Supporting Geothermal Energy Deployment

Main Challenges and Possible Solutions

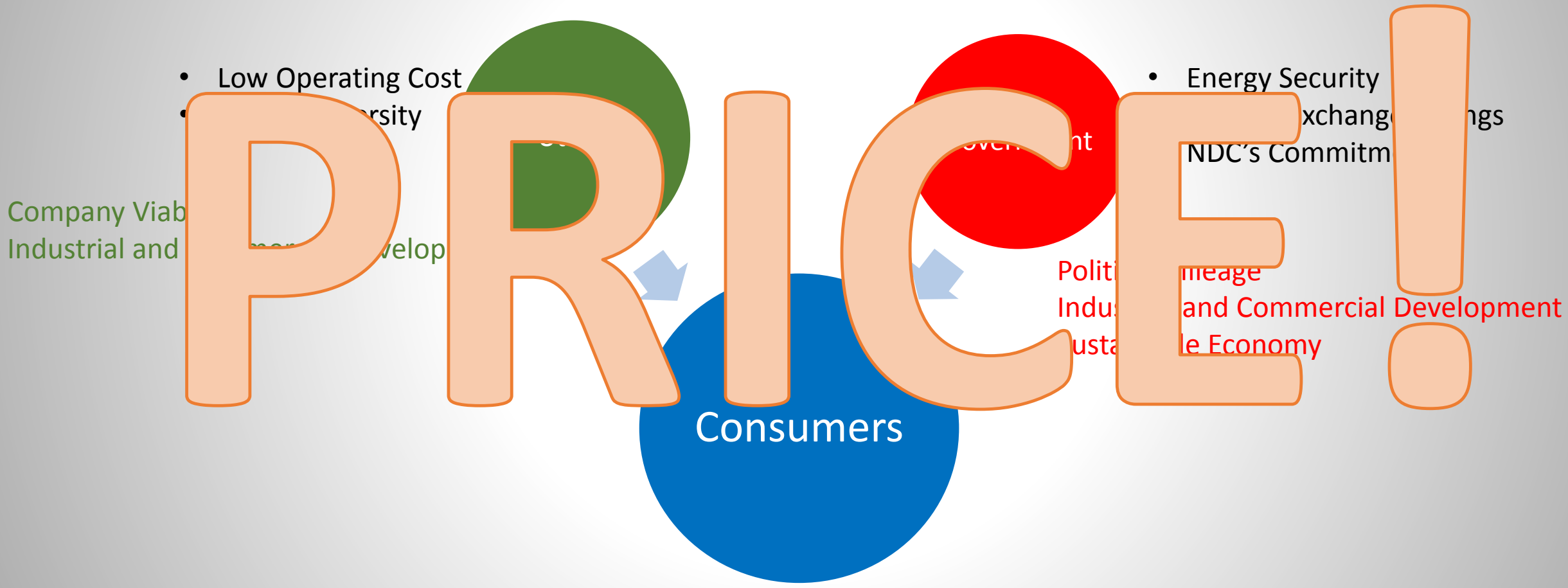
by

Ellsworth Dacon

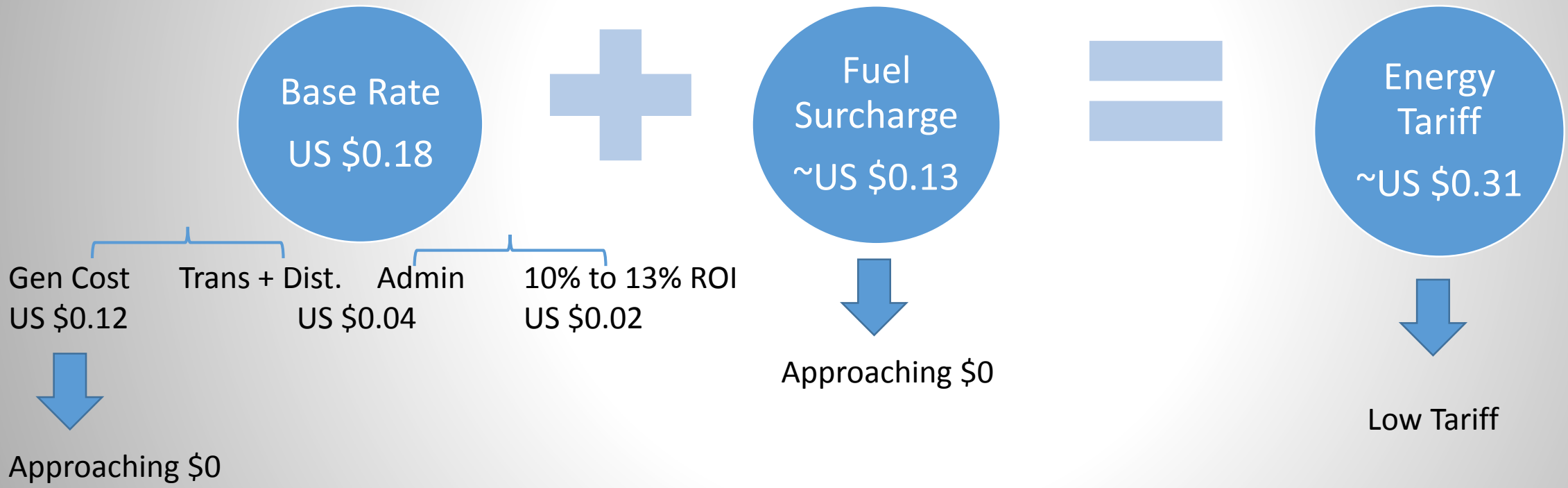
St. Vincent and the Grenadines

What is Driving the Discussion on Renewable Energy?

Renewable Energy Drivers



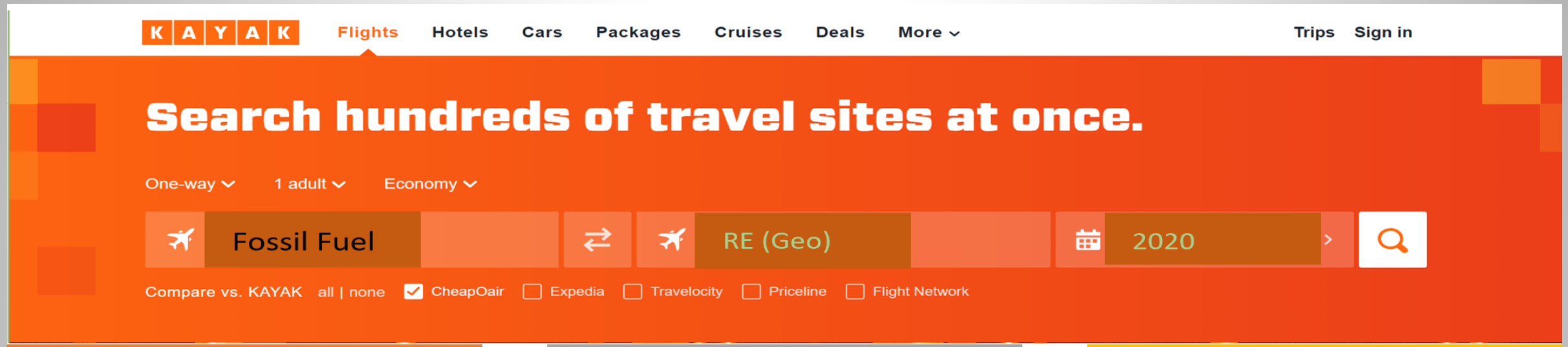
Energy Price



Challenge

- How do you obtain a Geothermal Plant in a small island state for US$ 0.12/ kWh?
    - **What is the capital project cost?**
        - What is the optimal size plant?
        - What is the optimal size engines?
        - Transmissions lines, Infrastructure
        - Operation and maintenance Cost
    - **Is Geothermal the least cost pathway?**
        - Determined by Integrated Resource plan (IRP)
            - **What is the ideal financial model?**
    - **Who would be the ideal Partners?**
        - Will they be willing to take 18-20% return on drilling risk or 10 -13% return for utility operation
        - Will they understand the social and political implications during legal negotiations?
    - What policy incentive can Governments offer?
        - Concessions, income taxes, public aid (vesting of lands etc)

Flight to Geothermal Energy (Financial Structure)



Cheapest

- Grants
- Concessional loans

Recommended

- Public-Private Partnership

Quickest

- Private
- Public Utility

Consider your options

Cheapest & Recommended

- Utilize grant resources to conduct studies
  - Use the results of the studies to unlock financing as a Government and prove your resource
  - Having a proven resource ,develop EPC document using grant financing
  - Access concessional loans to construct plant
  - Sign a O & M contract.

