Case 16: Rock Energy

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Case Question

- Rock Energy, an Oil & Gas company, is evaluating the purchase of one of three oil fields in Latin America. After purchasing the rights to extract oil from one of these fields, Rock Energy will outsource the drilling activity. You have been brought in to identify the best investment for Rock Energy.
- *How would you evaluate the three oil fields, and which oil field should Rock Energy purchase?*

7
Quants.

5
Structure

Invest. Creativity

Case tracker

- **Industry:** Energy
- **Level of Difficulty:** Medium
- **Case Format:** Opportunity Assessment
- **Concepts Tested:**
  - Investments
  - Creativity

Fit Questions

Spend first 15 min on fit

- What are you most proud of?
- Describe a time at Kellogg where you worked with a team to achieve a challenging goal

Guide to interviewer

- Main steps the interviewee should take:
  - Indentify days it takes to drill one well in each region, using the depth and penetration rate provided
  - After this, he/she should be able to quantify the cost associated with drilling one well
  - The price and barrels extracted by day will allow the interviewee to estimate the total revenue and profit by well. It is essential to consider that in 1 year you can produce different number of wells by Region, and that you have limited amount of rigs
  - After achieving the calculations, the interviewee should consider other factors, risks that could affect the decision investment such as, political risks, labor costs, difference in oil quality, insurance costs, of future oil prices

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Clarifying answers and case guide

Clarifying answers to provide

Industry Characteristics/Market Economics

- The rights being offered to Rock Energy gives them the right to drill during 1 year, and produce oil for 20 years. Assume that no oil is produced until the beginning of year 2.
- Rock Energy can get the drilling operator to deploy a maximum of 10 rigs in each of the regions
- The cost of the rig day includes crew, consumables and services
- Any amount of oil being extracted will be sold at the spot market price of the moment
- For simplicity assume that the oil wells will produce the same amount of oil for the next 20 years with no maintenance costs
- The rights to extract oil cost $40M in each region

Guide to case / Guide to handouts

Part 1 – Hand out exhibit #1 after introducing case

- This handout should lead the interviewee to understand that each region will have different geological characteristics which will affect the drilling time, production, revenues and costs for Rock Energy

Part 2 – Profitability

- Give out the current spot price and ask the interviewee to work out the profitability for each field, and not only by well.
- The answer will be a function of the investment, variable costs, and quantity of oil extracted by field. This last variable will depend on the number of wells drilled in one year.

Part3 – Conclusion and other issues

- Rock Energy should choose to buy the rights for **Region 2** because it will offer the best profits, but there are other factors that could impact the decision to invest:
  - Insurance costs
  - Political stability of the region
  - Labor contracts and unions
  - Volatility of oil prices
  - Oil quality differences

Key elements to analyze

Profitability - Quantitative analysis

- What are the costs and expected revenues of each investment option? What investment opportunity should Rock Energy pursue?

Qualitative Issues

- Even though the numbers make **Region 2** the best investment, there are other issues that would need to be analyzed by Rock Energy to fully understand the risk of the investment

Notes to interviewer

- Exhibit 1 – This exhibit should give the interviewee enough information to identify the number of wells and the amount of total oil that could be extracted from each field, as well as the per well yearly production. **Missing Spot Price = $50**
- There are three major points to identify: 1) The average well production in Region 3 is the largest of all regions, but you can only drill 33%/50% the number of wells you can drill in Region 1&2. 2) Variable costs on a per well basis show Region 1 as the most profitable. 3) Nevertheless, the number of wells you can achieve during the first year are different in each region and there is a fixed cost, **so Region 2** will be the most profitable for Rock Energy
- The yearly profits will be (Calculations on next page):
  - Region 1 = 50M, **Region 2 = 68M**, Region 3 = -4M

Notes to interviewer

- There are several "qualitative" issues that need to be considered when deciding to make an investment like this, and the interviewee is expected to mention and analyze the impact of at least two of these:
  - Insurance costs: Countries have different regulations and might differ on the required insurance coverage that an Oil & Gas company will need to hold. Liability caps could vary by country, affecting the insurance cost
  - Political stability of the region: Accessing a well site could become a challenge in politically unstable regions. Other property right risks could also affect the risk being bared by this firm
  - Volatility of oil prices: Prices below $27 will make all the Regions have a negative return
  - Oil Quality: Differences in Oil quality could have an impact on the spot price

Math question and solution

Math question

- What are the first profits during the first year of production (i.e. 1st year spent on drilling, and production begins in 2nd year)

Math solution

- **Time to complete a well** = (Depth/Penetration Rate): Region 1 = 60, Region 2 = 90, Region 3 = 180
- **Production per well by region =** Daily production * 360 days: Region 1 = 36K, Region 2=72K, Region 3= 108K
- **Cost per well** = Days to complete well*Cost per rig day. **Yearly Revenue per well** = Price * # barrels per year. **Number of wells per year =** 360/(Time to complete a well) * number of rigs. Profit Margin = (Profit per well)/(cost per well). **Total Revenue** =(Yearly Revenue) *(Number of wells per year). **Total Cost =** (Cost per well)*(number of wells)+(Rights to extract oil). **Profit =** Total Rev – Total Cost.

