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SLIDES: Assessing Opportunities and Barriers to Reducing the Environmental Footprint of Oil and Gas Development in Utah

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Background

- Working with larger national project

  Houston Advanced Research Center

- Goal of larger project
  - TECHNICAL: Develop & evaluate new natural gas exploration and production systems to reduce environmental impacts.
  - PROCESS: Foster dialogue among stakeholders and increase public awareness about Environmentally Friendly Drilling (EFD) systems
- Projects ongoing in TX, CO, WY, NY, PA, WV, AR, UT

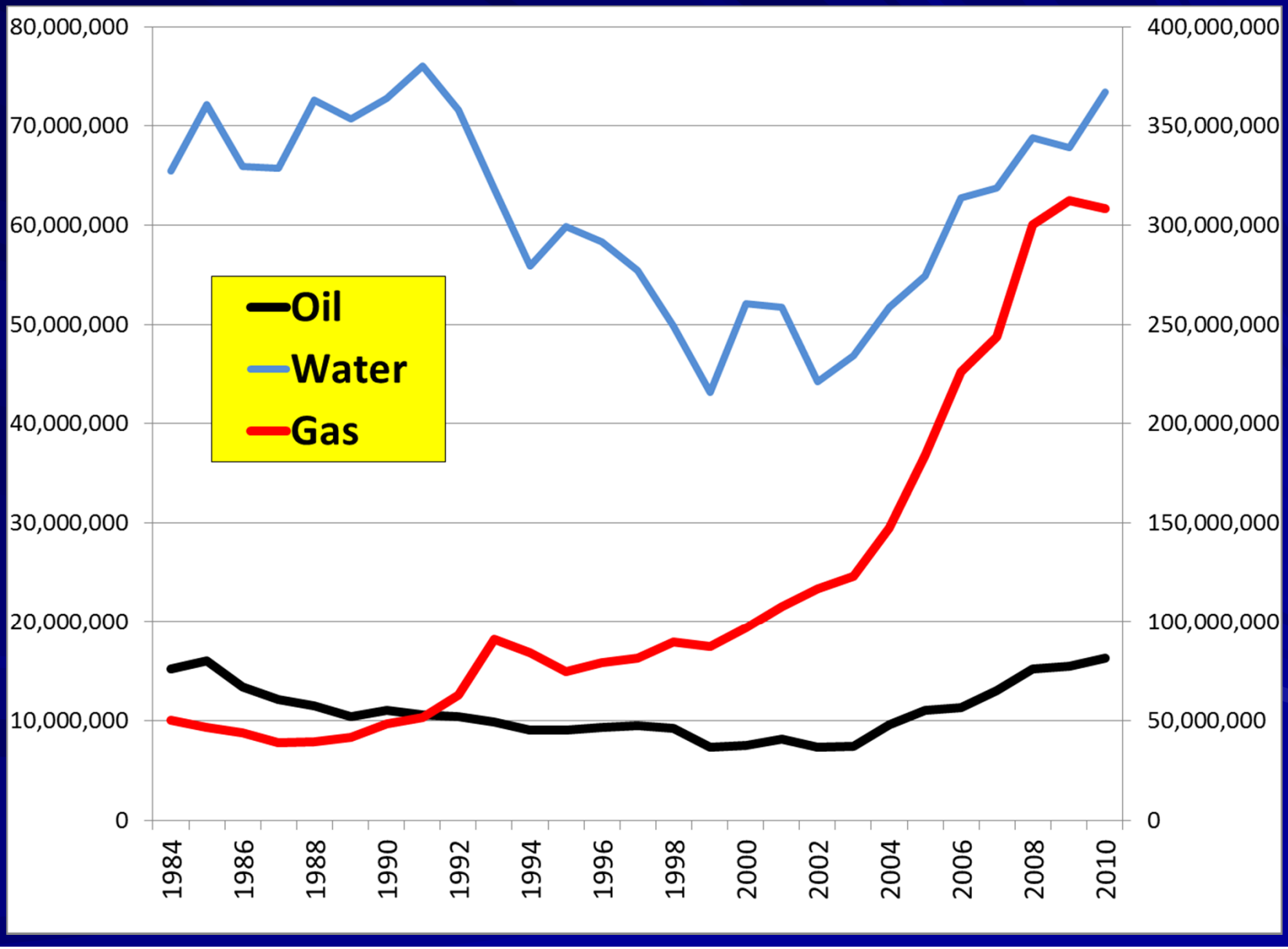
USU's Uintah Basin Project

- FOUR CORE RESEARCH QUESTIONS:
  - What is already being done to reduce the environmental footprint from natural gas resource development in this region?
  - What drives those changes?
  - What constraints exist to the expanded use of these practices?
  - How does the use of EFD approaches affect opportunities for expanded unconventional gas development in this region?

