

TAR SANDS: WORTH THE ENERGY? AN ANALYSIS OF THE FUTURE OF UTAH'S TAR SANDS

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I. INTRODUCTION

The rapid and sustained rise of the cost of foreign oil has caused the Bush Administration and the energy sector to look within America's borders for domestic oil resources. This policy focus has led the current administration, Congress, and the oil industry to focus their attentions on Utah, which contains approximately ninety-three percent of the United States' total tar sand resources, a resource thought to have the ability to produce an estimated twenty-five billion barrels of oil.¹ In combination with an estimated fifty billion barrels of recoverable oil from oil shale, many in the energy industry and in the government think Utah is in position to become an important player in the oil industry.²

This potential economic boon has energized Utah's congressional delegation, most notably senior Senator Orrin Hatch, who has supported immediate development of these resources.³ In December of 2005, the University of Utah formed the Utah Heavy Oil Center (UHOC) in response to the demand for answers regarding exploration, developmental costs and production of Utah's unconventional oil resources.⁴ UHOC has taken the lead in educating the public and exploring the possibility, methods and costs associated with developing the tar sands resource. To this end, on September 26, 2006, UHOC hosted businessmen, scientists, energy professionals, and the public at the Western U.S. Oil Sands Conference at the University of Utah.⁵

The purpose of this paper is to examine the history of tar sands in Utah and explore the future of tar sands as an oil resource, looking specifically at the effects of Combined Hydrocarbon Act of 1981 and the recently passed Energy Policy Act

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¹ UTAH DEPARTMENT OF NATURAL RESOURCES AND ENERGY, UTAH ENERGY OFFICE, AN ASSESSMENT OF OIL SHALE AND TAR SAND DEVELOPMENT IN THE STATE OF UTAH, PHASE II: POLICY ANALYSIS 1 (1982).

² *Id.*

³ See Natalie Clemens, *Hatch Urges use of Utah's Tar Sands and Oil Shale*, DESERET MORNING NEWS, Aug. 16, 2005 at B2; see also Jerry Spangler, *Vast 'Oil' Reserves in Utah may Tempt Feds to Help Out*, DESERET MORNING NEWS, Apr. 13, 2005, at A1.

⁴ About UHOC, <http://www.uhoc.utah.edu/about.htm> (last visited May 25, 2007).

⁵ Western U.S. Oil Sands Conference, <http://www.uhoc.utah.edu/events/oilsands.htm> (last visited May 25, 2007).

of 2005.⁶ Due to the environmental costs, socio-economic impacts, and concerns of economic viability due to the expense of the technologies to produce oil, the development Utah's tar sands as a domestic oil resource should not be undertaken at this time.

II. TAR SANDS BACKGROUND

Tar sands most commonly occur in Canada and Venezuela and also are found in the Middle East. In the United States, tar sands are found in Utah, Colorado, and Wyoming, commonly known as the Tar Sand Triangle. Tar sands are thick sands made up of a combination of clay, sand, water, and bitumen.⁷ It can be mined and processed to extract the bitumen, an oil-rich residue, which then can be refined into crude oil.⁸ Traditionally, tar sands are mined using two processes: (1) strip-mining, and (2) "in-situ" recovery.

Complex science and technologies drive both technologies of sand extraction and oil recovery. In both strip-mining and in-situ recovery, tar sands must be extracted, the bitumen separated from clay, sand and water, and the bitumen then must undergo an upgrading process. This process consists of diluting the bitumen with lighter hydrocarbons, thus making the oil viscous enough to transport by pipeline.⁹

Strip-mining is the more environmentally damaging of the two processes. In strip-mining, huge shovels load massive mining trucks full of tar sands before the sand is transported to upgrade facilities where the bitumen is extracted from the sands. While strip-mining of any kind is extremely hard on the environment, many Western companies engaging in this technique are concerned with its impacts and work hard to ensure proper reclamation of the mining site.

In-situ recovery is an underground piping system that forces huge amounts of super-heated steam into the ground. This super-heated steam separates the bitumen from the clay, sand and water and makes the bitumen viscous enough to be pumped out of the ground and transported via pipeline to the upgrade facility for processing into oil.¹⁰

A. Local and Worldwide Tar Sands Locations

The world's largest tar sand deposits, which contain approximately two-thirds of the world's tar sands, are located in Alberta, Canada and Venezuela.¹¹ The remaining one third is found in countries throughout the world, including the

⁶ While oil shale and tar sands are often talked about simultaneously, this paper does not explore Utah's oil shale resource, but focuses solely on Utah's tar sands.

