



Swiss Association of Energy Geoscientists
Schweizerische Vereinigung von Energie-Geowissenschaftlern
Association suisse des géoscientifiques de l'énergie
Associazione svizzera geoscientifici dell'energia



UNIVERSITÉ
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FACULTÉ DES SCIENCES

Department of Earth Sciences



The Swiss Association of Energy Geoscientists (SASEG)
in cooperation with the AAPG and SPE
and the University of Geneva presents
a lecture by

By Prof. em. Dr. Ladislaus Rybach

Institute of Geophysics ETH Zurich

GEOHERMAL SUSTAINABILITY

Thursday, 8 December 2022, 17h15

University of Geneva, Department des Sciences de la Terre, Auditorium 001
13, Rue des Maraichers,
1205 Genève

You are cordially invited to attend or join us on Zoom:

<https://unige.zoom.us/j/65602410214?pwd=TWRIUUt5b3dxMFFUTm5qUE12amo1Zz09>

Meeting ID: 656 0241 0214

Passcode: 772814





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Geothermal sustainability

By Ladislaus Rybach

Institute of Geophysics ETH Zurich

ABSTRACT:

The sustainable use of geothermal resources should secure longevity of production. This can be achieved by moderate production rates, taking into account the local conditions (field size, natural recharge rate, etc.). After production stops, the resources recover by natural processes; the production of geothermal fluid and/or heat successively creates a hydraulic/heat sink in the reservoir. This leads to pressure and temperature gradients, which in turn – after termination of production – generate fluid/heat inflow to re-establish the pre-production state. Geothermal resources can regrow like biomass.

The recovery shows asymptotic behavior, being strong at the beginning and slowing down subsequently, the original state re-establishes theoretically only after infinite time. However, practical replenishment (e.g. 95% recovery) will already be reached much earlier, generally on a time-scale of the same order as the lifetime of geothermal production systems.

The sustainability of production can be ensured by moderate production rates. The sustainable geothermal production level depends on the utilization technology as well as on the local geologic conditions. Concerning the requirements for sustainable production, four resource types and utilization schemes are treated, by numerical model simulations: 1) heat extraction by geothermal heat pumps; 2) hydrothermal aquifer, used by a doublet system for space heating; 3) high enthalpy, two-phase reservoir, tapped to generate electricity; 4) Enhanced Geothermal Systems (EGS).

Prof. em. Dr. Ladislaus Rybach

Prof Rybach is of Hungarian origin, emeritus professor of geophysics at ETH Zurich (Switzerland), co-founder, now Scientific Advisor of ETH spin-off company GEOWATT AG Zurich. His research activities cover a wide range, from heat flow studies and lithospheric geothermics over low-enthalpy utilization (geothermal heat pumps) to Hot Dry Rock modelling. He is active worldwide as expert and lecturer, President 2007-2010 of the International Geothermal Association (IGA), Co-founder of the IEA Geothermal Implementing Agreement and Former Executive Committee Chairman; Honorary Doctor and Professor of Eötvös University, Budapest.