USU Uintah Project = Exploratory

- Our group = social scientists not engineers
- Core interests: understanding drivers & obstacles to use of environmentally-friendly approaches
- Expectations
  - Not all EFD approaches are appropriate in this region.
  - Acceptability of future energy development will be affected by availability and use of EFD systems
- Outputs
  - Workshop (today)
  - White Paper (December 2010)
    - Recommendations for programs or policies to facilitate adoption of appropriate forms of EFD technology

Oil & Gas Production in the Basin



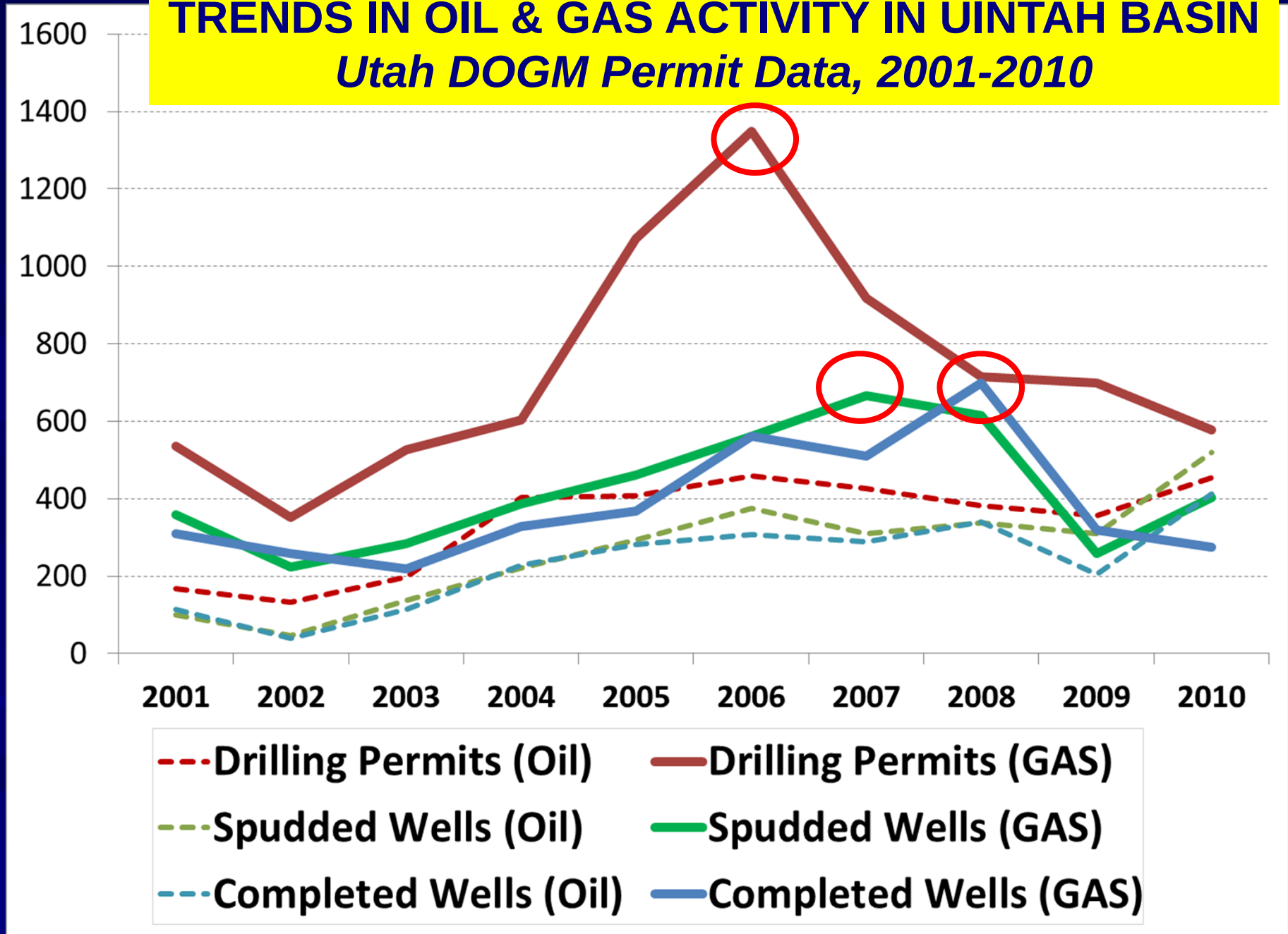
Importance of the Uintah Basin

2010

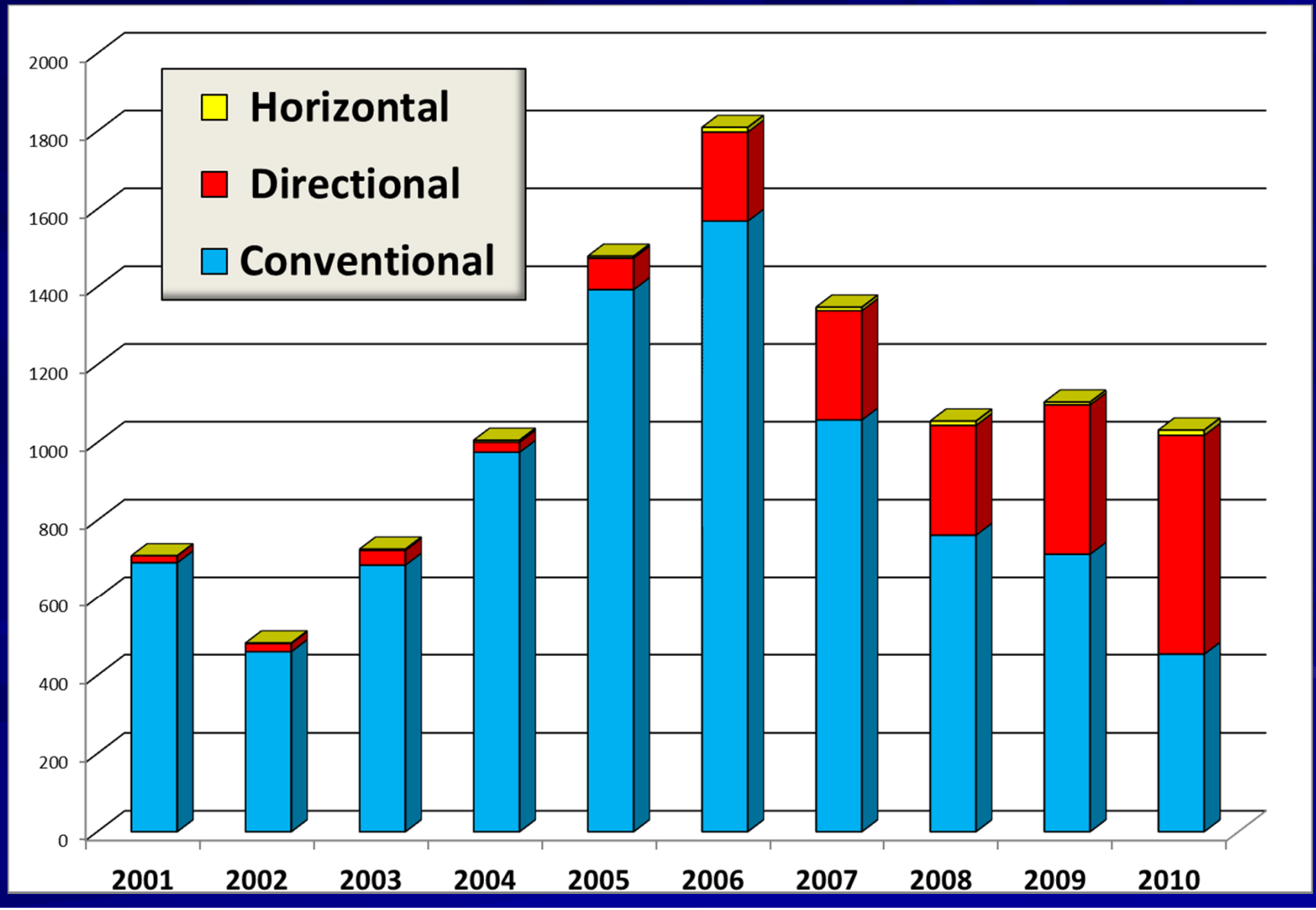
- 70% of Utah's oil production (23 m. bbl)
- 72% of Utah's natural gas (430 bcf)
- 94% of new spudded wells