⁷ About Tar Sands, <http://ostseis.anl.gov/guide/tarsands/index.cfm> (last visited May 25, 2007).

⁸ *Id.*

⁹ *Id.*

¹⁰ *Id.*

¹¹ *Id.*

Middle East.¹² The largest tar sand resources in the United States are in Utah, with in-state totals ranging from 12 to 20 billion barrels of recoverable oil.¹³

All of Utah's tar sand deposits are located on the eastern side of the state, from the northern portion of the state to close to its southern border. Six tar deposits in Utah contain ninety six percent of Utah's tar sand resources.¹⁴ Four of the six, Asphalt Ridge, Sunnyside, P.R. Spring, and Hill Creek, are located in northeast Utah's Uinta basin, while the other two, the Tar Sand Triangle and Circle Cliffs, are located in central-southeastern Utah.¹⁵

B. History of Tar Sand Extraction in Utah

Knowledge of Utah's tar sands resource and the desire to extract oil from the sands has existed for over a century. The challenge has been to find and develop economically and practically feasible technologies to produce oil from the tar sands. Because technology and economics have not found a way to co-exist, the history of tar sand extraction in Utah has been largely unsuccessful. A lack of success however has not stopped individuals, small domestic private oil companies, or international oil corporations from trying to develop the resource.

Some of the earliest recorded events of oil extraction in Utah history occurred in the northeast Uinta basin. Most activity of large oil companies occurred during the 1970s. This activity during the 1970s was due to a worldwide oil shortage that forced the United States to look inward and develop domestic oil resources to fill its needs.

1. Asphalt Ridge Deposit

As early as the 1920s the city of Vernal was using the tar sands in the Asphalt Ridge deposit to pave the roads and sidewalks in the town.¹⁶ In the 1930s, Doc Renne, an early oil entrepreneur built a tar extraction plant on Asphalt Ridge using a hot water separation process.¹⁷ Though his efforts were relatively unsuccessful, in the early 1940s, major mining of tar sands began at the Sunnyside deposit. The tar sands mined from the Sunnyside deposit were used for road surfacing material rather than for crude oil capabilities.¹⁸ Recognizing the profit possibilities if cost-effective technologies could be implemented to separate the oil from the sands, several companies including the Knickerbocker Investment Company, Sohio Petroleum Company, and Shell Oil Company began the first

¹² *Id.*

¹³ *Id.*; see also TAR SAND ASSESSMENT PHASE II, *supra* note 1 at 1.

¹⁴ CHARLES E. BISHOP & BRYCE T. TRIPP, AN OVERVIEW OF TAR SAND OF UTAH 1 (Utah Geological Survey 1993).

¹⁵ *Id.*

¹⁶ ROBERT E. BLACKMAN, TAR-SAND RESOURCES OF THE UINTA BASIN, Utah 31 (Utah Geological Survey 1996).

¹⁷ BISHOP & TRIPP, *supra* note 14, at 1.

¹⁸ *Id.*

comprehensive evaluations of the tar sands resources in the 1950s and 1960s.¹⁹ Major Oil Company, Aminoil Company, Arizona Fuels Corporation, Texaco, Phillips and others all drilled test wells or experimented with strip mining and hot water extraction during the 1970s.²⁰

2. *Sunnyside Deposit*

Like Asphalt Ridge, the Sunnyside deposit was mined early on. From 1892 to the late 1940s, Sunnyside was mined mostly for road base construction in Utah and five surrounding western states.²¹ In the early 1960s, Shell Oil Company collected core samples and in 1967 went as far as developing an experimental in-situ recovery system.²² Signal Oil and Gas Company and Pan-American followed suit, using horizontal in-situ systems to recover oil.²³ Texaco, Gulf, Enercor, Phillips Petroleum, Sabine Resources, Cities Service, and Amoco all made initial evaluations of land interests that they had in the Sunnyside deposit, but all developmental activity tapered out in 1982.²⁴

3. *P.R. Spring Deposit*

The P.R. Spring deposit was used for petroleum recovery as early as 1900.²⁵ In 1900, John Pope drilled an oil test well which was later followed by a gravity based recovery system installed in a nearby sector.²⁶ During the 1970s and 1980s many companies actively studied the oil resource and extraction potential of the P.R. Spring deposit.²⁷ In 1983, a Salt Lake City based oil company was able to operate a pilot processing plant using solvent solutions to extract 100 barrels-per-day.²⁸ However, while further developmental proposals using in-situ and strip-mining techniques have been reported, there has been essentially no production from this deposit since 1983.²⁹

4. *Hill Creek Deposit*

The Hill Creek Deposit is one of the biggest tar sand areas in Utah. However no development has taken place on this resource because it is within an area set aside for the Ute Indian Tribe.