Concept	Region 1	Region 2	Region 3
Investment Cost (Rights to extract oil)	$ 40,000,000	$ 40,000,000	$ 40,000,000
Cost per well	$ 300,000	$ 900,000	$ 3,600,000
Yearly Revenue per well	$ 1,800,000	$ 3,600,000	$ 5,400,000
Profit per well	$ 1,500,000	$ 2,700,000	$ 1,800,000
Profit margin per well	500%	300%	50%
Number of wells per year	(360/60) = 7 x 10 Rigs = 60	40	20
Total Revenue	$ 108,000,000	$ 144,000,000	$ 108,000,000
Total Cost	$ 58,000,000	$ 76,000,000	$ 112,000,000
Profit	**$ 50,000,000.00**	**$ 68,000,000.00**	**$ (4,000,000.00)**

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Solution and recommendations

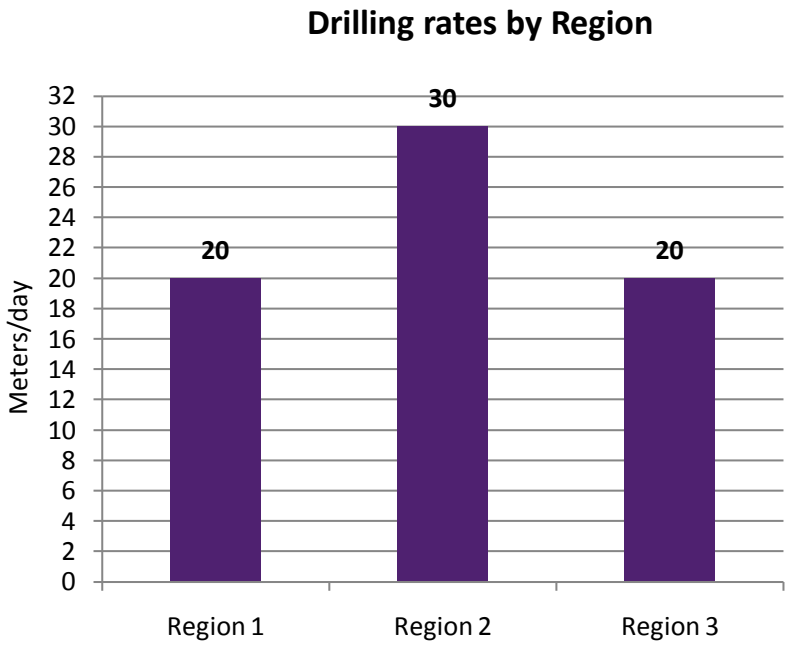
Solution & Recommendations

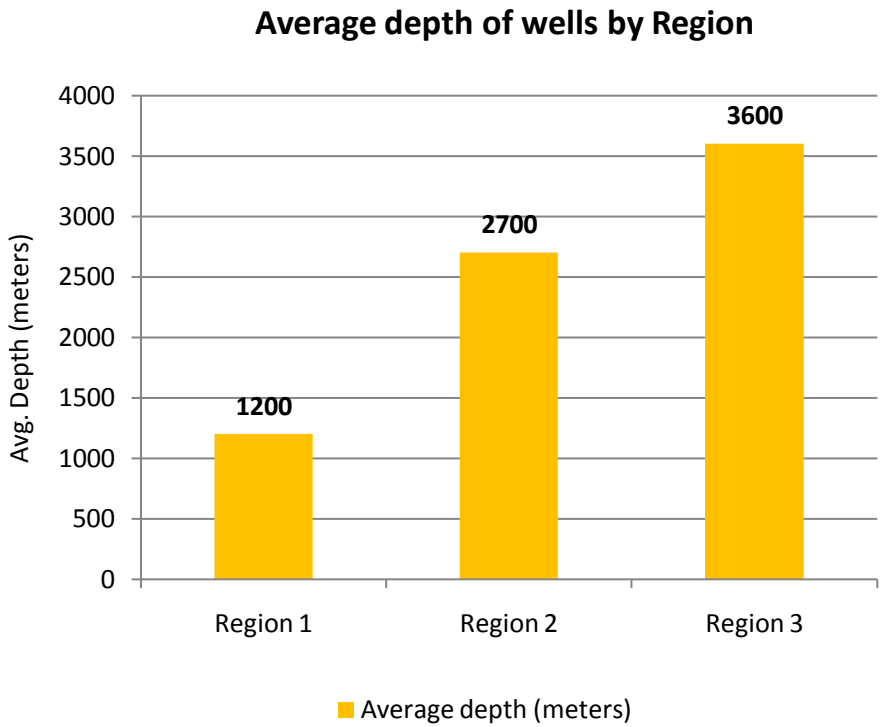
- Rock Energy should invest in buying the rights for Region 2
- It is important to recognize that even though the profit margin for Region 1 is significantly higher on a per well basis, the return of the investment depends on the total number of wells that you can drill in the first year and the upfront cost for the rights to extract oil in that Region
- Additionally, the interviewee should be able to identify other qualitative aspects of the investment that might affect the decision to invest in a certain Region

Bonus/Guide to an Excellent Case

- An excellent answer would mention and briefly summarize the impact of including an expected value analysis, which would assign different probabilities of extracting the expected barrels per day

Exhibit #1: Oil Field profiles, 2010





	Region 1	Region 2	Region 3
Number of Rigs that would operate	10	10	10
Average well production (barrels per day)	100	200	300
Cost per rig day ($US)	$5,000	$10,000	$20,000

*Note: Wells are continuously dug for only one year and then oil is extracted going forward. Wells are dug by "Rigs". Once a Well has been completed, the Rig moves on to dig another well.

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