TRENDS IN OIL & GAS ACTIVITY IN UINTAH BASIN

Utah DOGM Permit Data, 2001-2010



Approved DOGM Drilling Permits in Uintah Basin, By Type of Well



Basin Jobs Associated with O&G

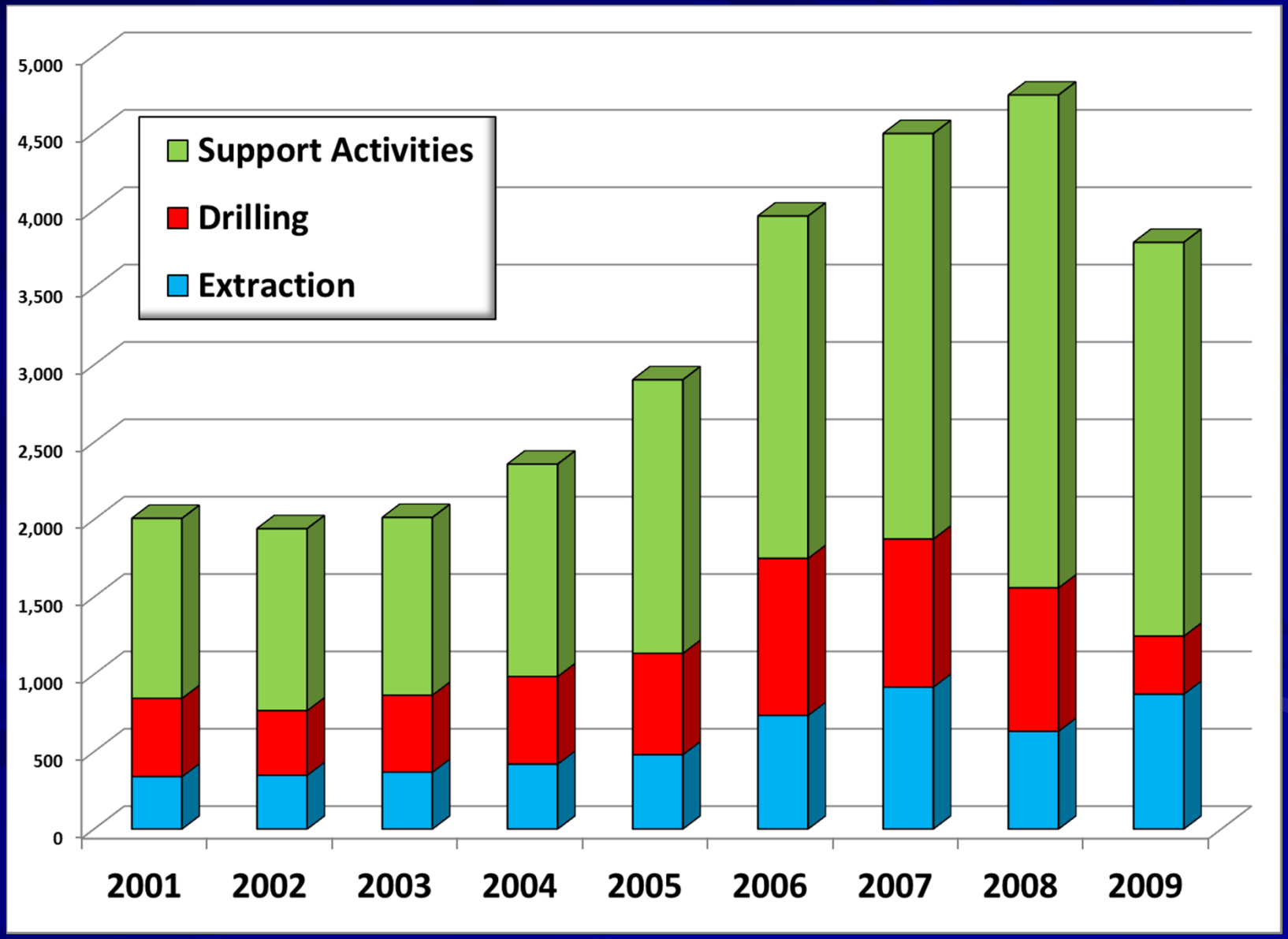


Table 3.1
Economic Impact of the Oil and Gas Industry in the Uinta Basin, 2007

	Employment	Wages (000s)
Total, Nonfarm	21,640	$896,858.4
E&P Industry, Direct	4,494	$304,743.0
E&P Industry, Indirect and Induced	5,195	$144,844.3
E&P Industry, Total	9,689	$449,587.3
E&P Industry, Share of Total	44.8%	50.1%

Source: Utah Department of Workforce Services, Bureau of Economic and Business Research.

From: Downen et al, 2009.

Highlights of Findings

- Attention to environmental footprint of O&G activity has increased in last decade
- Many examples of innovation on the ground