¹⁹*Id.* at 10.

²⁰BLACKETT, *supra* note 16, at 31.

²¹*Id.* at 47.

²²*Id.*

²³*Id.*

²⁴*Id.*

²⁵*Id.* at 36.

²⁶*Id.*

²⁷*Id.* at 38.

²⁸*Id.*

²⁹*Id.*

5. *Tar Sand Triangle Deposit*

Significant discovery has also taken place in the Tar Sand Triangle Deposit. Shell Oil Company conducted evaluations and even drilled some exploratory holes in the 1970s, and several other companies, including Santa Fe Energy, Altex Oil Company, and Gulf Exploration and Production Company all conducted evaluations in the area.³⁰ A draft environmental impact statement (DEIS) was conducted in the Tar Sand Triangle in the early 1980s, but there is no record of production in this area.

Unfortunately, although many oil companies were spending money and time trying to apply technologies to create economically feasible methods for extracting oil from the sands in Utah, there was no measurable success. The leasing system at this time was also in disarray.

C. The Leasing System Prior to 1981

Before 1926, the leasing of tar sand areas was controlled by the General Mining Act of 1872, but the General Mining Act was not created for tar sands and was "awkward for these types of deposits."³¹ Efforts were made in 1909, 1914, and 1920 to distinguish tar sand deposits from oil and gas as well as other mineral leases.³² However, it was not until Congress amended the Mineral Leasing Act of 1960 that a leasing system was created specifically for tar sand deposits.³³ Despite efforts to provide this leasing system, wording of the amendment created confusion and the Department of the Interior ceased leasing tar sand areas in 1965.³⁴ With the increased exploration and production activity in Utah's tar sand areas in the 1970s, Congress recognized the need to act.

D. Early Congressional Action

In the late 1970s and early 1980s Congress became increasingly concerned with the continuing worldwide oil shortage and instability of the oil markets. Hopeful that tar sands resources had the potential to increase America's domestic oil reserves and wean the United States from the rising costs of foreign oil dependency, Congress finally acted with clarity on tar sand leasing and development by passing the Combined Hydrocarbon Act of 1981 ("CHL Act").³⁵ The purpose of this Act was "to provide for the conversion of existing oil and gas leases and valid claims based on mineral locations within Special Tar Sand Areas

³⁰ BISHOP & TRIPP, *supra* note 14, at 10.

³¹ BLACKETT, *supra* note 16, at 22.

³² *Id.*

³³ *Id.*

³⁴ *Id.*

³⁵ 43 C.F.R. § 3140.

to combined hydrocarbon leases."³⁶ The Act allowed oil companies and private land owners who had traditional oil and gas permits on their land to convert their traditional leases and obtain combined hydrocarbon leases (CHLs). The Combined Hydrocarbon Act not only provided a non-competitive leasing mechanism in which persons and corporations holding traditional oil and gas leases within tar sand areas could convert their oil and gas leases to CHLs, it also created a competitive leasing framework. This competitive leasing system was designed for people who did not hold existing oil and gas leases in the specially designated tar sand areas and was separate from the non-competitive leasing requirements.³⁷

The regulations and requirements of the Combined Hydrocarbon Act were promulgated in 43 C.F.R. §§ 3140 and 3141 in early 1982. 43 C.F.R. 3140 lists the mechanisms and specific requirements to convert a traditional oil and gas lease to a CHL.

1. 43 C.F.R. 3140 Conversion of Oil and Gas Leases

In the non-competitive leasing context, only "owners of oil and gas leases issued within Special Tar Sand Areas (STSAs) on or before November 16, 1981, and owners of valid claims based on mineral locations within Special Tar Sand Areas, [were] eligible to convert leases or claims to combined hydrocarbon leases."³⁸ Initially, there was some discussion as to the plight of owners of oil and gas leases on lands that were partially within or sat on or close to the borders of Special Tar Sand Areas (STSA) because they could not take advantage of the non-competitive leasing system unless their entire lease was within the designated STSA.

