Interview 9 - Dr. Chiasson, USA

Profile
Name: Andrew Chiasson
Age: 50
Education: PhD in Engineering
Activity: Faculty, Department Mechanical & Aerospace Engineering, University of Dayton
Lives in Ohio, USA
Experience in the thermogeology sector: 20+ years
Geographical working area: USA

Thermogeology in USA

Andrew Chiasson is a professor at the University of Dayton (Ohio) in the Department of Mechanical & Aerospace Engineering, where he teaches courses and conducts research in the areas of thermofluid sciences, renewable and clean energy, geothermal energy, and solar energy engineering. He has academic and professional practice experience in a wide range of geothermal and hydrogeologic applications related to geothermal heat pumps (geoexchange), direct-use geothermal, small-scale electrical power generation, hydrogeological site evaluations, and groundwater flow and mass/heat transport modeling. Dr. Chiasson has been extensively involved in research and development of design and simulation tools for optimal earth heat exchanger coupling, hybrid geoexchange systems, and underground solar energy storage. As a Professional Engineer in the United States and in Canada, he has designed numerous closed and open-loop geoexchange systems and HVAC systems for a wide variety of building types. He is a member of ASHRAE Technical Committees, an IGSHPA member, and an Associate Editor of Geothermics Journal.

What are the main features of the Shallow Geothermal Energy in USA?

As one might imagine, shallow geothermal energy features in the contiguous USA are extremely diverse. From west to east, the Western U.S. borders the Ring of Fire, and thus contains relatively shallow high-enthalpy resources. The interior of the country is dominated by sedimentary basins of normal geothermal gradient. The Eastern US contains orogenic belts remaining from the opening of the Atlantic Ocean. Groundwater resources of the US are also plentiful. Attempts have been made by the United States Geological Survey (USGS) to categorize these groundwater regions: https://water.usgs.gov/ogw/aquifer/atlas.html. The climate of the U.S. is also quite diverse, which affects shallow Earth temperatures. The climate varies from subtropical in the south and south east, to Mediterranean on the West Coast, to cold and humid in the northern Great Lakes. Within these, there are local variations related to mountains, deserts, and lakes.

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How is thermogeology managed by regulation? Is there an official cadaster of the private and public installations?

The main regulations in the U.S. related to thermogeology are the regulation of groundwater and wells. Groundwater is a resource, and is therefore protected and regulated, typically at the State level. Drilling of vertical boreholes is regulated, mostly to protect the subsurface from contamination. Permits are required in all States for the drilling of water wells, and must be done by licensed drillers. The same is true in many states for drilling of any vertical borehole. Strict laws exist regarding grouting and proper sealing of boreholes and wells. Many States have searchable databases of water well logs.

Recently in the U.S., the National Geothermal Data System (NGDS) (http://geothermaldata.org/) was created to house geothermal data of all types, but currently mainly consists of high-enthalpy resource data.

Yet another resource is the U.S. Energy Information Administration (EIA) which, in the past, has tracked details of geothermal heat pump shipments: https://www.eia.gov/renewable/annual/geothermal/

Financially, is thermogeology competitive with other renewables?

Yes. In fact, on a life-cycle basis, thermogeology is competitive with conventional energy systems in the U.S.. There are ebbs and flows, however, with natural gas prices.

What are the main obstacles faced by thermogeology?

Regarding geothermal heat pump systems, the main obstacle is the higher capital costs associated with implementing these systems, along with the short-sighted nature of consumers not willing to consider life-cycle cost. Another obstacle is lack of public understanding and awareness of these systems.

How would you improve (if necessary) the diffusion of thermogeology in your country?

Public awareness, education, and outreach activities are critical pathways. Educational curricula, particularly at early levels, will help to disseminate the technology and concepts.

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