- Some approaches used in other regions have yet to become ‘standard’ practice in the Basin
- Complex regulatory jurisdictions complicate and shape patterns of change

Examples of Innovation

- Reduced surface disturbance
  - Multi-well pads; directional drilling
  - Centralized fracking facilities (with pipelines to pad sites)
  - Reclamation of drilling pads (interim, final)
- Water management
  - Pre-treatment of produced waters before reinjection or evaporation ponds

More Examples of Innovation

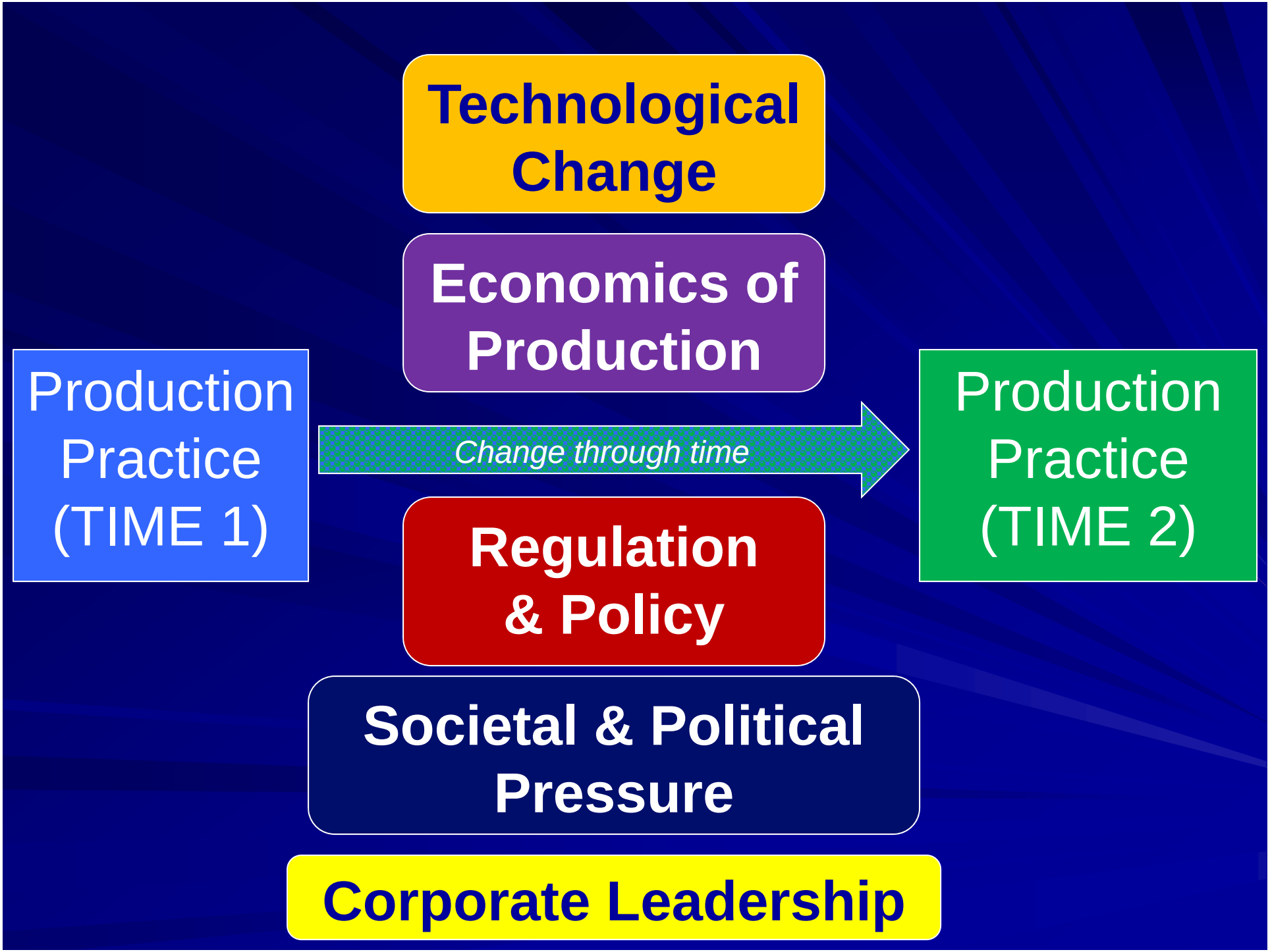
- Air Quality
  - Tier 2 diesel engines on more rigs
  - Electrification of some rigs
  - Dust mitigation (upgrading access roads; pipelines for water; reduced truck traffic)
  - Compressed air valves
- Protecting Wildlife and T&E Plants
  - Mandatory buffers from known T&E species
  - Time restrictions on drilling activities

