

RESULTS BASED MANAGEMENT FOR ENERGY IN JORDAN

WITH REFERENCE TO THE USE OF OIL SHALE

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□ Acknowledgements

- Energy Sector in Jordan
- Oil Shale in Jordan
- Results Based Management
- Oil Shale Technologies
- Roadmap for Oil Shale
- Conclusions



Oil Shale Stone



Oil Shale Burning

Energy Sector in Jordan

□ Electricity



□ Oil and Gas



□ Renewable



➤ Solar

➤ Wind

➤ Biogas

□ Oil Shale



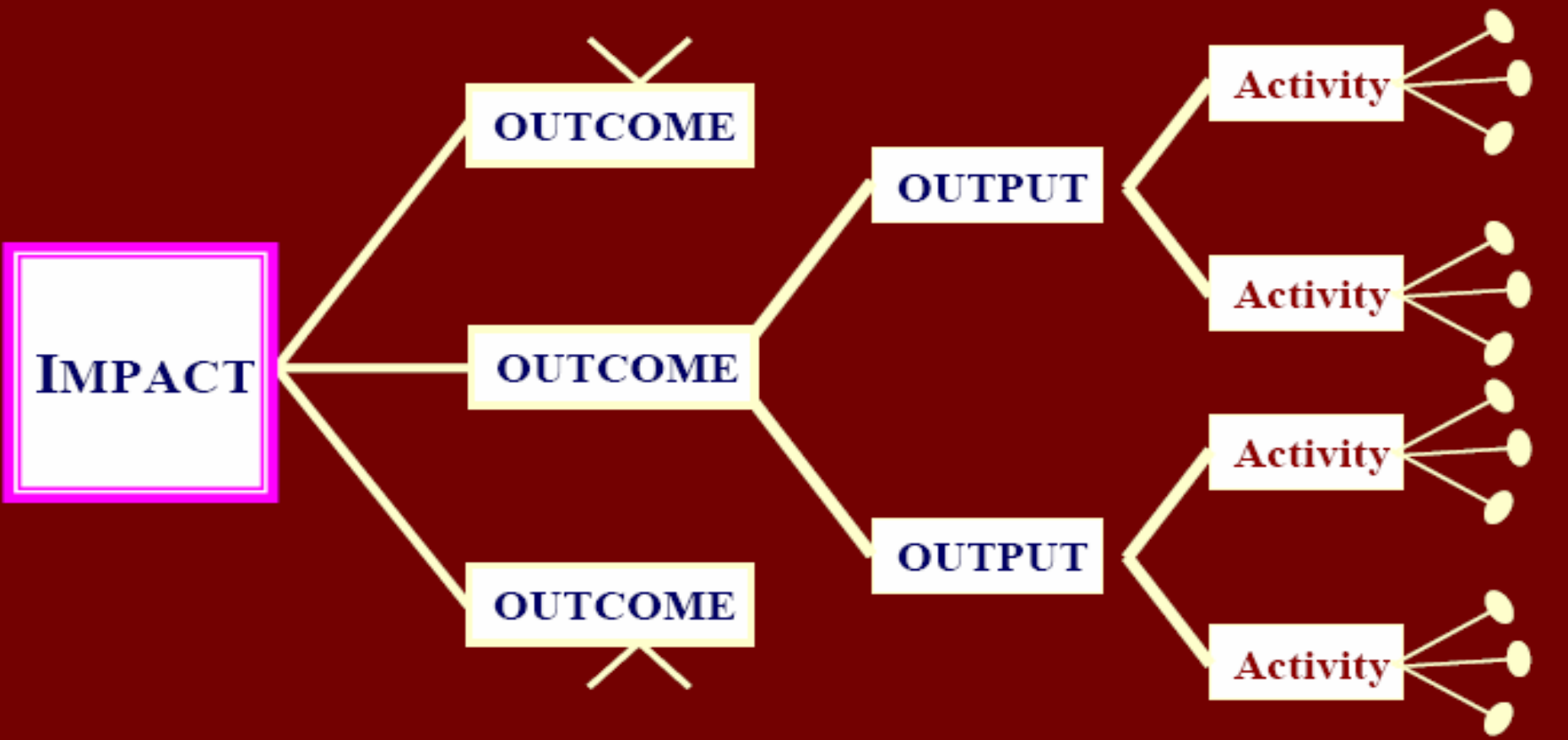
What is the Results Based Management-RBM?

RBM is an approach that seeks to focus efforts and resources on the expected results of a project.

RBM builds on traditional management approaches such as management by objectives or activities, but shifts the emphasis from inputs and activities to results.

Considering oil shale as a promising source of energy and a challenging and hot issue where the stakeholders exchange the know-how and technical services, sustainability and maintaining the on-going momentum, should lead to a road map that involves strategic, operational and tactical planning.

