IEA-GIA

International Energy Agency
Geothermal Implementing Agreement

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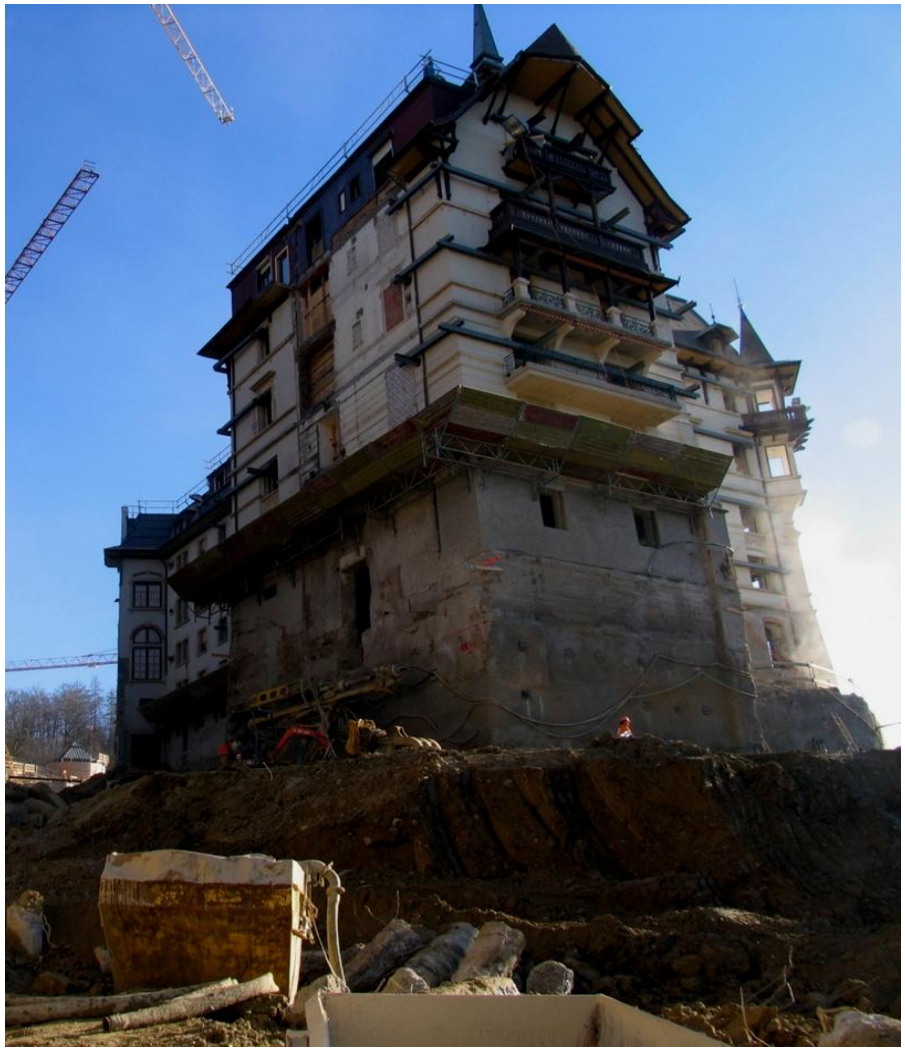
Outline



Geothermal heat-pump installation
Hotel Dolder, Switzerland, L. Rybach

- Role of IEA
- Global Energy Situation
- IEA Implementing Agreements
- IEA-GIA
  - Mission
  - Current Activities
  - Achievements
    - Sustainability
    - Global Geothermal Potential

