

# Financial framework for project related innovations



April 19, 2016

# Why financial innovation matters for geothermal development

Energy generation projects have utility scale returns:

- High up-front investments
- Long development times
- Long re-payment periods

Projects are able to provide competitive returns to investors only under highly leveraged conditions

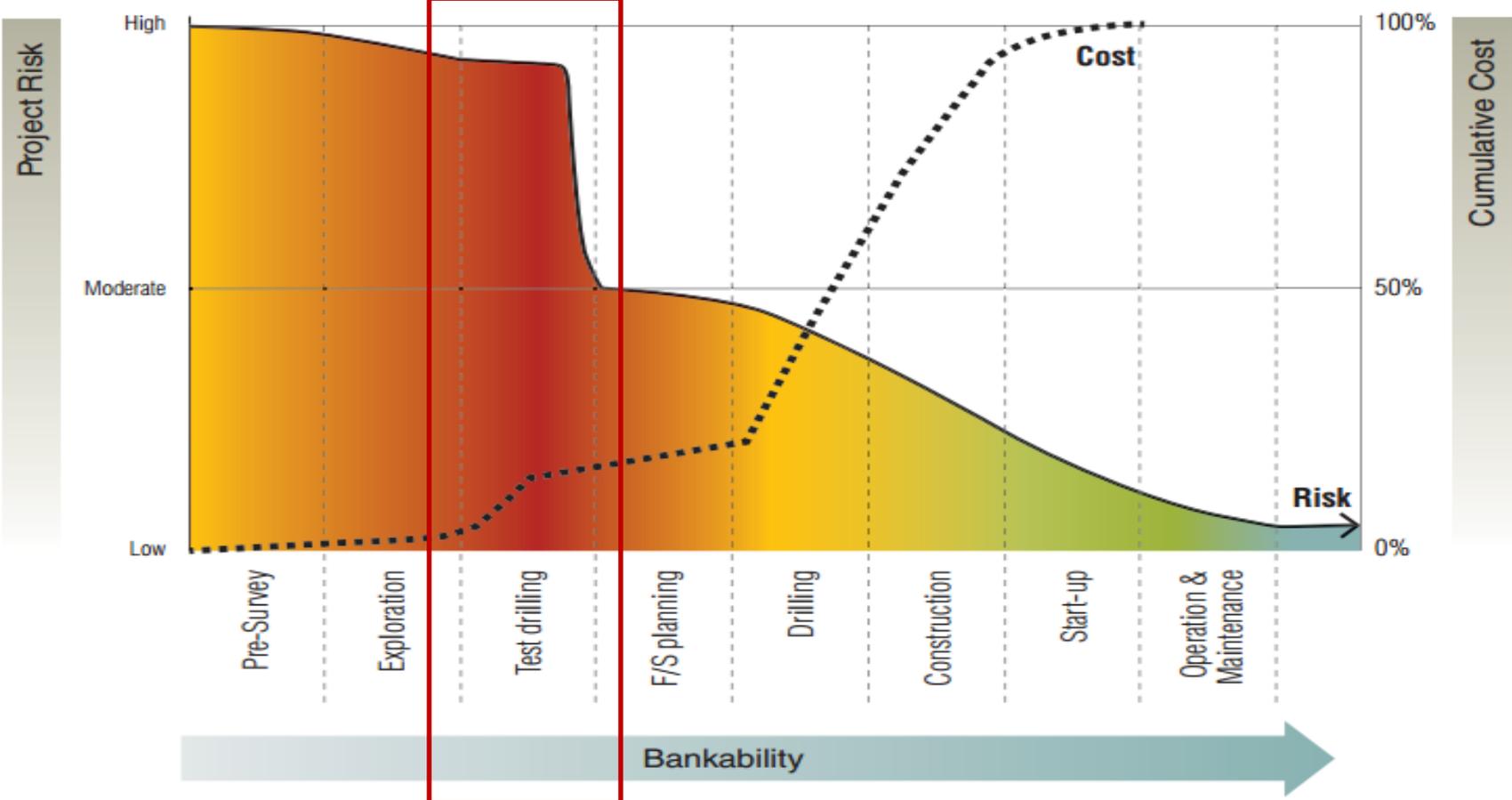
Financial innovation has been a driving force of clean energy deployment worldwide:

- Project finance
- Green bonds
- Property Assessed Clean Energy
- Securitization
- Yield Co's

- 
- Geothermal projects have a very particular risk profile that needs participation by different investor classes
  - This risk profile warrants the need for financial innovation to balance risk and return between investor classes

# Geothermal projects have a particular risk profile

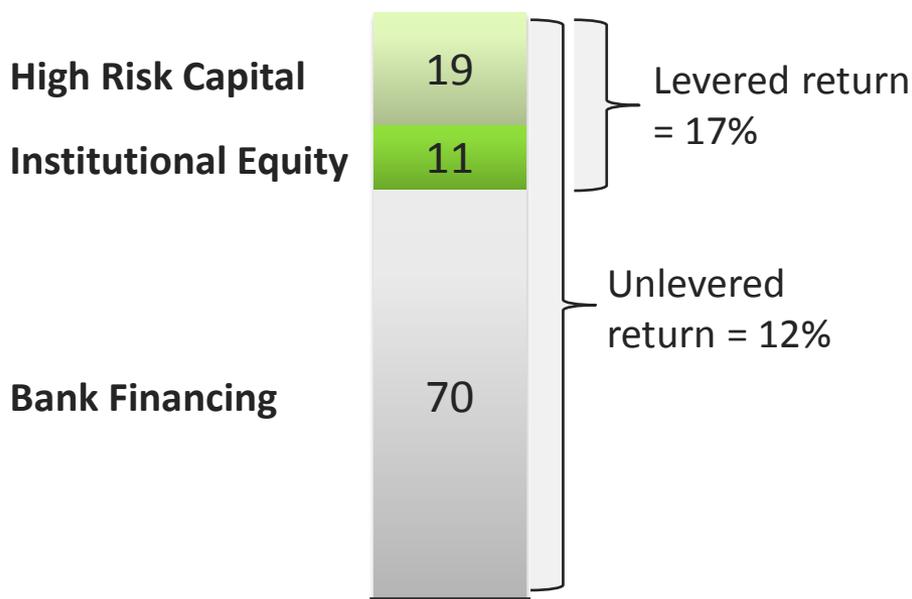
## Geothermal Project Risk and Cumulative Investment Cost



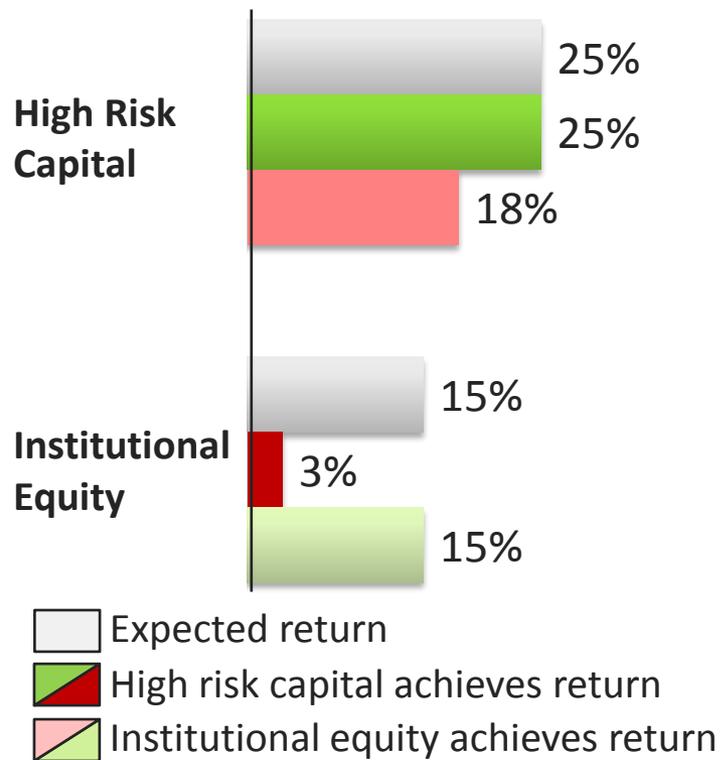
Source: ESMAP 2012

# From the financial point of view, the resource risk profile translates into a fundamental imbalance in capital structure