RBM Approach Models



STRATEGIC	OPERATIONAL	TACTICAL
GOAL	OBJECTIVES	INPUT
Long-term	Medium-term	Short-term

- ✓ **Organizational**
- ✓ **Political**
- ✓ **Administrative**
- ✓ **Intellectual**

- ✓ **Physical Resources**
- ✓ **Human Resources**
- ✓ **Technologies**

Activities

**R
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Vision for the 21st century

Using oil shale in Jordan is manifested by:

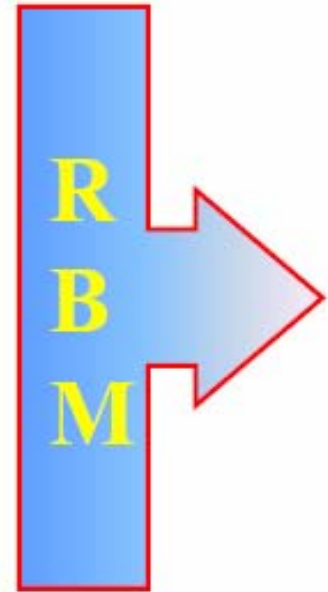
- ❑ Having the will of the wise leadership
- ❑ Defining the roles of all stakeholders
- ❑ Enhancing international cooperation
- ❑ Employing science & technology
- ❑ Attracting investors
- ❑ Using RBM approach

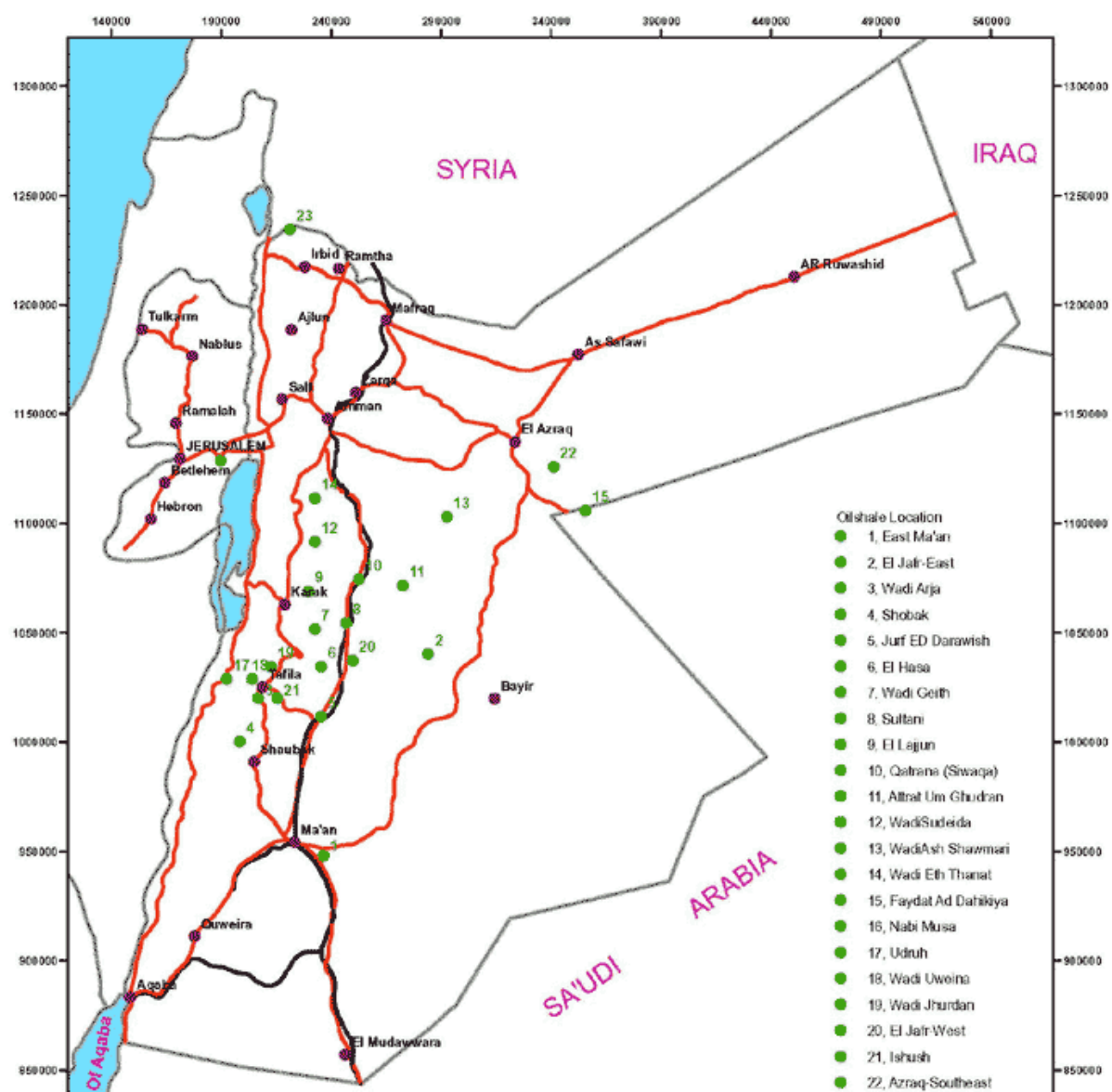
RBM may be considered as a powerful tool to realize this vision to make Jordan depend on its natural resources.