To this end, Cooper Petroleum challenged the regulation arguing that the existing oil and gas leases on the lands lying within or on the boundaries of STSA should be split from the land lying outside of the boundaries, allowing the conversion of the oil and gas lease to a CHL on those lands entirely within the STSA and making it easier for corporations to obtain CHLs and begin development.³⁹ However, the United States Department of the Interior Office of Hearings and Appeals Interior Board of Land Appeals disagreed with Cooper's suggestion and strictly interpreted the language of the statute, stating, "only pre-November 16, 1981, oil and gas leases that are *entirely within* Special Tar Sand Areas can be converted to combined hydrocarbon leases."⁴⁰

Questions also arose as to whether this regulation required owners of existing oil and gas leases to convert those leases to CHLs or lose their lease. In answer to this question, the statute explicitly provided that owners of oil and gas leases in Special Tar Sand Areas who elected not to convert their leases to a combined

³⁶ 43 C.F.R. § 3140.0-1.

³⁷ See 43 C.F.R. § 3141.

³⁸ 43 C.F.R. § 3140.2-2

³⁹ Cooper Petroleum, Inc, 73 IBLA 295 (1983).

⁴⁰ *Id.*, emphasis added.

hydrocarbon lease acquired no rights to any hydrocarbon resource except the oil and gas leases on the terms of their lease prior to the passing of the Act.⁴¹ Furthermore, failure to file a CHL conversion application had no effect on the validity of the original mining claim or the right to maintain that mining claim.⁴²

The regulation then listed requirements and timetables under which the conversion of an oil and gas lease to a CHL could be granted. The first requirement was submission of a written request of a CHL to the Bureau of Land Management (BLM), signed by the owner of the existing oil and gas lease or valid claim, accompanied by three copies of a plan of operations.⁴³ The plans of operation were required to identify all leases proposed for conversion, include a designated operator or proposed operating agreement, and a development stage, as well as provide for "reasonable protection of the environment and diligent development of the resources requiring enhanced recovery methods of development or mining."⁴⁴

Next, the regulation contemplated the modification and amendment of plans of operation either before or after conversion of a lease or valid claim to reflect technological changes, changes in schedule beyond the control of the owner of the lease, and new information regarding the development of the resource as well as other changes and directs how modifications and amendments should be made.⁴⁵ However, the plan of operations was required to be complete, and if found to be incomplete, was subject to rejection by the authorizing officer.⁴⁶ When determined that the plan of operations was complete, the authorized officer could "suspend the term of the Federal oil and gas lease(s) as of the date that the complete plan was filed" and the lease would remain suspended until the plan received final approval or rejection.⁴⁷

Once the applicant developed a plan of operations that demonstrated a commitment for the diligent protection of the environment and a plan to develop the tar sand resource, the plan of operations to convert an existing lease to a CHL had to be filed by November 15, 1983.⁴⁸ After filing, the authorized officer had 15 months to take action on the application.⁴⁹ As soon as the authorizing officer found the plan of operations was acceptable, the conversion was complete,⁵⁰ the oil and gas lease suspended, and a CHL was issued for a primary term of ten years, "and for so long thereafter as oil or gas is produced in paying quantities."⁵¹

⁴¹ 43 C.F.R. § 3140.1-1(b).

⁴² *Id.*

⁴³ 43 C.F.R. § 3140.2-3(a).

⁴⁴ 43 C.F.R. § 3140.2-3(d-f).

⁴⁵ 43 C.F.R. § 3140.2-3(b).

⁴⁶ 43 C.F.R. § 3140.2-3(2).

⁴⁷ 43 C.F.R. 3140.2-3(g)(1).

⁴⁸ 43 C.F.R. 3140.3-1.

⁴⁹ 43 C.F.R. 3140.3-2.

⁵⁰ 43 C.F.R. 3140.4-2(a).

⁵¹ 43 C.F.R. 3140.5.

The burden to meet the guidelines established in the regulation was on the applicant. If the plans were not submitted on time, they were subject to rejection and denial of a CHL by the BLM. Congress also made clear its intent to place the burden of meeting the statutory requirements on the applicant by stating, "If the applicant does not have sufficient commitment by the necessary parties to enable the resource to be developed then the applicant does not have the right to convert."⁵² This "sufficient commitment" language places the burden of converting an oil and gas lease to a CHL directly on the owner of the oil and gas lease, not the state or federal agency.