Quickest

- High tariff
- Not recommended

The success of that road map was a office cabinet full with beautifully volcano covered reports, filled with very much the same conclusion. “That the geothermal potential is good but the infrastructure cost is high for the load profile.”

New Strategy

1. Utilize the grants and technical assistance to develop a legal framework. The framework offered concessions, permits, environmental regulation, etc.
2. Looked for ideal partners that were willing to conduct feasibility studies at their own cost, and develop a project and operate it for 25 yrs. We needed such partners to have skin in the game from the feasibility study stage.
3. Ideal partners will attract funding agencies.

Optimal Model

Annual Fuel Savings – US $17m

Cheapest

- 10 Years
- Opportunity Cost - US $170m (10yrs x 17m)

SVG's Approach

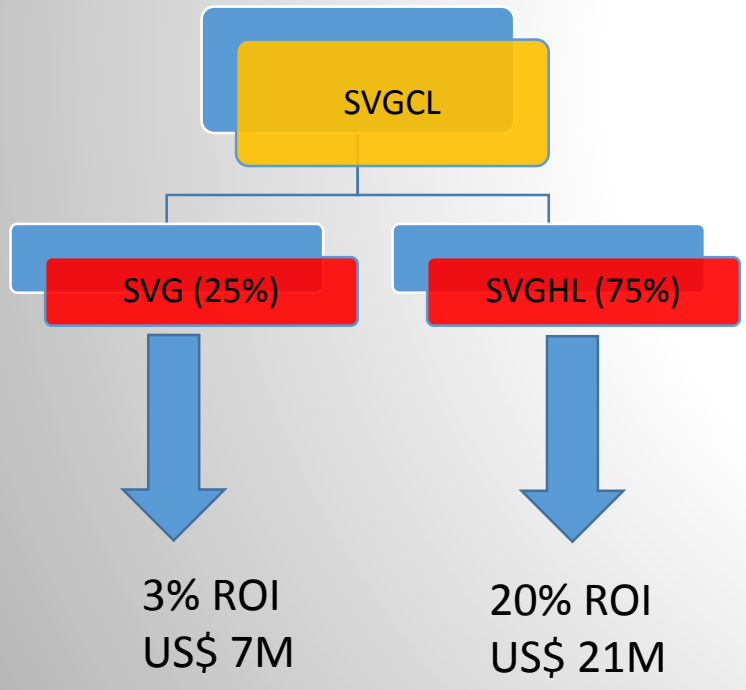
- ≤ 7 Years
- Opportunity Cost - US $119m (7yrs x 17m)

Quickest

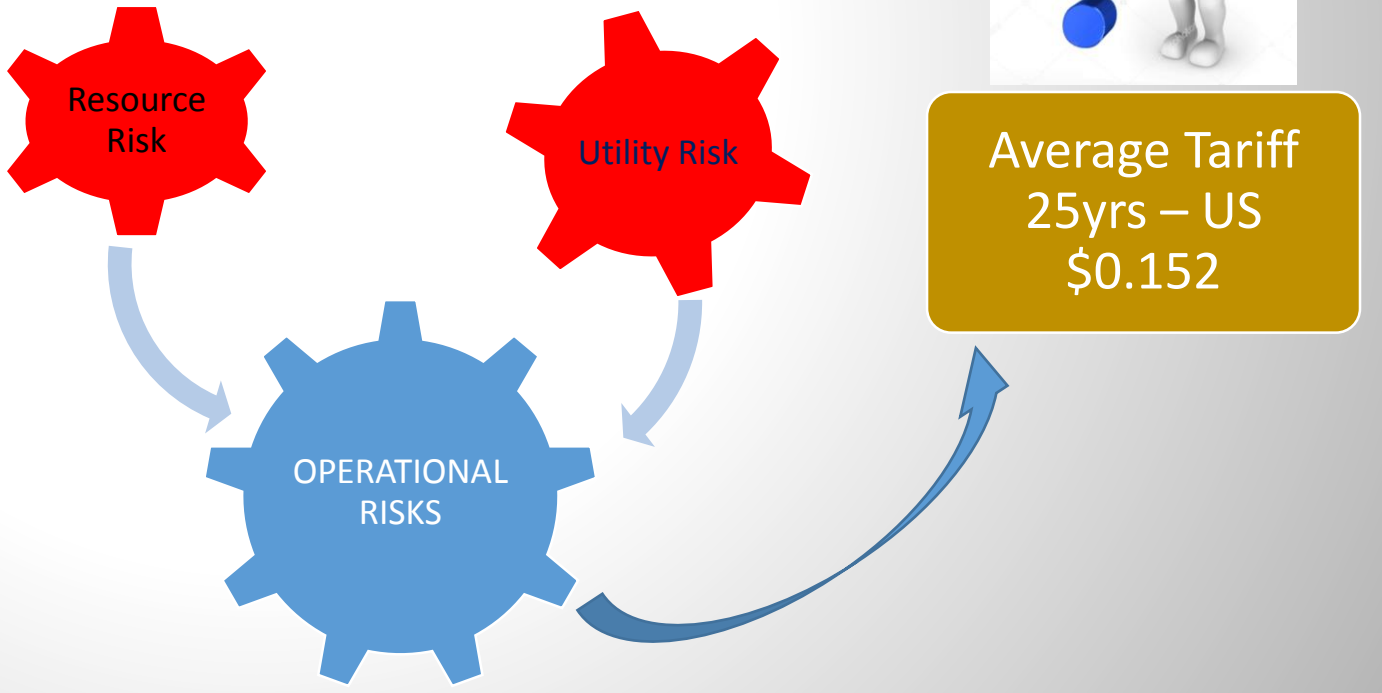
- 5 years
- Opportunity Cost - US $85m (5yrs x 17m)

