

# Geothermie - die Sicht der Versicherung

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SWISS RE  
**150**  
YEARS

# Swiss Re - we enable risk-taking that is essential to enterprise and progress

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We identify and evaluate risks

Climate change identified as emerging risk almost 20 years ago

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We select and take risks

Insurance of single risks (eg industrial plants) or entire portfolios of risk (eg motor insurance portfolio)

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We transfer and trade risks

Securitisation of earthquake, hurricane or life risks

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We educate and consult on risks

Over 30 risk-related publications during the last 12 months

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# Agenda

- What can go wrong?
- How are the risks perceived by the public?
- How does Swiss Re assess the risks?
- Can Geothermal Power be insured?

# What can go wrong?



# Loss scenarios Geothermal power

## Induced earthquakes

- due to the drilling
- heat carrying liquid which is forced with high pressure into the ground (e.g. Hot Dry Rock)

## Settlements or heave

- due to change in groundwater regime in the soil
- e.g. by puncturing an aquiclude (water impermeable ground layer)

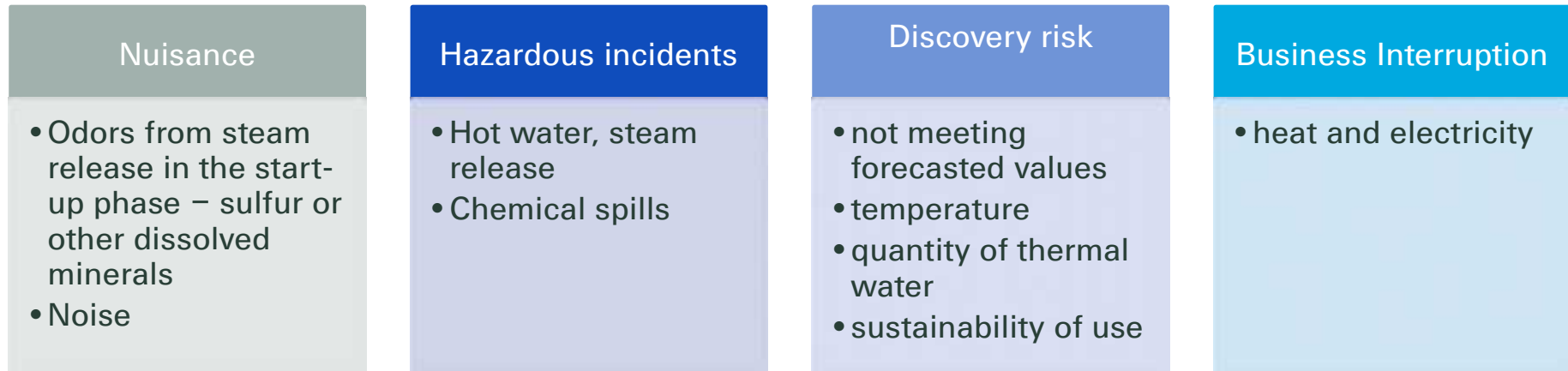
## Environmental impact Pollution of ground or groundwater

- due to a leakage in the bore hole
- due to boring puncturing of ground layers which alters water regime
- Chemicals e.g. biocides, corrosion inhibitors, arsenic, radioactivity
- Soil compression from construction activities

## Bore hole blow out

- groundwater or mud-flow
- flammable gases such as hydrogen sulfide, methane gas
- inflammable gases like carbon-dioxide or nitrogen gas

# Loss scenarios Geothermal power



# Examples for settlements or heaving of ground

- Staufen im Breisgau , sounding wells to 140 m depth (2007)

“ Mit den Rissen  
kommen die Fotografen,  
die Fernsehkameras,  
das Radio.  
Bilder von geborstenen Wänden,  
klaffenden Lücken,  
besorgten Menschen  
bewegen das ganze Land.  
Und dann sind alle wieder weg.  
Nur die Risse nicht.  
Und die Lücken.  
Und die Menschen.  
Staufen „war“ nicht,  
Staufen „ist“.  
Und damit es bleibt,  
braucht Staufen unsere Hilfe. ”

Sascha Zeus  
Michael Wirbitzky



# Sidoarjo mud flow, Indonesia

- Drilling for a natural gas well
- Sidoarjo mud flow ongoing since May 2006
- Controversial cause: drilling or earthquake
- Oil company "Lapindo Brantas" was asked to pay about 2.5 trillion rupiah (about US\$ 276.8 million) to the victims and about 1.3 trillion rupiah as additional costs to stop the flow