In short, the Combined Hydrocarbon Leasing Act of 1981 together with 43 C.F.R. 3140 gave private industry the necessary mechanisms to begin developing Utah's tar sands for oil production.

After Congress acted with the Combined Hydrocarbons Act of 1981 and promulgated 43 C.F.R. 3140, many individuals and companies holding traditional oil and gas leases began converting their traditional leases to CHLs. While the passage of rules and regulations generated a lot of initial excitement, the realities of environmental damage, socio-economic shortfalls, and economic difficulty soon surfaced.

2. *Environmental, Socio-economic and Economic Concerns*

An early government report done in 1980 by the Department of Energy previous to the passage of the Combined Hydrocarbons Act of 1981 noted that serious environmental, socio-economic, technical, and economic viability concerns relating to tar sands development needed to be taken into account and studied.⁵³ For example, the report noted, "[D]evelopment of tar sand deposits will invariably impact the environment. Mining by open cut methods will impact the landscape necessitating reclamation of lands disturbed in this fashion."⁵⁴ It also discussed potential air quality emission controls that "might constrain synthetic fuel development."⁵⁵ One of the most important concerns with tar sand development then and now is the location of the tar sands. Many tar sand areas are located in close proximity to some of the nation's most beautiful landscape treasures. Due to the close proximity of many tar sand areas to Canyonlands National Park and other national parks in southern and southeastern Utah, including Bryce Canyon and Zion, the report also noted that development might cause environmental conflict with "other uses such as recreational use associated with National Parks and other recreational areas in Utah."⁵⁶ In addition, this report

⁵² Combined Hydrocarbon Leasing; Conversion of Existing Oil and Gas Leases and Valid Claims Based on Mineral Locations, 47 Fed. Reg. 22476.

⁵³ UTAH DEPARTMENT OF NATURAL RESOURCES AND ENERGY, UTAH ENERGY OFFICE, AN ASSESSMENT OF OIL SHALE AND TAR SAND DEVELOPMENT IN THE STATE OF UTAH PHASE I xi (1980).

⁵⁴ *Id.* at 21.

⁵⁵ *Id.*

⁵⁶ *Id.*

recognized that several Special Tar Sand Areas are located in extremely arid locations in Utah and noted that an additional demand would be created on the state's rapidly decreasing store of water.⁵⁷

After discussing environmental concerns, the report looked at possible socio-economic shortfalls related to the development of tar sands. For example, the report noted that a "severe stress" would be placed on Utah's construction industry to absorb the growth created by expansive production of the tar sand areas.⁵⁸ The report also stated that the mining industry would require another "1,100 to 1,750 underground hard rock miners" from a skilled labor pool already understaffed in Utah.⁵⁹ It also discussed the social and economic effects of boom-bust cycles on rural areas as well as shortages in medical, educational, law enforcement and other professional personnel.⁶⁰

Phase 2 of this initial report was completed in 1982, after the passage of the act and concurrent with several pilot exploration projects. This report focused less on environmental and socio-economic concerns and more on the economic problems associated with extracting oil from sand. Economic feasibility, the same problem that existed during the 1960s and 1970s remained the problem in the early 1980s as those who now had CHLs struggled to find a process that would cost less to execute than the oil they extracted could be sold for. The technology needed to extract the bitumen and then upgrade it for public consumptive use created the question of whether the end product justified the cost of production.

The findings of this report, in conjunction with a DEIS done on the Tar Sand Triangle, indicated that at that time, and most likely today, the environmental, socio-economic, and economic problems associated with the production of tar sands may very well outweigh the benefits, both to consumers and oil companies, of production.

a. Topographical Concerns

Draft Environmental Impact Statements (DEISs) for the Tar Sand Triangle Deposit and the Circle Cliffs Area were completed nearly three years after the passage of the Combined Hydrocarbon Lease Act of 1981. These DEISs discuss at length the environmental concerns that will be created as a result of developing tar sands in Utah.⁶¹

The first concern was the topography. In the initial environmental impacts on the topography in the Tar Sand Triangle, the DEIS states:

⁵⁷ *Id.* at 22.

⁵⁸ *Id.* at 20.

⁵⁹ *Id.*

⁶⁰ *Id.*

⁶¹ See generally U.S. DEPARTMENT OF THE INTERIOR, DRAFT ENVIRONMENTAL IMPACT STATEMENT ON CONVERSION OF OIL AND GAS LEASES TO COMBINED HYDROCARBON LEASES, TAR SAND TRIANGLE, UTAH (1984); see also U.S. DEPARTMENT OF THE INTERIOR, DRAFT ENVIRONMENTAL IMPACT STATEMENT ON THE CIRCLE CLIFFS COMBINED HYDROCARBON LEASE CONVERSION (1984).