First Approach

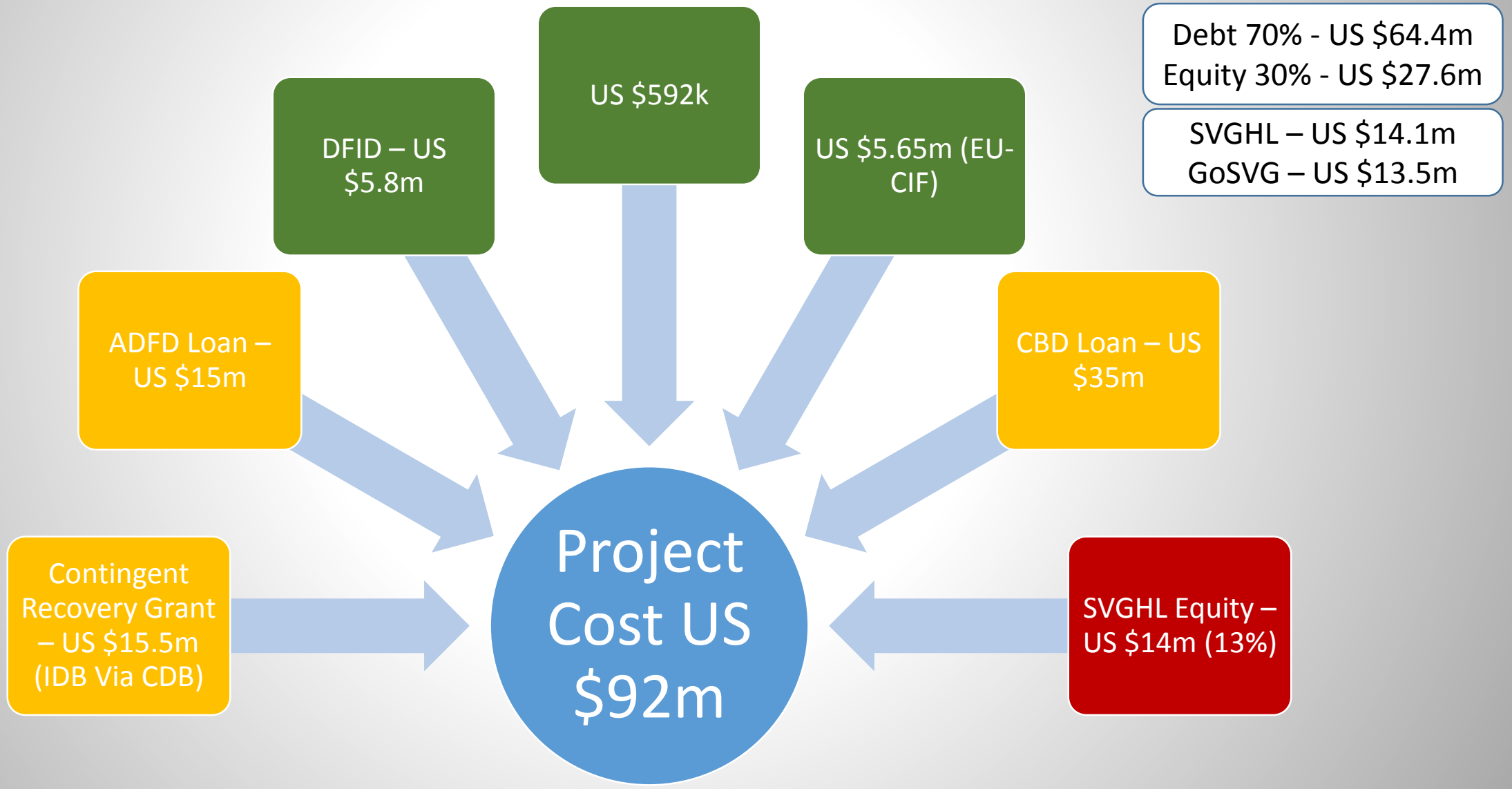
Initial



Total Project Cost US$92.M



Financing Structure



Second Approach

CRG US$ 15.5

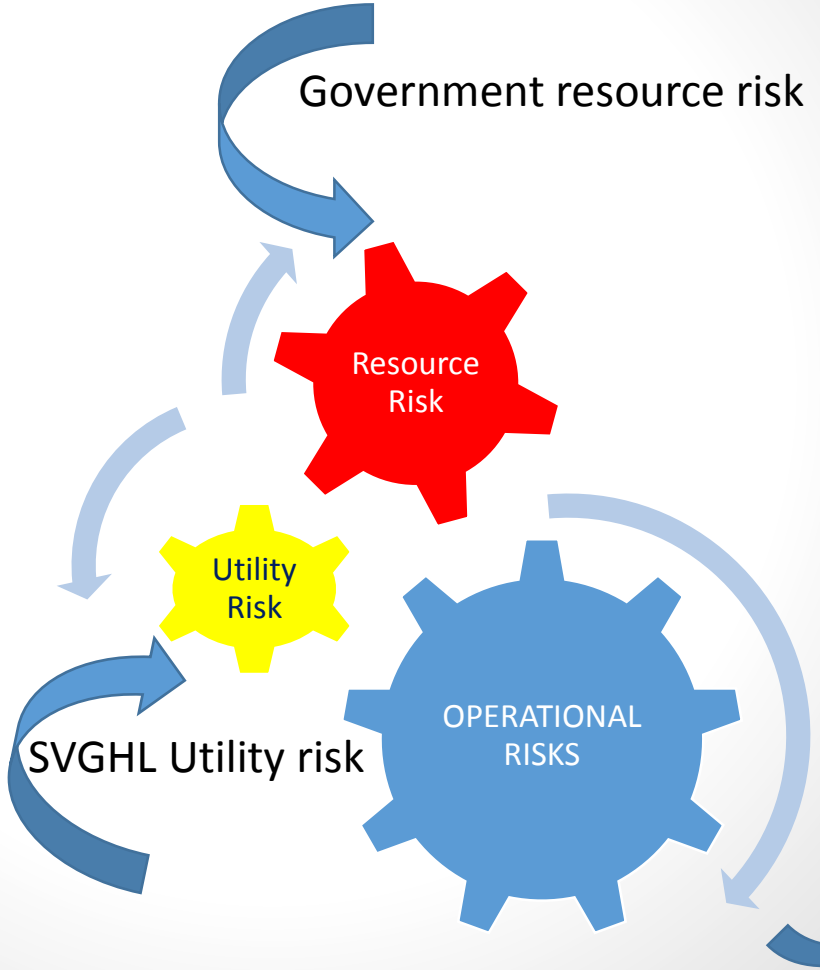
SVGCL

SVG (49%)

SVGHL (51%)

2% ROI ADFD
US$3 M
0% ROI (Grants)
US$ 9.5M

13% ROI
US$ 14.1



Average Tariff
25yrs – US
$0.118

Success to Date

- We have moved beyond the office filled with glorified reports
- We have found ideal partners (RG and Emera)
- We have form a Public Private Partnership
- Together we have made the case to the IDB, CDB, ABDF, DFID, GEF, New Zealand JICA, and have secured the financing required to complete the project.
- Civil Works will be completed in December, Drilling contract signed November and commence in April, EPC contract issued by Jan 2020, Plant completion 2021.