Vision for 21st Century

Oil Shale is manifested by:

- New Technology**
- Industry Interface**
- Roles of stakeholders**
- International cooperation**



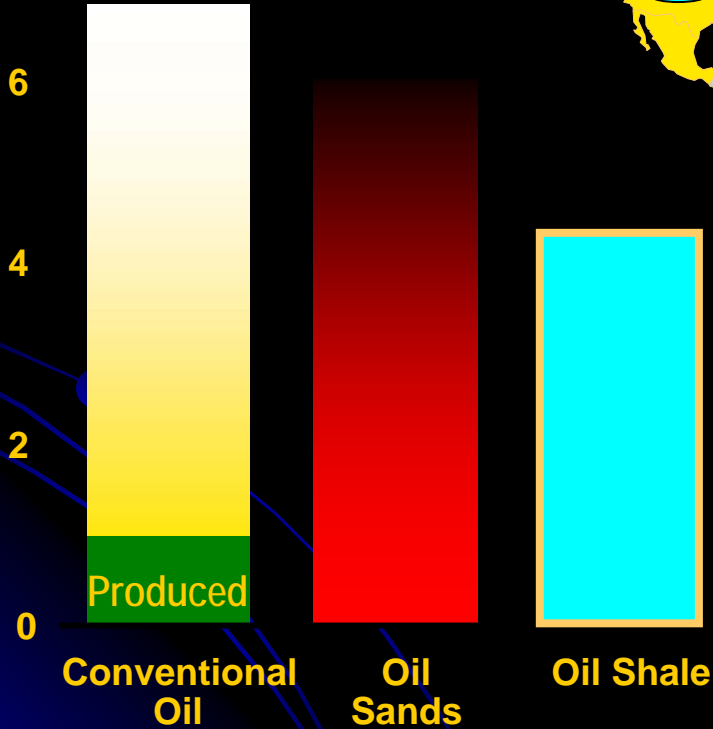


Oil Shale in Jordan

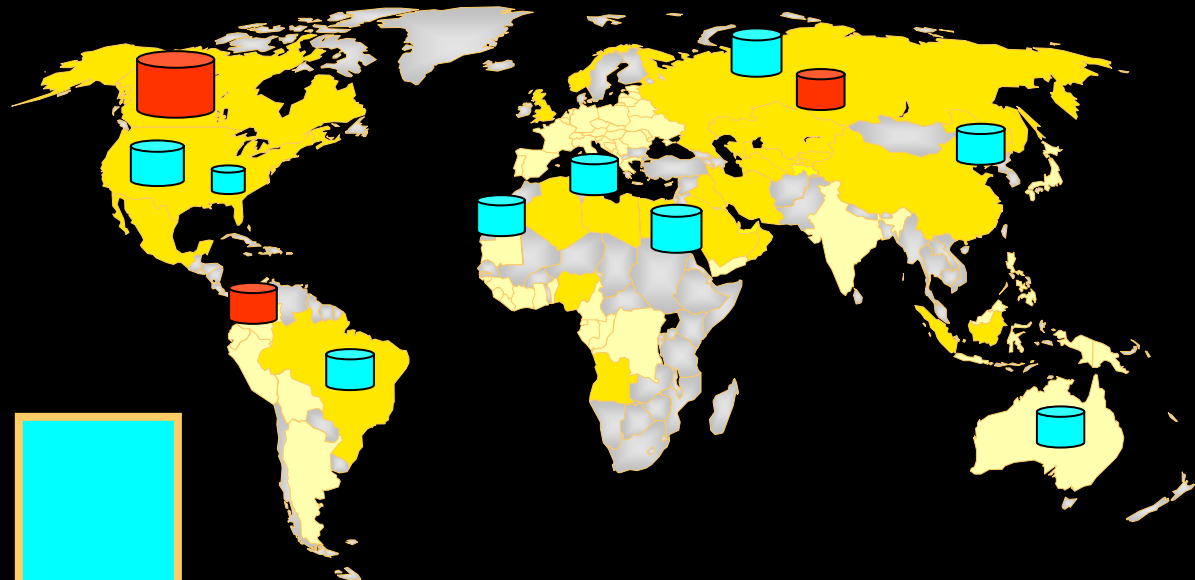
Large Oil Resources Exist

Oil in Place

Trillions of Barrels

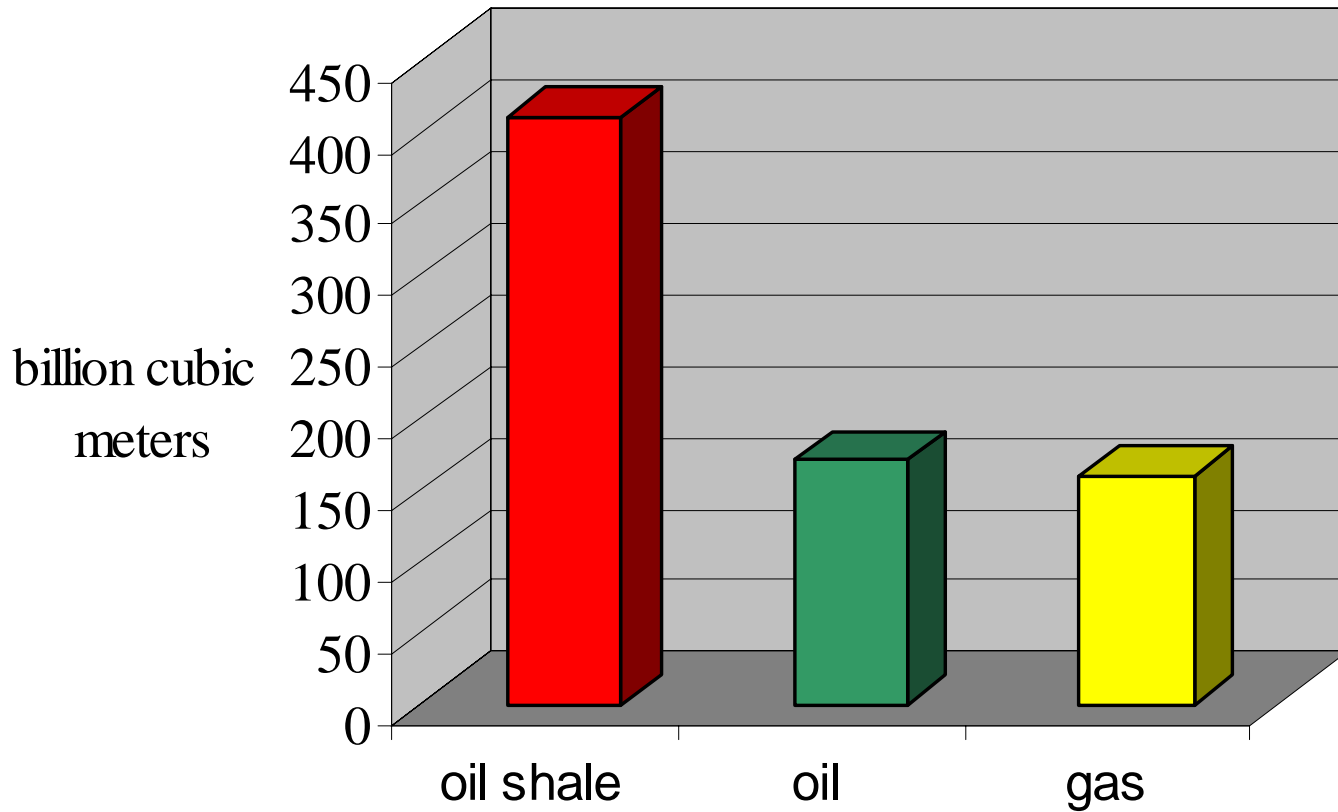


Locations of Major Deposits



-  Conventional Oil
-  Oil Sands
-  Oil Shale

Oil Shale Resources

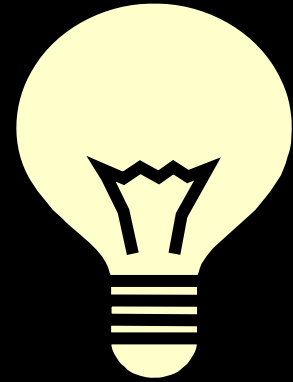


Oil Shale World Resources %

1999		2002		2003		2005	
country	(%)	country	(%)	Country	(%)	country	(%)
US	61	US	78	US	70	US	72
Australia	17	Russia	7.4	Russia	15	Brazil	5.4
Jordan	11	Brazil	2.5	Zaire	3.3	Jordan	4.2
Brazil	4.5	Jordan	1.0	brazil	2.7	Morocco	3.5
Ukraine	3	Australia	1.0	Italy	2.4	Australia	2.1
Morocco	2.1	Estonia	0.5	Morocco	1.8	China	1.5
Thailand	0.4	China	0.5	Jordan	1.1	Estonia	1.1
Israel	0.3	France	0.2	Australia	1.0	Israel	0.3
Turkey	0.1			Estonia	0.5		
				China	0.5		
				Canada	0.5		
				France	0.2		



Highlights on Oil Shale



Is there oil in shale rock?

How oil is produced from shale rock?

How much oil can be harvested?

What is the production capacity of a Retort?

- ❑ **There is actually no oil in shale rock.**
- ❑ **The rock contains organic matter that forms an oil compound only after it is heated and vaporized.**
- ❑ **The Oil-Tech process may be viewed as drastically speeding up the millions of years that nature would require to produce oil from the same geological ingredients**

