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SLIDES: Costs and Benefits of Development: An Industry Perspective

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THE PROMISE AND PERIL OF OIL SHALE
COSTS AND BENEFITS OF DEVELOPMENT

AN INDUSTRY PERSPECTIVE

Natural Resource Law Center Conference
Hyatt Hotel, Denver, Colorado
February 5, 2010

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Disclaimer – the views presented are the authors views, and not the views of any one industrial firm or of the National Oil Shale Association as a whole.
INTRODUCTION

- The PROMISE and PERIL of oil shale
  - There is no oil shale industry, and never has been one in the U.S.
  - Only a huge resource and the potential for making its development economic and sustainable
  - May never be an industry

- Technology is the key
  - Continuing current R&D&D is important

- Misconceptions Abound
  - E.g. Inferior hydrocarbon resource, federal leasing unnecessary, social impacts are all negative

- Stigma of Black Sunday
WHAT HAS CHANGED SINCE BLACK SUNDAY

- No Federal Government funding or rush to meet federal production mandates
- Evolution of technologies and environmental mitigation strategies and stricter regulations
- Focus on in situ technologies in the deep Piceance Basin of Colorado and need for federal resources in that region
- Successful commercialization of surface technologies developed abroad
- Deliberate and expensive private research, development and demonstration programs
WHY IS INDUSTRY INVESTING $MILLIONS ON R&D&D

- Long term profit potential
- New technologies with the potential of competing with conventional petroleum
- Proven non-U.S. oil shale technologies that provide less technical and investment risk
- Huge & well defined domestic resource with no discovery risk or offshore political risk
- Potential to add $billion to assets if projects are economically viable
- Potential for small commercial operations

National Oil Shale Association
www.oilshaleassoc.org
Progress on BLM R,D&D Leases

- Some allege no progress is being made on R,D&D leases
- Leases were issued by BLM in 2007 – 10 year leases
- State and BLM requirements
  - 4-quarters of hydo data
  - Detailed development plan
  - Permit approvals
  - Reclamation bonding
- Example - AMSO has all permits to begin work
- Other projects are also moving ahead

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www.oilshaleassoc.org
Oil Shale Costs

- Historically, oil shale has been more expensive than conventional oil & gas production.
- Detailed cost estimates were performed by developers in the 1970's, but they are of little use today.
- Current R,D and D is focused upon improving economic return, reducing investment risk, and proving environmental mitigation strategies.
- Estimated costs of shale oil production range from $20 to around $80 per barrel depending upon the technology and level of project maturation.
- Initial demonstration plants are needed to define costs and technical parameters.

Unocal Plant Circa 1980's
OIL SHALE BENEFITS FOR THE PUBLIC

- Revenues from taxes, royalties and fees
- High paying jobs
- Infrastructure improvements
- Long lived industry/ large reserve base
- Security of oil supply
- Potential to drive down gasoline prices long term

Battlement Mesa, Colorado – a town built for oil shale development in the 1980’s
OBSTACLES FACING INDUSTRY

- Technical
  - Few commercially demonstrated technologies - long lead times
- Political
  - Federal and regional opposition, and stigma of 1980’s collapse
- Environmental
  - Carbon management, water, air & wildlife issues have technical solutions that will be expensive
- Regulatory
  - Limited access to federal oil shale resources
- Social & Economic
  - Social benefits obscured by external emphasis upon impacts
- Investment Risk

Estonian Oil Shale Plant
SUMMARY AND CONCLUSIONS

- Petroleum is becoming harder to find and more expensive.
- 94% of the U.S. transportation system runs on liquid fuels made from petroleum.
- Oil shale is one of the U.S. domestic energy resources that can reduce the societal cost of increasing oil importation.
- A balance between public costs and benefits is the desired end result.
- Technology is the key to whether oil shale will in the end become competitive with petroleum.

94% of Transportation Fuels in the US come from Petroleum
NOSA IS A NOT-FOR-PROFIT ORGANIZATION THAT STANDS FOR RESPONSIBLE DEVELOPMENT OF U.S. OIL SHALE TO BENEFIT THE LONG TERM ENERGY NEEDS OF THE NATION.

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Recently produced DVD available
OIL SHALE PROJECTS

Shell*
Chevron*
AMSO*
  (w/TOTAL)
Exxon
OSEC*
  (w/Petrobras & Mitsui)
EcoShale
Paraho (STI)
Enshale

*BLM R,D&D Lease Holder

Shell Mahogany Project Freeze Wall 2009
ADDITIONAL OIL SHALE PROJECTS

- Schlumberger
- AuraSource
- Quasar Energy LLC
- Percy Kean Clean Technologies
- IEP
- Mountain West Energy
- PetroProbe
- University of Denver
- Phoenix-Wyoming
- Natural Resources Recovery
- Millennium Synfuels
- Chattanooga Corporation
- CRE Energy
- Global Resources
- Natural Soda/Sentient
- General Synfuels International
- ConocoPhillips
- Encana
- Anadarko

EnShale Pilot Plant in Utah