The cumulative changes in topography over the life of the four-phase development would result in a change from a landscape where human alteration is inconspicuous to one that is noticeably manipulated by human activity. These changes would include mounded roadfills, ditches, stockpile and material mounds, solid waste disposal sites, and filled and leveled areas for the construction of ancillary facilities. Although the applicants would be required to reclaim these areas, the original topographic features would not be restored.⁶²

Many areas where tar sands could be developed are very remote and the topographical changes likely would not impact many. However, in a State where open, unchanged landscapes are valued because they are remote and primitive, changes to the topography would be met with resistance. If topographical changes are requisite to developing tar sands, which they are, oil developers should make minimal impact and reclamation high priorities.

b. Water Concerns

Perhaps the biggest environmental concern is water. In the arid areas of northeastern and south-central Utah, it remains uncertain how much water is necessary to develop "in-situ" techniques and run the upgrade facilities required by both strip mining and in-situ recovery. Where will the water come from and will water quality be affected? The DEIS for the Tar Sand Triangle in south-central Utah addresses water quantity and quality and other water concerns in filling water needs for 61 leases on the Tar Sand Triangle area.

Annual processing and extraction water use would be 1,679 acre-feet (from the Dirty Devil River), 2.0 to 2.7 tons of silt per acre-foot would be disposed onsite; steam injection and surface operations could disrupt aquifers and recharge areas and may reduce quantity and quality of flows in springs, seeps, and wells; availability of groundwater for future uses could be reduced.⁶³

In fact, estimated total demand of water over the life of the project at peak production would require approximately 268,640 acre-feet of water.⁶⁴ This is over 87.5 billion gallons of water over the lifespan of the project. Furthermore, the Tar Sand Triangle DEIS recognized that developing in-situ steam injection systems, the preferable and more environmentally friendly method of production, could still cause significant damage to the groundwater systems. In-situ systems might facilitate "mobilization and transport of hydrocarbons, chiefly light-ends" to the

⁶² TAR SAND TRIANGLE DEIS, *supra* note 61, at 4-4.

⁶³ *Id.* at xiv.

⁶⁴ *Id.* at 4-7.

groundwater of the area, effectively tainting groundwater resources.⁶⁵ Additionally, the expected steam loss of steam injection would likely double the amount of ground water in the area, which would cause migration of the water to lower areas and spread the undesired residues into previously unaffected and unpolluted groundwater areas.⁶⁶

These are not all of the water concerns. Surge and storage ponds would be required to store water at maximum production, creating the possibility of spills, overflows and leaks.⁶⁷ Another peripheral—but no less important—concern is that the project would use up large amounts of water that would be foreclosed for the life of the project, creating competing interests in water rights.⁶⁸

This raises serious questions about where the water will come from and how it should be allocated. Utah is a rapidly growing state with much of its available water already appropriated. Water is also extremely precious in this arid state. The courts have recognized its importance and value, stating that “a drop of water is a drop of gold.”⁶⁹ This means that to get water from naturally flowing streams or groundwater sources, oil companies would have to either appropriate any unappropriated water in those systems or purchased already appropriated and perfected water rights for a high price.

Assuming there is unappropriated water in the system to be appropriated, upon appropriation of that water and perfecting the rights to that water, those rights will be junior to others along the river and will only be filled if those with senior rights are first fulfilled. If oil companies purchase existing rights, they will have to file a change of use application for the change of use, location and likely place of diversion. Oil companies should expect protests from other water users during this administrative process overseen by the State Engineer and will likely also have to overcome judicial challenges if change of use is granted. Oil developers also have the options of developing groundwater or importing water from elsewhere but all of these are expensive propositions that will need to be addressed before actual development of these resources can begin.

Even if sufficient water exists to support in-situ and strip mining recovery of oil from Utah’s tar sand, the risks of polluting underwater aquifers and the exchange of one valuable resource in water for the exchange of another valuable resource in oil must be weighed before a determination is made to allow full-field development.

⁶⁵ *Id.* at 4-10.

⁶⁶ *Id.*

⁶⁷ *Id.* at 4-7.

⁶⁸ *Id.* at 4-53.