Oil Harvesting



1000
Barrels
Retort



Spent Shale is used for

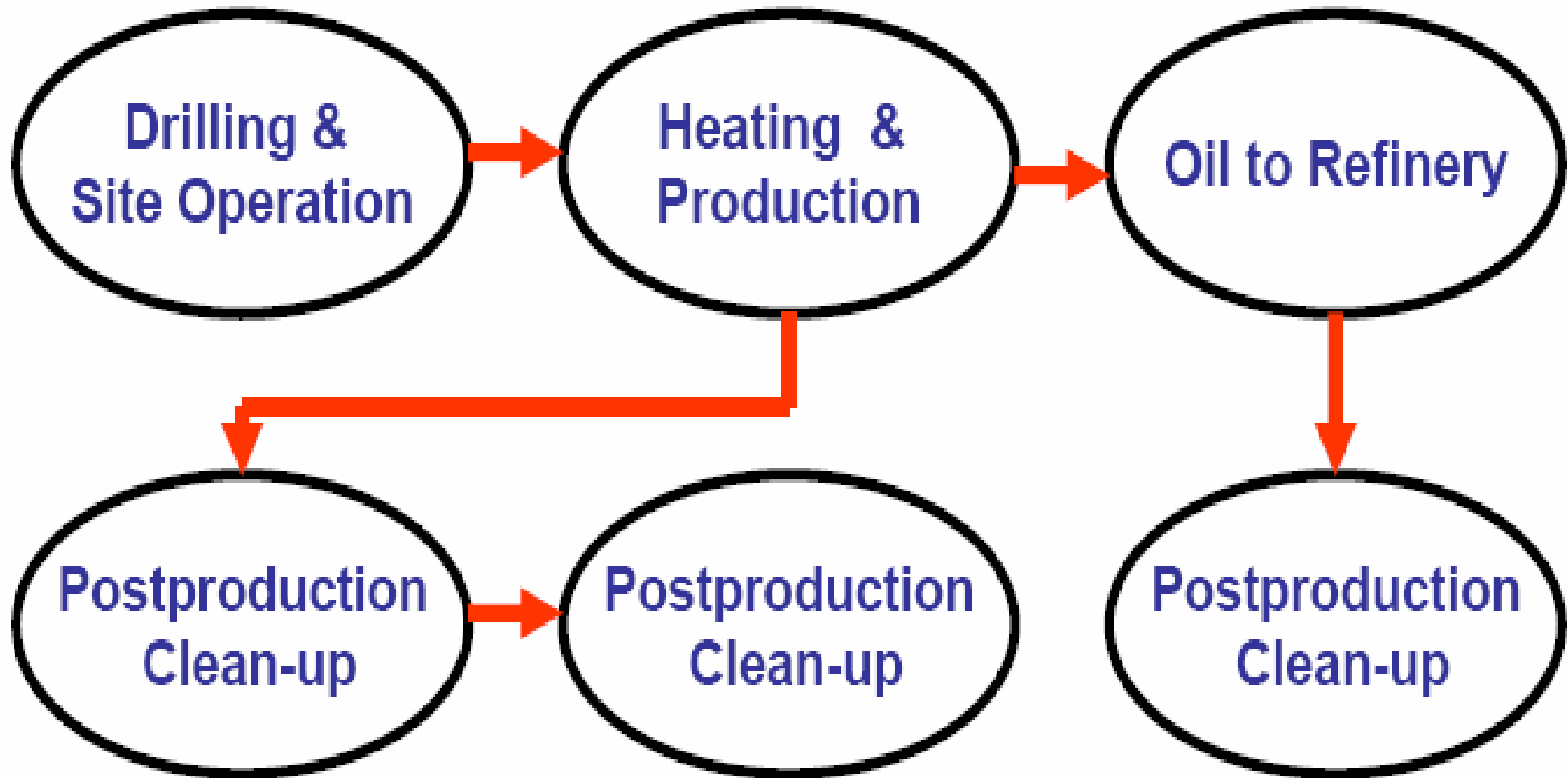
- Adhesives
- Resins
- Cement Production
- Building materials
- Insulation
- Other uses

Oil Shale and Old Technologies

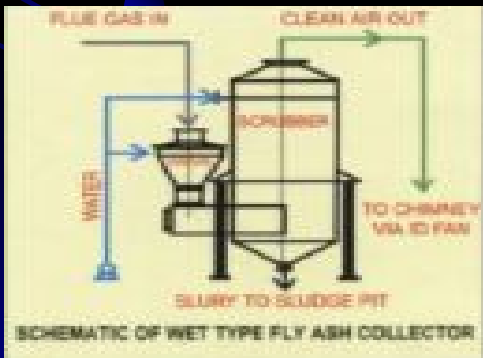
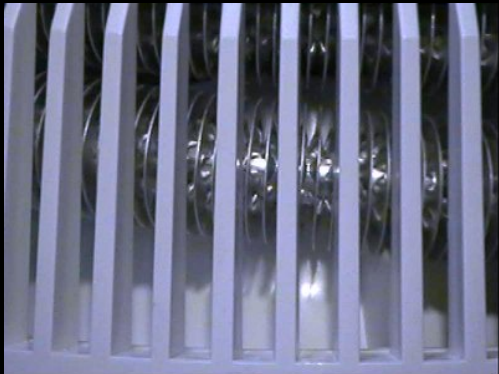
- Add water/heat to get Oil
- Needs Lots of Water