## Resulting capital structure



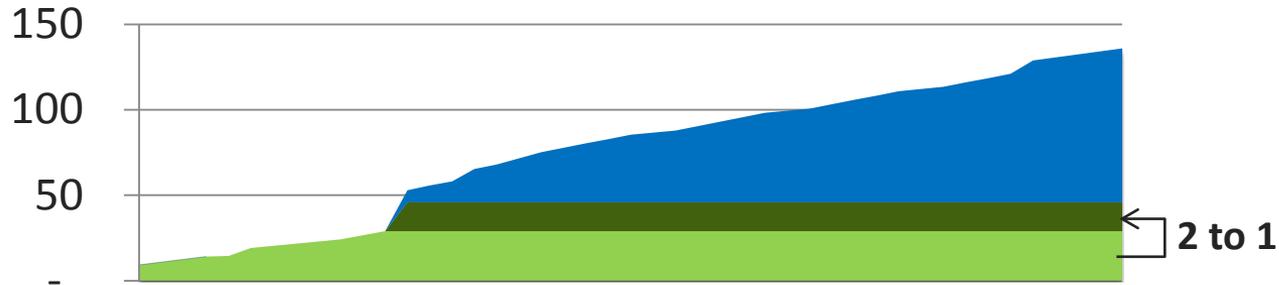
## Risk return distribution



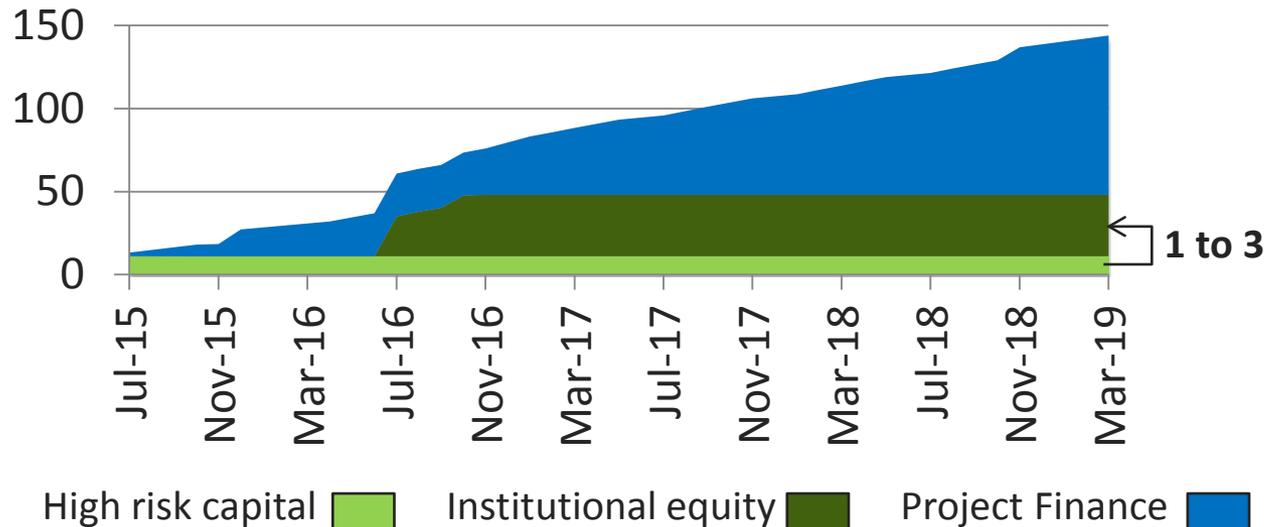
**There is no way to simultaneously satisfy the return requirements of high risk and institutional equity**