Examples of Approaches Less Widely Used In Uinta Basin

- Closed loop or recycled fracking water systems
- Aggressive treatment of produced waters
- Drilling pad mats and ‘disappearing’ roads
- Aggressive capture of fugitive air emissions
- Capture, testing, and treatment of drilling muds and cuttings

Drivers and Constraints

- Most ‘EFD’ practices not yet standard practice, yet great progress made
- What explains pace and direction of change in O&G development methods?


Technological Change
Economics of Production
Production Practice (TIME 1)
Change through time
Production Practice (TIME 2)
Regulation & Policy
Societal & Political Pressure
Corporate Leadership

Findings

- Technological Change & Economics
  - Important Link in Chain: “Can’t use that here” or “Too expensive”
  - Not always a DRIVER, but innovations can remove a technical or economic barrier
    - Much technology out there – but not yet used
    - Limiting characteristics of geology, topography
    - If regulation is to work, technological solution must exist
  - Easiest cases = WIN-WIN technologies
    - Reduce footprint AND save $

Economics

- *“Directional drilling is only affordable at certain gas prices. The technology is there, but utilization is cost dependent.”*
- *“As the price of the product goes up, you can reduce the spacing, apply better technology, but make more money in the long run.”*
- *“The biggest barrier [to water management] is always money.”*
- *“For operators, it has to be economics. Drilling superintendents would rather do vertical (than directional drilling) because it’s easier.”*

Examples of Win-Win

- *“We thought [multi-well pads] were going to break us . . . But when we got going on it, we saved money in different areas we weren’t even considering. Don’t have to move the rig every time you go to another pad and with the new style of rigs there is no need to re-lay pipe.”*

Geology

- *“There aren’t that many zones geologically that can take a lot of water.”*
- *“Topography and underground geology will be what drives [operator] costs.”*
- *“Drilling would have to be vertical in areas with corrosive salts and large geologic holes if there were any hope of hitting target resources.”*

Regulation and Policy

- Not a simple story
- Some changes in production practices directly linked to new rules/regulations
  - *or at least: perceptions that they are coming*
- Many examples where industries are 'ahead' of the regulatory wave
- Complexity of regulatory jurisdiction complicates the situation