Oil Shale with New Technologies

- Heat to get
- No need for Water

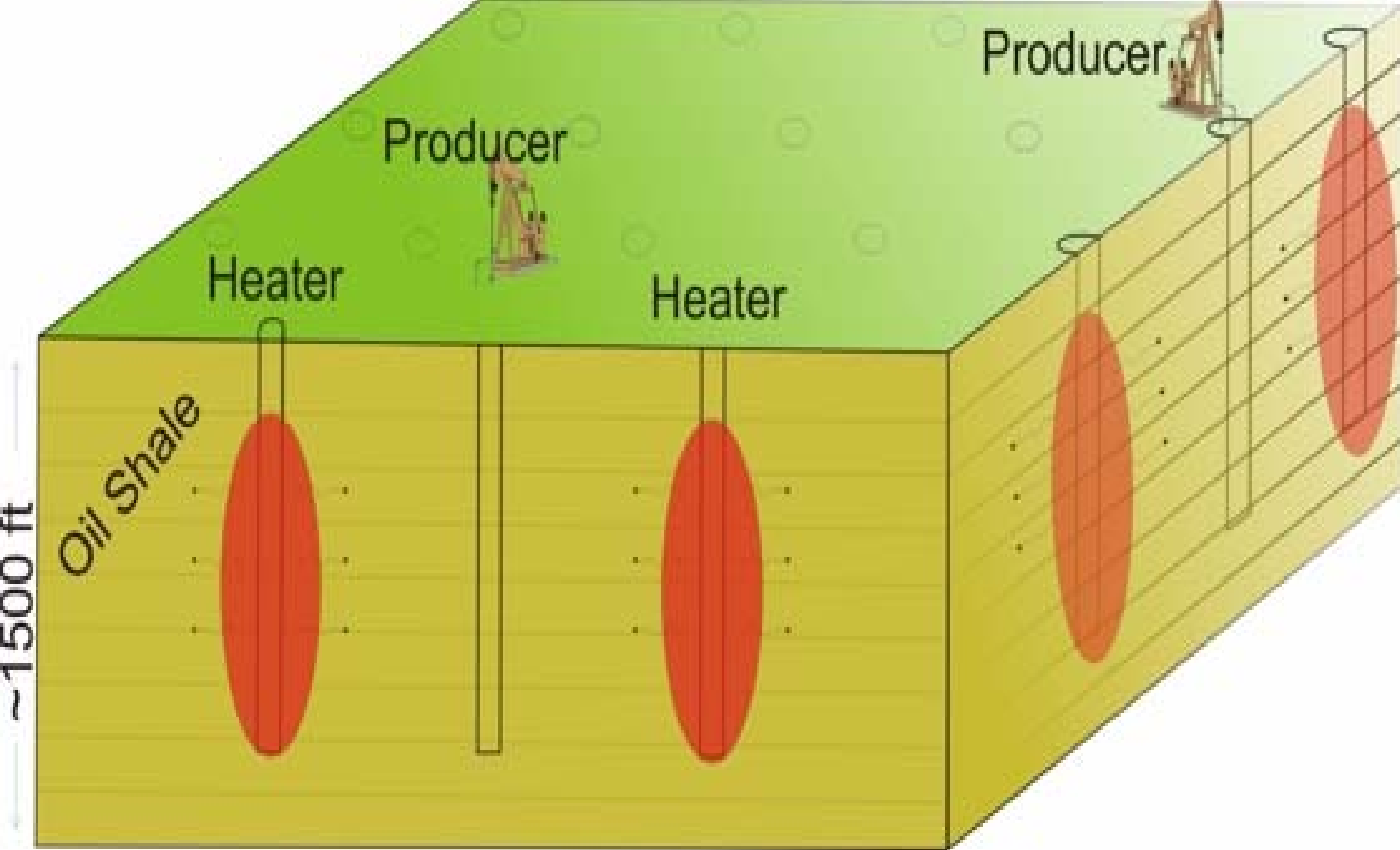


Major steps in Mining and Surface Retorting

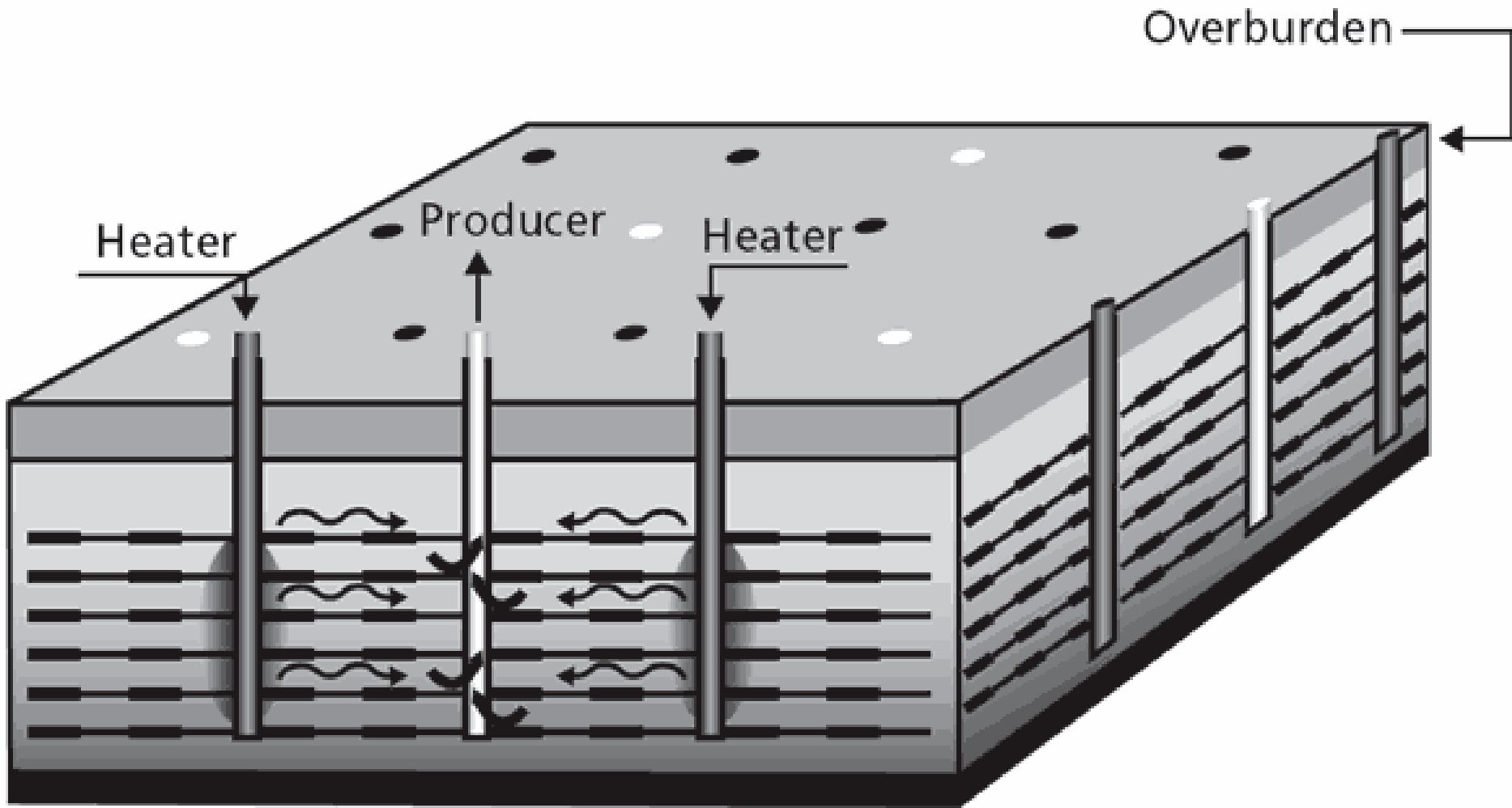




**Believe It Or Not! set Up On Crushed Oil Shale!
Put A Torch To This Rock And It Will Eventually Catch Fire!**



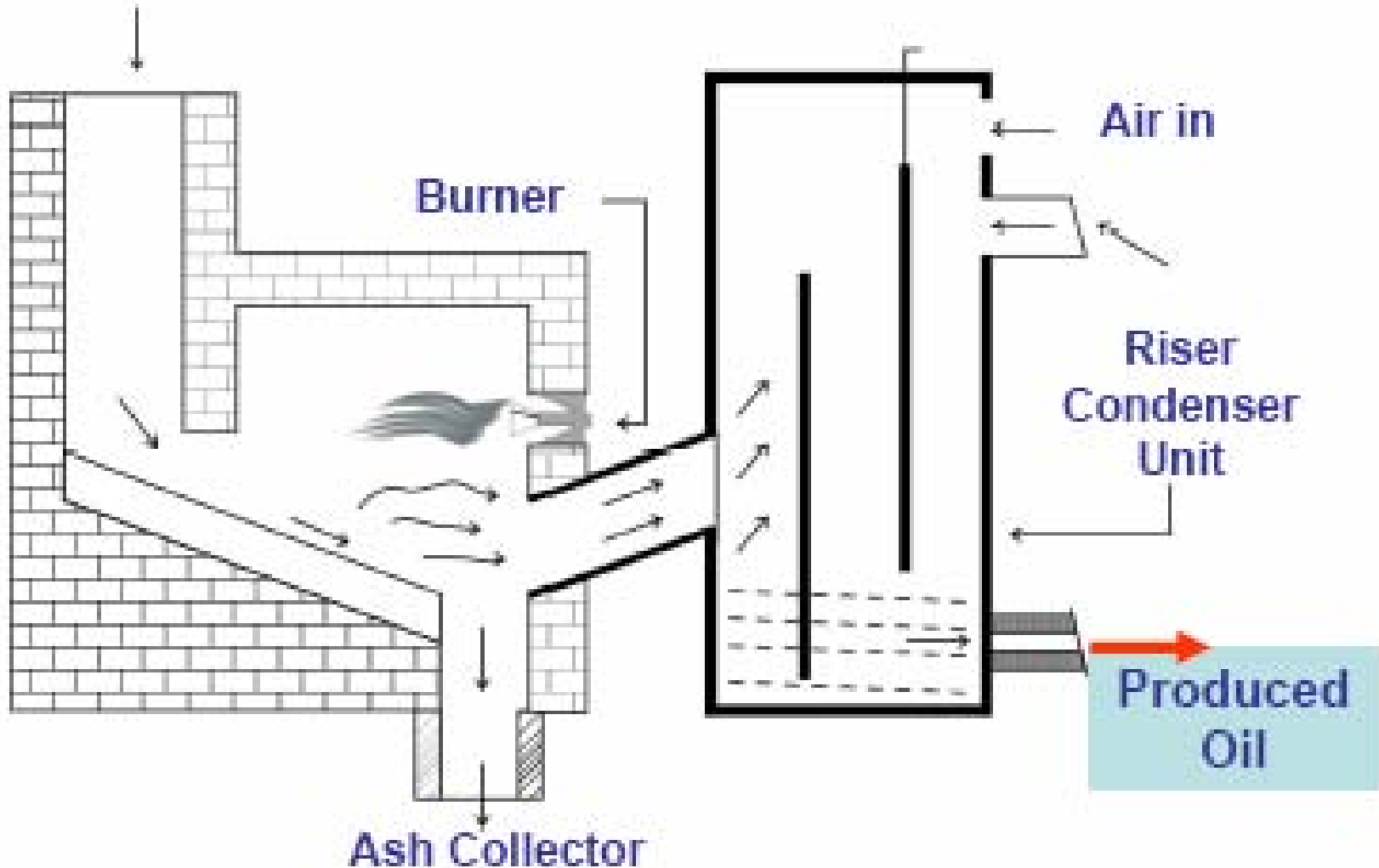
In-Situ conversion



SOURCE: Adapted from material provided by Shell Exploration and Production Company.

RAND MG414-3.2

Oil Shale Feeder



Oil Shale Furnace and Condenser Unit



The New Technology Retort

Retort Control Room

2/11/2007





Condensing System Control



Dust Collector & Rock Processing Equipment

Retort facility in Uintah County, Utah, USA



Road Map

□ Power Supply

- Oil?
- Gas?
- Solar?
- Wind?
- Hydro?

□ Resources

- Water
- Desalination

□ Other Projects

- 2-seas canal

□ Problems

- Environment
- Expenditures

□ Plan of Action

- Budgeting
- Time horizon
- Risk

The Cost

The first four 1,000 barrel/day retort cluster will cost approximately \$6.5-\$7.0 million. Subsequent units will be less expensive as a result of amortizing tooling and fabrication costs and via volume purchasing of component parts.