International Energy Agency

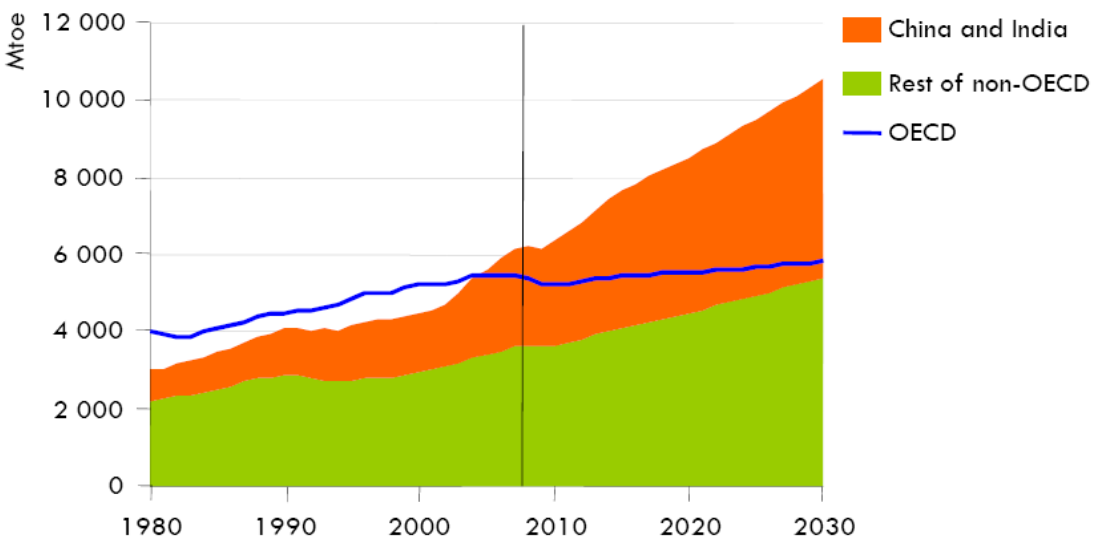
Nuova Gabbro, AMIS, Italy, Cappetti

- IEA established in 1974 within OECD
- Influenced by the Arab-Israeli war in 1973.
- Co-operation between 26 of the 30 OECD countries in:
  - Coping with oil supply disruptions
  - Promote rational energy policies
  - Operate an information system
  - Develop alternative energy sources
  - Increase efficiency
  - Integrate environmental and energy policies.
- Iceland is not a member of IEA

World Energy Outlook

Continued growth in primary energy demand

- **Primary Energy Demand:**
  - 50% increase 1980-2008
  - 45% increase 2008-2030 predicted
  - Fossil fuel contribution 77% of increase
- **Electricity Generation:**
  - 76% increase 2008-2030 predicted
- **Population Growth:**
  - 50% increase 1980-2008
  - 25% increase 2008-2030 predicted
- **GHG Emissions:**
  - 35% increase 2005-2030
- **IEA Conclusion:**
  - World energy development **not sustainable**



Non-OECD countries account for 93% of the increase in global demand

Source: IEA World Energy Outlook 2009

IEA - Implementing Agreements (IA)

Habanero, Australia, Geodynamics

- The IA facilitate international co-operation and collaboration on research, development, deployment and demonstration.
- There are 41 IA covering all the key technologies of energy supply and end use.
  - Clean & advanced fossil fuel technologies, the entire range of renewables, & end use technologies (buildings, electricity, transport etc.), fusion and cross cutting activities.
- The IEA technology roadmaps serve as an input to G8 for decision making in how to reduce GGE emissions by 50% in 2050!
- According to IEA Energy Technology Perspective, 21% of the necessary GGE reductions will have to come from renewable energy production.

IEA-GIA

Established in March 1997

Current (3rd) term operates to 2012

Currently 19 Members:

- 13 Countries:
  Australia, France, Germany, Iceland, Italy, Japan, Mexico, New Zealand, Norway, Republic of Korea, Spain, Switzerland and the United States
- European Union
- 5 Industry Members:
  CanGEA, Geodynamics, Geothermal Group- APPA, Green Rock Energy, ORMAT Technologies

Secretariat at GNS, Taupo, New Zealand

IEA-GIA Mission

Landau, Germany

To promote sustainable use of geothermal energy worldwide

by improving existing and developing new technologies to render exploitable the vast and widespread global geothermal resources,

by facilitating the transfer of know-how,

by providing high quality information

by widely communicating geothermal's strategic, economic and environmental benefits, and thereby contribute to the mitigation of climate change

To realize this Mission, GIA participants take part in one or more tasks in the current five major study areas (Annexes):

Highlighted Efforts

Annex I: Environmental Impacts

Investigation of sustainable production strategies , Geothermics Special Issue 2011

Annex III: Enhanced Geothermal Systems

Induced Seismicity Protocol

Annex VII: Advanced Geothermal Drilling

Well drilling cost database, drilling best-practices handbook for review

Annex VIII: Direct Use of Geothermal Energy

Chemistry and temperature database, develop geographic display on Google Earth

Annex X: Data Collection and Information

Mokai, New Zealand, Ormat

Highlighted Efforts
Sustainability

- Workshop on Geothermal Sustainability Modelling
  - International NZ Workshop with Wairakei 50th Anniversary
  - Over 40 participants from 6 countries
  - 20 Presentations on GIA Website
  - Covered: case histories of power and direct use developments, risk and terminology considerations, etc.