⁶⁹ *Carbon Canal Co. v. Sanpete Water Users Ass’n*, 425 P.2d 405, 407 (Utah 1967).

c. Air Quality Concerns

The third major concern noted in the DEISs is the impact that oil production from tar sands has on air quality, noting these particular air quality concerns at peak production:

For 4% sulfur bitumen, the 3-hour class II S02 PSD increment would be exceeded by a factor of 1.54, the 24-hour increment by a factor of 5.83, and the NAAQS for S02 would be exceeded by 1.49; short term class II particulates PSD increment would be exceeded by a factor of 8.28, the annual by 7.42, the 24 hour NAAQS for particulates would be exceeded by 1.52, and the annual by 2.12; maximum concentration levels would occur in Glen Canyon; for 4% sulfur bitumen, short-term and annual class I S02PSD increments would be exceeded in Canyonlands and the 24-hour S02 increment would be exceeded in Arches National Park; adverse effects on visibility in Canyonlands.⁷⁰

Air quality is a highly technical area and it is clear from the analysis that before full production goes forward, there will have to be mitigation to ensure the emissions from the proposed plants meet air quality standards.⁷¹

The locations of these tar sand deposits may add to the difficulty of ensuring air quality standards are met. Not only will industry standards need to be met, but the proximity to areas managed by the National Park Service (NPS) will also have to be taken into account. The NPS has been charged to preserve and enhance air quality and other air quality related values in parks and other units of the National Park System.⁷² The requirements and standards of the National NPS Organic Act, Wilderness Act, Clean Air Act, NEPA, and PSD Regulations will all have an affect on what levels of production on tar sand lands will be allowed.⁷³ These considerations could come into play, especially since the Tar Sand Triangle DEIS specifically mentions adverse effects on visibility in Canyonlands National Park.⁷⁴

Future EISs will need to examine more closely the effects chemicals put off by oil development may have on surrounding vegetation and populations, as well as the effects of pollutants that are carried by winds to distant locations. Production would take place in mostly rural and remote areas that inherently have little or no emissions. Therefore, while haze might become a concern, the counties surrounding the projects would likely retain their high quality, clean air.

⁷⁰ TAR SAND TRIANGLE DEIS, *supra* note 61, at xv.

⁷¹ *Id.* at 4-25 to 4-37.

⁷² Prevention of Significant Deterioration, <http://www2.nature.nps.gov/air/regs/psd.cfm> (last visited May 25, 2007).

⁷³ *Id.*

⁷⁴ TAR SAND TRIANGLE DEIS, *supra* note 61, at 4-30.

d. Socio-economic Concerns

The socio-economic issues addressed in the DEISs are not all adverse in nature. As in every boom cycle, shortages will exist in law-enforcement, fire protection, health care, and education that will create a fiscal and administrative burden on communities. Housing will likely be insufficient to handle the immediate increase, and rural infrastructures and utility systems are not equipped to handle large population explosions.⁷⁵ However, there is never a shortage of people willing to solve these problems in areas where the economy is booming and there is money to be made. While some local residents might be upset at the increase in population and the ills that come with growth, many local residents would likely view the tar sand industry coming to their area as a positive thing, with positive economic implications in the community.

e. Economic Concerns

In the introduction of the report, *An Assessment of Oil Shale and Tar Sand Development in the State of Utah Phase II: Policy Analysis*, the authors wrote:

The interest (in the development of synthetic oils) has been on an upswing during the decade of the 1970s due to the possibility of synthetic fuels lessening U.S. dependence on foreign oil. However, even during this period, the economic viability of a synthetic fuel industry has never been completely established. There exist major questions still unanswered regarding the technologies, capital costs, and impacts of the synthetic fuel industry.⁷⁶

The report further recognized that development of tar sands had great economic uncertainty because development was dependant (1) on future world oil prices, and (2) capital risk and operation costs.⁷⁷ Both concerns were and continue to be extremely valid. The first concern remains valid because no one can predict the future of world politics and relationships, and the second because if world oil prices dropped and fell, big oil companies would not be in a position to supply the capital necessary to begin operations only to lose out to cheap foreign oil. Also, because of the tremendous amount of financial capital needed, the incentive would be seriously weakened because, "the likelihood of industry committing billions of dollars to projects which are experiencing escalating costs and uncertain returns is not great. Indeed, it is the financial issues surrounding synthetic fuels that may be the most critical of all constraints."⁷⁸

⁷⁵ *Id.* at 4-56.