The total requirement for a 20,000 barrel/day operation will be between \$50 and \$150 million, depending primarily on mining equipment and mining development costs.

Even the \$150 million capital expenditure would be recovered in less than one year.

Based on a 20,000 barrel/day mine, we estimate a cost range of \$12-28/barrel depending upon mining methodology, cogeneration and other processing factors.

Question



Can we adapt this technology in Jordan?

Answer

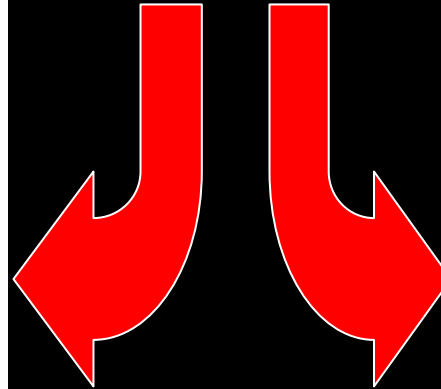
Conclusions

- ❑ Surface retorting is appropriate the oil shale in Jordan.
- ❑ The proposed system could easily be implemented and tested within a very short period of time.
- ❑ Within the foreseen future and considering the oil prices escalation, the proposed system is certainly pioneering as well as promising.

- ❑ The spent shale can be used as an additive to asphalt for paving roads, streets and highways.
- ❑ The spent shale could also be used to produce lime and construction material for concrete products.
- ❑ The spent shale and lime could be used in the chemical industries.
- ❑ The **Results Based Management** approach could be adapted for planning strategic projects such as the utilization of oil shale resources in Jordan.

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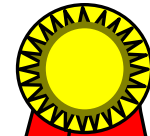
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Irbid, JORDAN

شكراً لكم

Thank you



- Jordan is poor in its resources but this sector preserved a sustainable growth with 5% in average, covering 99% of the country.

Capacity stands at 1,800 MW.

- Plants are fired by a combination of natural gas that is imported from Egypt, HFO and diesel.

✓ **Oil and Gas are imported.**



- Jordan meets its oil need from Saudi Arabia, Kuwait and United Arab Emirates.
- Risha gas field located near the Iraqi borders.
- Production \approx 35 million ft³/day
- Risha Power Station supplies Jordan with 10% of its electricity
- ✓ **Oil and Gas are still imported**



- 2 wind plants producing 3 GW/H
- Solar cells is lightening couples of remote villages
- Biogas factory at Rusaifeh dump producing 6 GW/H

Expansions are under way to increase the total capacity of the factory to 5 MW

✓ **Contribution to energy is small**