Regulation as a Driver

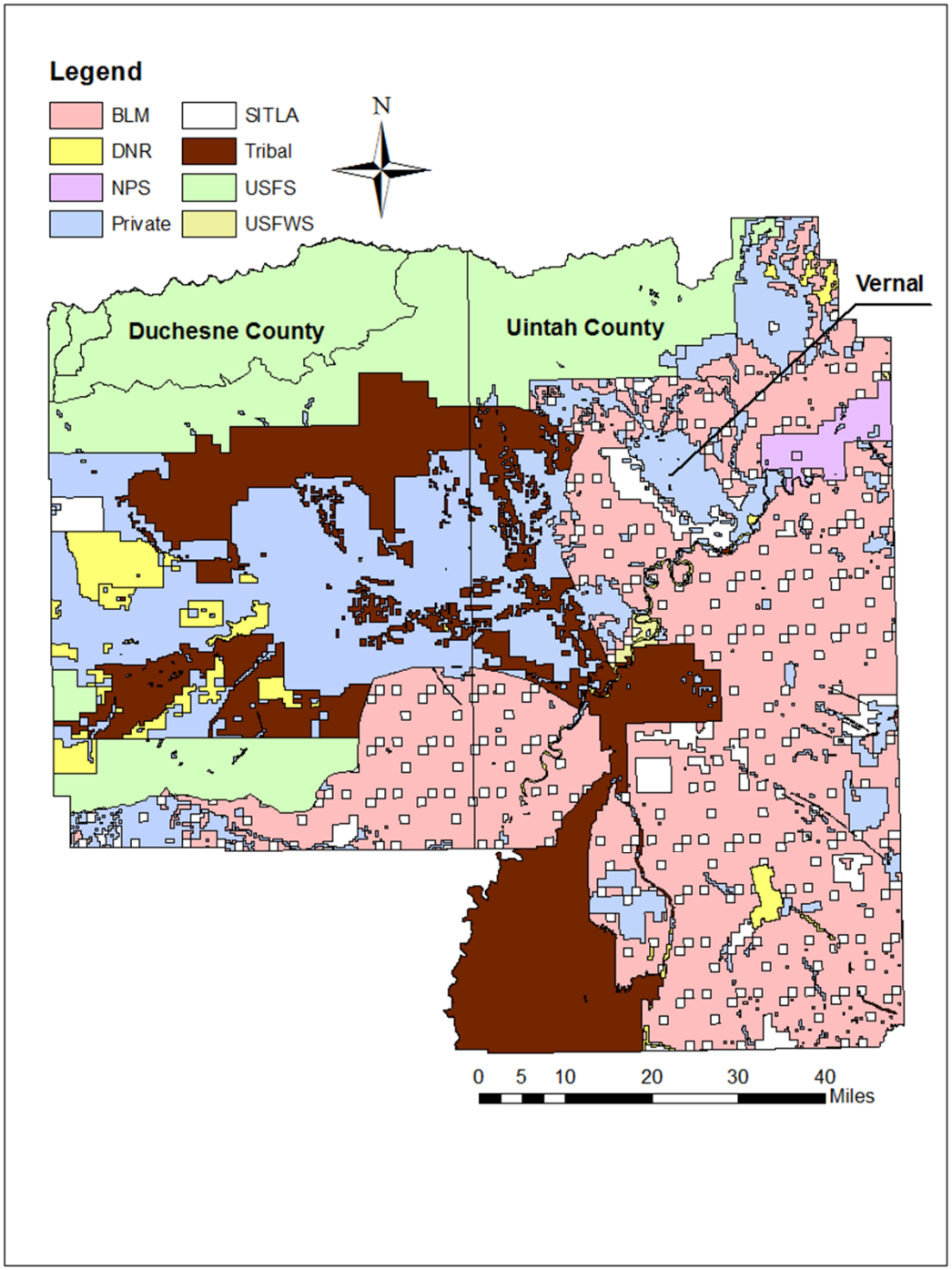
- *"The energy industry isn't doing anything out of the goodness of its heart that costs money…but are rather responding to increasing standards set by state and federal governments."*
- *"Overall companies are begrudging partners but will do what they have to…about the only time I've seen them willingly adopt conservation measures . . . [is] if it improves or keeps good relations with an enforcement agency."*
- *"Bad things happen, regulations occur, and companies figure out how to deal with those regulations."*

Legal NEPA Challenges

- *"…if a practice is going to be changed, it's going to be changed because SUWA took the BLM to court and the courts ruled that yeah, you need to do this, and then that becomes part of the regulation."*