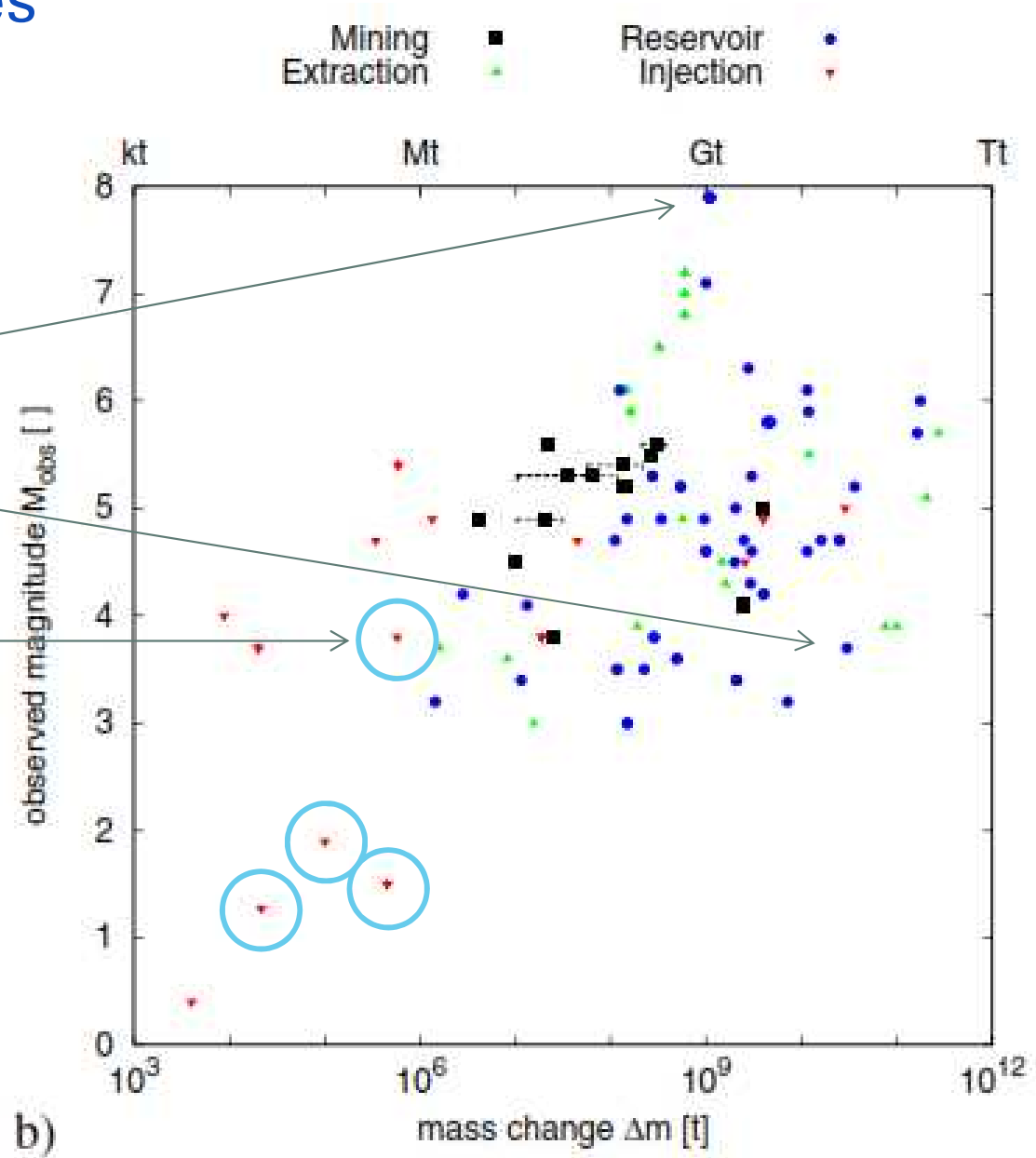
# Man Made earthquakes

Geothermie ○

Zipingpu, China, 2008

Emmosson, CH, 1974

Basel



Source: Mechanical and statistical evidence of the causality of human-made mass shifts on the Earth's upper crust and the occurrence of earthquakes, Christian D. Klose, 2012

# How are the risks perceived by the public?

# Nutzenwahrnehmung am Beispiel Geothermieprojekt "Überland Gross-Gerau"



Abbildung 1: Nutzenwahrnehmungen nach Häufigkeit und Grad der Meinungsverschiedenheit der Befragten. Quelle: Stiftung Risiko-Dialog

# Risikowahrnehmung am Beispiel Geothermieprojekt "Überland Gross-Gerau"



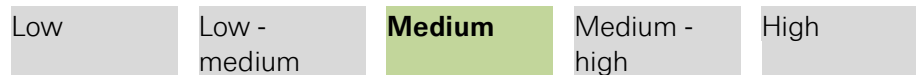
Abbildung 2: Risikowahrnehmungen nach Häufigkeit und Grad der Meinungsverschiedenheit der Befragten. Quelle: Stiftung Risiko-Dialog

# How does Swiss Re assess the risks?

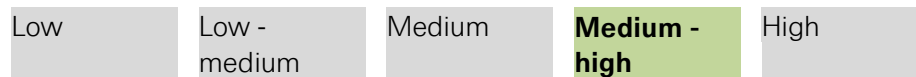
# Risk Exposure

for an average Geothermal Power Plant Construction Project

- Professional Indemnity



- Third Party Liability





# Project specific modifiers

- Soil & Hydrology
- Excavation depth
- Complexity of project
- Potential damage to existing infrastructure
- Equipment related exposures