  - Led to the preparation of:
- Geothermics Special Issue on Sustainable Utilization
  - Guest Editors: Mike Mongillo & Guðni Axelsson
  - Both Electricity Generation and Direct Heat Use (including GHPs)
  - So far: 10 papers received; more expected
  - Publication date: end 2010

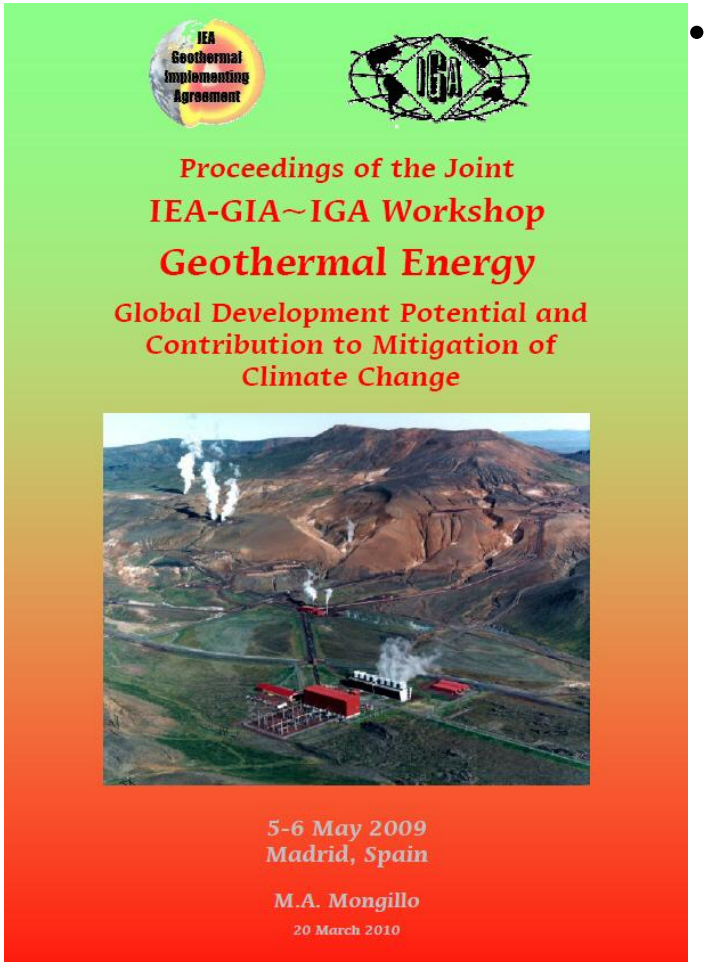
Yellowstone, USA

Highlighted Efforts
Climate Change Mitigation

Kawerau, New Zealand

- **IPCC Renewable Energy Special Report**
  - Scoping study review
  - GIA input- members as Lead & Contributing Authors and Reviewers
  - Joint GIA-IGA Workshop input

