapes the casual **lobbying** rationale;
  - GDH cannot advocate any specific **technological attribute** (comparable to wind energy turbines, PV cells, solar thermal collectors, biomass reactors...)

WHERE ARE WE NOW? (3)

- HEAT PUMP (GWHP/GSHP) ISSUES
  - high public awareness
  - thorough state responsiveness
  - boosting customer demand
  - mitigated entrepreneurial response
  - great future expectations

WHERE TO GO NEXT?

- **GDH** WHAT IS NEEDED MOST
  - ***Operators side.*** More integration, less dissemination, by grouping several GDH grids into single management structures with a well defined mining/heating synergy
  - ***State side.*** A clearly stated (and applied) environmental policy by favouring RES via relevant regulation, fiscal incentives and ecologic taxation.
  - ***Overall.*** Gain wider social acceptance via selectively targeted actions and relevant communication.
- GWHP AND GSHP
  - less or not subject to site specificity
  - the greatest future
  - let it go and fly