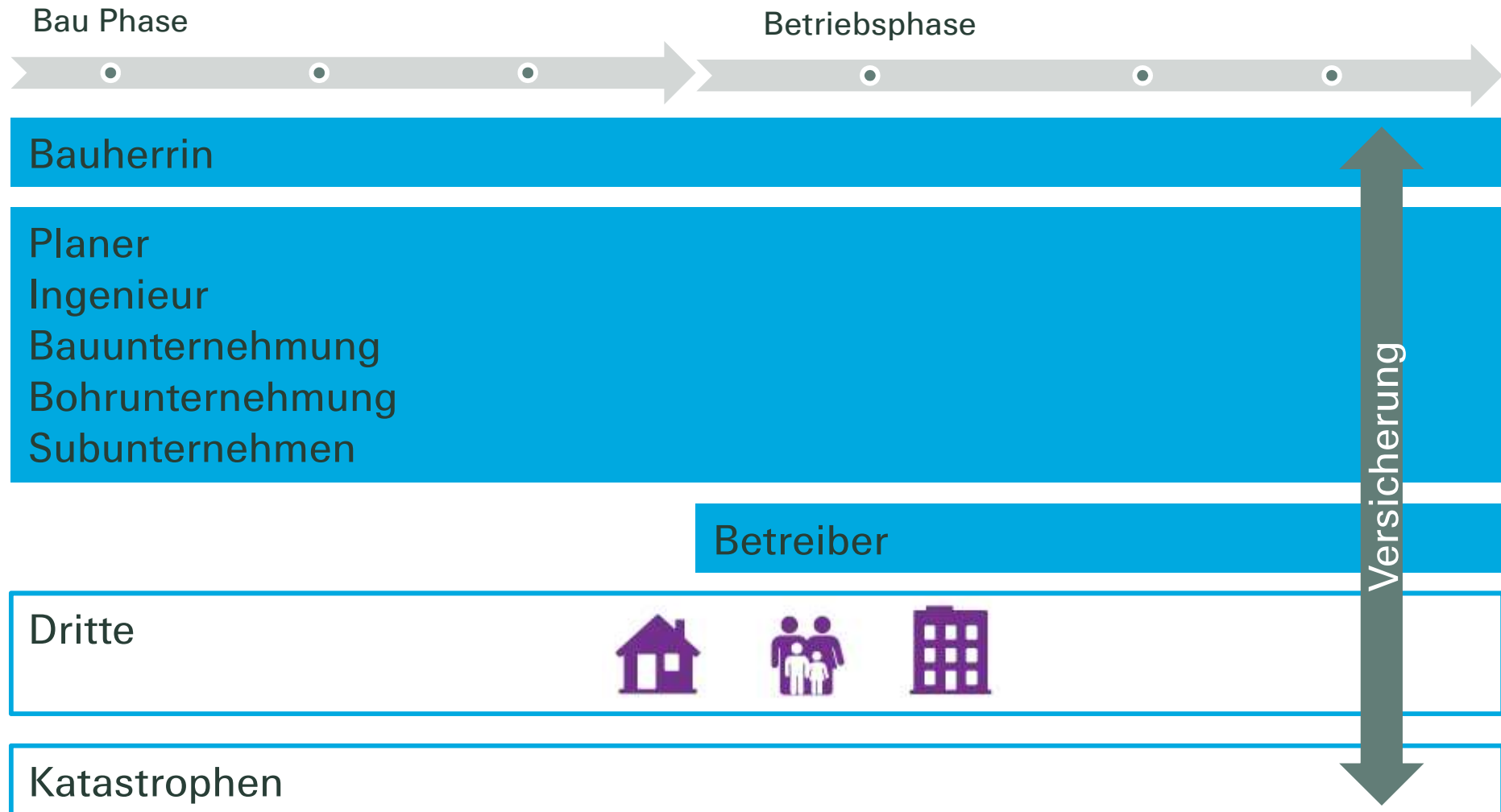
# Modifiers for risk quality



# Can Geothermal power be insured?

# Versicherbarkeit Geothermie

## Sach- und Haftpflichtversicherungen



# Spezialfall "Fündigkeitsrisiko"

- Grenzfall für traditionelle Versicherung – alternative Risikotransfers sind zu prüfen
- Wenig Erfahrung mit vergleichbaren Projekten
- Geringe Diversifizierung
- Unternehmerrisiko
- Schweiz: Teil der Kosten für Gutachten, Exploration, Bohrung gedeckt über Risikogarantie des Bundes
- Deutschland: für das Geothermieprojekt "Unterhaching" wurde eine projektspezifische Fündigkeitsversicherung im Sinne eines Pilotprojektes gewährt.





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