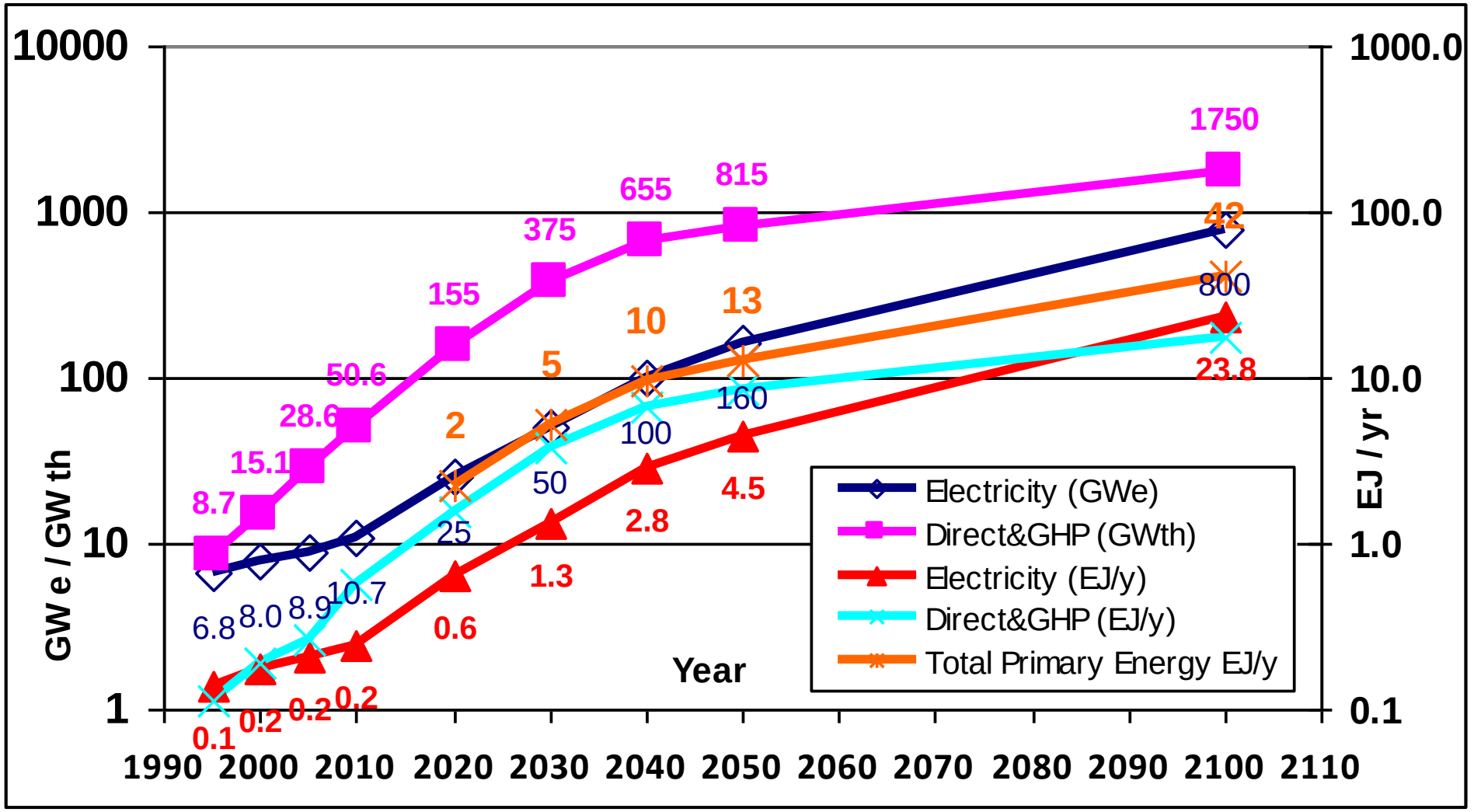
Highlighted Efforts
Global Geothermal Potential



- **Joint IEA-GIA~IGA Workshop**
  - IPCC RE Scoping Study (2007)
  - Geothermal contribution
    - Fridleifsson, Bertani, Huenges, Lund, Ragnarsson and Rybach
    - International comment via GIA website
  - ***Led to Joint IEA-GIA~IGA Workshop***
  - Held in Madrid, Spain
  - Over 50 international participants from 17 countries
  - Co-Chaired by C. Bromley & L. Rybach
  - Topics: Potential definitions, current use and global potential estimates, future potentials
  - GIA Website Presentations
  - Workshop Proceedings
    - Available on IEA-GIA and IGA websites

Global Geothermal Deployment

Actual and projected



IPCC geothermal group

Conclusions

- IEA-GIA has enjoyed considerable success over the past 12 years promoting collaboration & sustainable use of geothermal worldwide
- We expect geothermal will contribute significantly to the provision of energy to satisfy growing global demand, but we need to:
  - Improve & develop new technologies
  - Promote benefits of geothermal & its long-term sustainable use
  - Stress contribution geothermal can make to mitigation of climate change
- This will require significant international effort
- The next IEA-GIA meeting will be in Iceland in October, hosted by Orkustofnun and Reykjavik Energy.

To Find Out More