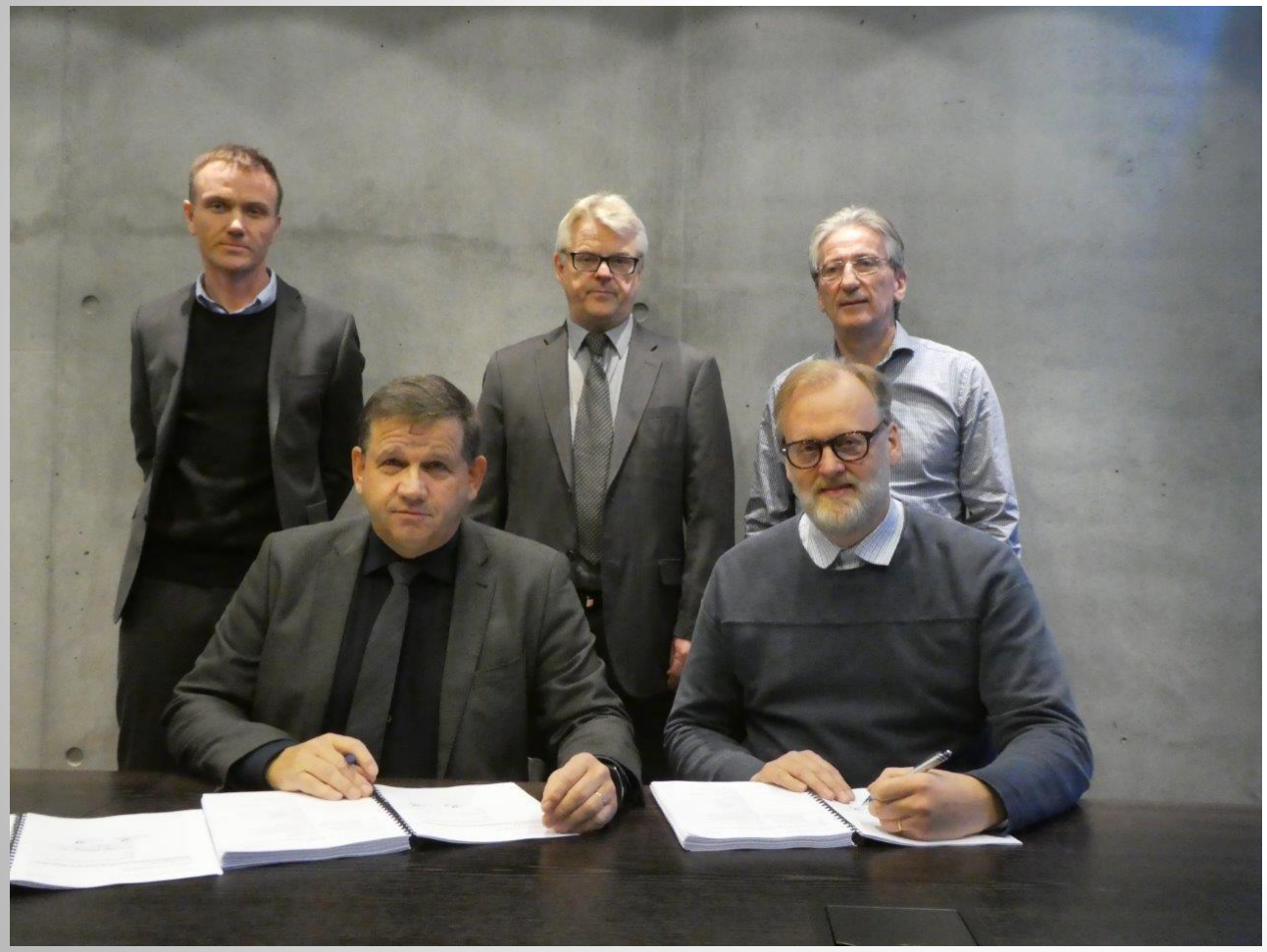
Lessons Learnt

Geothermal development requires clear, strategic planning that is country specific.

Open book approach with ideal partners.

Acceptance by utility and other stakeholders.

Drilling Contract Signed ~US $20m



November 29th, 2018