# The programs designed for Mexico and Chile aim to address this issue

## Initial situation



## With Program Financing



- By accelerating finance to the exploration drilling phase high risk capital can be substituted with institutional equity
- This allows for risk return to be balanced between investor classes
- Banks are willing to lend early because resource risk insurance guarantees credit in early phases

# Comparison of Mexico and Chile programs

## Country context

	Mexico	Chile
Potential	~ 9 GW	3 – 17 GW
Installed Capacity	~ 1 GW	0
Marginal technology	Natural gas combined cycle	Imported coal
Drilling cost per well	~ 5 USDM	~ 8 USDM

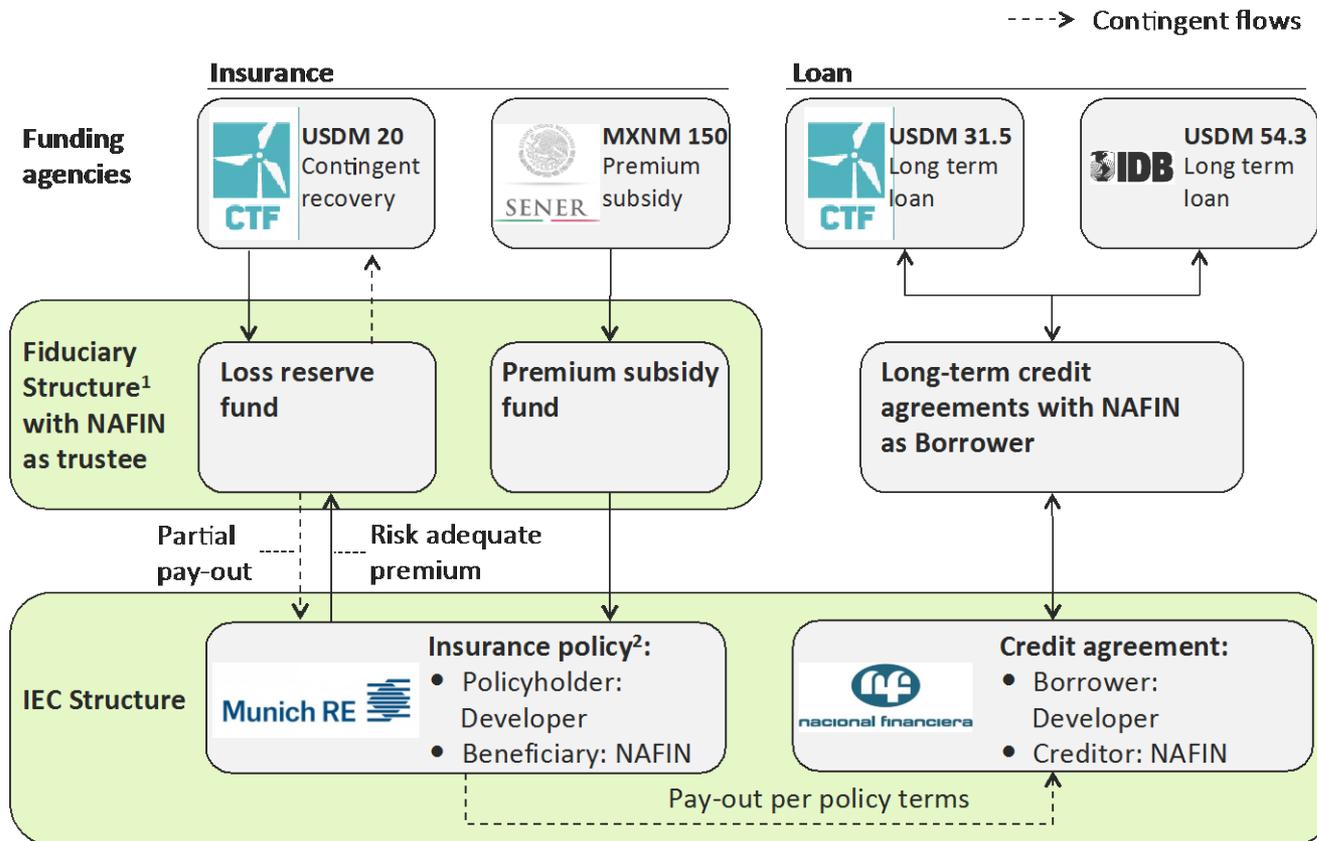
## Program overview

Risk bearing program funds	20 USDM	73 USDM
Third party insurance involved	Yes	No
Sovereign guarantee	Yes	No
Target of supported projects	10-15	2-3