COMPLEXITIES IN LAND OWNERSHIP

- Tribal (16%)
- Federal (53%)
  - BLM
  - USFS
  - USFWS
  - NPS
- State (10%)
  - SITLA
  - DNR
- Private (21%)



Complexities in Regulatory Jurisdiction

- Federal Lands
  - BLM = lead
  - NEPA governs
  - State permitting (DOGM), little state oversight (DEQ)
- Tribal Lands
  - Mix: Tribal Government, BIA, BLM, EPA
  - Boundaries of tribal jurisdiction extends beyond contemporary reservation
- SITLA lands
  - State = lead
  - EPA more involved on water & air issues

Confusion about Regulatory Authority & Processes

- *"There are something like twelve agencies intermixed here…[this] makes it "hard to figure out what agency is in charge . . . Someone must have rules and regs on who enforces [what], but we haven't seen it."*
- *"Operators would like a one-stop shop . . . that's not the reality of the situation and they have to answer to multiple masters."*
- *"The BLM can only regulate what they are given authority over…they don't have direct authority [over water], so it's hard for them to take the lead."*

Perceived Inconsistency & Uncertainty

- *“Regulatory uncertainty is scary. It’s no fun to go to an agency . . . and have them say they don’t know if they can approve that or not.”*
- *“[our] biggest problem with feds is inconsistency. Getting the BLM to come down hard on a company is like pulling teeth.”*
- *“[while] the EPA needs to get involved, [they] don’t always agree … about what is big enough to care about.”*

Perceived Inconsistency & Uncertainty

- *"So much of what the BLM does is discretionary, and there really aren't that many regulations about what needs to be done environmentally."*
- *"One of the huge problems that we have in Utah is we can't get DOGM to write down the stinking regulations. It's all verbal . . . from our perspective, we don't have a problem dealing with meeting a certain regulation, so long as my competition . . . has to jump through the same hoops."*

Societal & Political Pressure

- Important Backdrop to Other Drivers
- Differences between UTAH and private lands states
  - Federal lands = NEPA driven decisions
    - Environmental Stakeholders = tend not to be local
    - Decisions = technical/process oriented
    - Local, regional & national political pressures
  - Private Lands
    - More private/local opposition groups
    - State regulatory process = key actor
    - Key federal actor = EPA

Role of Corporate Leadership

- Concerns about public perception of industry / company
- Feelings of responsibility to community
- Corporate culture

Role of Public Image

- *“Innovations come from the bigger companies because they are in the public eye and care about their image.”*
- *“Spills are costly, bad PR is costly. It’s better to be a green company, now, politically and every other way.”*
- *“Energy companies have to understand that what other people say about you is what your brand is.”*
- *[Companies want to] “sell themselves as good guys doing the right thing.”*

Community Responsibility

- *"We reclaim because someone else's livelihood depends on that grass. We don't want to be the bad guy."*
- *"People that love the outdoors would be pissed if you're out there fricken' trashing it . . . you don't get people who love the outdoors going out and trashing it."*

Corporate Culture

- *"Their corporate ethic . . . I think comes from the newer generation who is just more environmentally aware."*
- *"As the older generation retires, new generations are more environmentally adept and concerned."*
- *"The right person in the right position needs to be there . . . who's thinking ahead, coupled with a smart, technical savvy and a company [ethic] that will embrace them."*

Working Model for How Change Often Happens

- Growing awareness of potential environmental issues ➔
- A few companies proactively identify need to innovate to solve those problems ➔
- Regulatory agencies begin to recommend changes to address certain issues ➔
- Experience of innovators leads to greater industry comfort with certain practices ➔
- Changes in state or federal policies might formally require certain practices or approaches

Implications

- Technical innovation important, but not enough
- Market conditions are important in the pace of changes
- Regulatory ambiguity uncertainty = huge issue
  - Many industry informants would be happy to live with strict environmental rules if…
    - They could get quick decisions on leases/permits
    - They knew the rules would be stable for foreseeable future
- Industry behavior = diverse
  - Lessons from innovators)

Future Steps (2011)

- Answer Q:
  - *How could the expanded use of EFDs affect the social acceptability of (and potential for development of) unconventional oil and gas resources in the region?*
- Methods may include:
  - General population community surveys
  - Focus groups with stakeholders
  - More interviews with key actors and interest groups

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