

The Four Deep Geothermal Energy Generations

①

from 8000 BC



1st Generation

Ancient thermal bath

natural random discoveries

geographically limited to hot springs

kW category

Examples:
Baden (CH)
Abano Terme (I)
Hungary
Hot Springs (USA)
Spa (B)

virtually free heat

②

from 1910



2nd Generation

Power plants with natural heat sources
random hydro geology

geographically limited to volcanic areas (geologic anomalies)

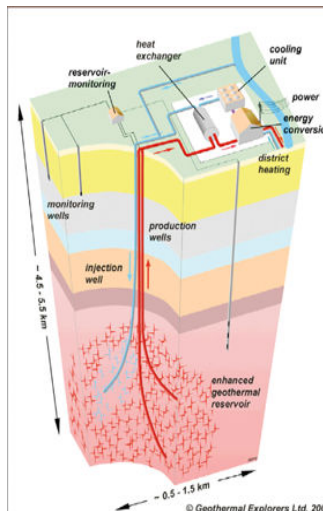
only MW class

Examples:
Iceland
New Zealand
Philippines
Hawaii (USA)
Lardarello (I)

0,06-0,20 \$/kWh

③

from 1960



3rd Generation

Power plants fed by drilled heat sources
Artificial hydro geology (also heat pumps)

!! Local Earthquake Risk !!
with deep boreholes using high hydraulic overpressures (hydraulic fracturing)
relatively small energy yield

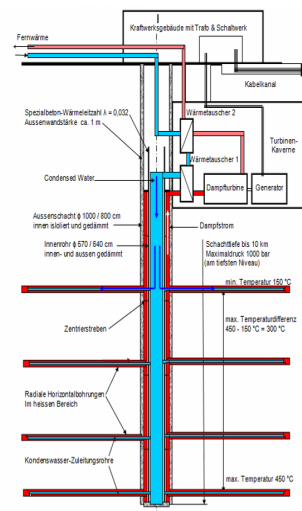
lower MW class

Examples:
Riehen (CH) *
Soutz (F)
Landau (D) *
Cornwall (UK)
Staufen (D) *

0,10 - 0,90 \$/kWh
part or total loss

④

from 2010



4th Generation

GEOCOGEN
with closed water cycle without artificial overpressure (co-generation)

no dangers
can be built nearly anywhere (all underground)
very big power & heat production

GW class

Potential:
worldwide unlimited in the proximity of energy consumers (short distances)

0,01 - 0,02 \$/kWh