# The Mexico program relies on providing a full financing solution

	Insured Exploration Credit			Project Loan
Objective	Wells 1 & 2	Wells 3 & 4	66% of steam	Energy flowing
Risk Profile	Very high	High	Mid	Bankable
Use of funds	Drilling essential			All project costs
Loan guarantee by insurance	Full based on total steam		Partial based on total steam	No
Insurance backed by	Public funds	Insurer & public funds	Insurer	
Premium subsidy	Yes	No		
Other guarantees	Project assets		Project assets & public funds as subordinated	Project assets
Requisites	Exploration permit + (conditional) capital commitment			Concession + PPA

# Everybody involved benefits from sharing the risk



- Developer:
  - Achieves balanced risk/return profile
  - Limits losses from unsuccessful projects
  - Successful projects not affected!
- Local public funds:
  - Clean power
  - Fiscal revenues
- Multi-lateral funds:
  - GHGE reduction
  - Not a grant
  - 55x multiple
- Banks: Income from loans (interest & fees)
- Insurer: Income from premiums

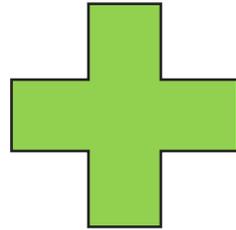
<sup>1</sup> May be set-up as separate funds or within a single fund with segregated rules and accounting

<sup>2</sup> Through local insurance fronting company

# Geothermal investments within a corporate portfolio face a different challenge

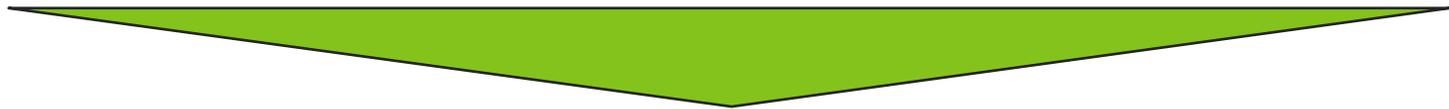
## Individual project view

- Imbalance between risk capital structure and return profile
- Difficulty in attracting sufficient high risk equity to conclude exploration phase
- Difficulty in securing institutional equity for development... Chicken and egg problem with securing financing



## Portfolio view (utility perspective)

- Competition for resources among projects, generally not only geothermal
- Risk profile in early exploration highest in portfolio
- In order to compete in the portfolio, exploration projects need a different methodology (v.gr., real option or probabilistic NPV)
- If exploration does not conclude within one decision cycle project runs high risk of being interrupted
- Can secure financing on balance sheet



- Insured exploration credit addresses some, but not all of the financial barriers of geothermal within a broader portfolio
- Can the product be adapted? For example:
  - Insurance pay-out applied forward towards further exploration to address stalling
  - Bundling financing with other non-geothermal projects

# Implementation challenges

- Need to educate decision makers (v.gr., risk committee at financial institutions, investment committee members, regulators)
- Structure and regulations of local financial system:
  - Country willing to offer sovereign guarantee to international funds
  - Development banks acting as first or second tier institutions
  - Strength of local insurance market
  - Regulatory restrictions to bundling insurance and financing
- Expertise to evaluate risk and insurance market is in short supply
- Long period of implementation... tied to development timelines
- Alignment of interests along all development phases is not trivial:
  - More parties involved means more complex interactions
  - Care not to "double-up" incentives in order to keep costs down
- Financial programs should be part of a broader portfolio of actions to promote geothermal

# Financial framework for project related innovations



April 19, 2016