⁷⁶ TAR SAND ASSESSMENT PHASE II, *supra* note 1 at 1.

⁷⁷ *Id.* at 12.

⁷⁸ *Id.* at 14-15.

As all of these reports indicated, the technological, environmental, socio-economic and straight economic issues make development of tar sands an expensive, risky, and speculative venture. Due to all of these concerns, and with the price of oil per barrel dropping during the mid-1980s and through the 1990s, interest in developing tar sands waned, and the work of converting traditional oil and gas leases to Combined Hydrocarbon Leases ground to a halt. The BLM, administrator of the CHL conversion program, shelved the conversion applications and tar sands faded into a forgotten resource.

III. THE PRESENT STATUS OF TAR SANDS

For nearly twenty years the international oil market remained stable, keeping Utah's tar sands out of mind and out of production. However, due to the rise in oil prices starting with September 11, 2001, a series of devastating natural disasters, and world-wide tension stemming from the war in Iraq and general instability in the Middle East, oil prices have jumped extremely high and the market has been somewhat volatile. The price of crude oil has jumped rapidly since 2001 and since 2005 has hovered around \$60 per barrel.⁷⁹

With foreign oil in high demand and a policy push to wean the United States away from its dependence on foreign oil, development of Utah's tar sand resources has once again become an emergent priority. This policy shift and priority on domestic production of oil is demonstrated by the passing and signing of the Energy Policy Act of 2005.

A. *The Energy Policy Act of 2005*

The Energy Policy Act of 2005 is important to tar sands. Different from previous acts, it not only recognizes tar sands as part of the United States domestic oil resources but creates a framework and incentive for oil companies and governments at the federal and state level to develop tar sands for production. It also creates a leasing system for tar sands specifically, rather than following the traditional oil and gas leasing system as was done in the past.

The Act created separate tar sand leases in the combined hydrocarbon leasing system stating, "For any area that contains any combination of tar sand or oil or gas (or both), the Secretary may issue under this Act, separately (i) a lease for exploration for and extraction of tar sand; and (ii) a lease for exploration for and development of oil and gas."⁸⁰ This is a change from the Combined Hydrocarbon Leasing Act of 1981, which only allowed conversion of existing oil and gas leases to hydrocarbon leases under the oil and gas leasing structures.⁸¹

⁷⁹ Oil Price History and Analysis, <http://www.wtrg.com/prices.htm> (last visited May 25, 2007).

⁸⁰ Energy Policy Act of 2005 § 350(a)(2)(B), 42 U.S.C. § 15801 (2005), emphasis added.

⁸¹ 43 C.F.R. § 3140.1 *et seq.*

The Energy Policy Act also specifically states that tar sands are “strategically important domestic resources that should be developed to reduce the growing dependence of the United States on politically and economically unstable sources of foreign oil imports.”⁸² Furthermore, the Act recognizes that development should be conducted in an “environmentally sound manner, using practices that minimize impacts.”⁸³ These statements reflect the changing policy and national attitude toward more self-reliance in the oil industry. Furthermore, the Act recognizes the impacts development will have noting, “development should occur with an emphasis on sustainability to benefit the United States while taking into account affected States and communities.”⁸⁴

1. Action

While the three aforementioned statements reflect policy considerations, the Act also affirmatively sets the framework for pushing that policy forward in action. Section 369(d)(1) of the Act requires action, stating:

Not later than 18 months after the date of enactment of this Act...the Secretary shall complete a programmatic environmental impact statement for a commercial leasing program for oil shale and tar sand resources on public lands, with an emphasis on the most geologically prospective lands within each of the States of Colorado, Utah, and Wyoming.⁸⁵

This order moves the country one step closer to production than did the Combined Hydrocarbon Leasing Act of 1981 by requiring a full Environmental Impact Statement (EIS) to be made and then beginning the leasing process for development to begin. This EIS is due to be completed in the summer of 2007.⁸⁶ While the EIS will cover the leasing program in general, it is likely that NEPA requirements will ensure that more site specific environmental impact analysis is completed. No later than six months after the EIS is completed, the Act requires that final regulation establishing a commercial leasing program be published,⁸⁷ and no later than 180 days after the final regulation has been published, the Secretary will consult with the governors of Utah, Colorado and Wyoming (and possibly other states) to determine the level of support and interest each State has in the development of the resource.⁸⁸ If sufficient interest and support is found,

⁸² Energy Policy Act of 2005 §369(b)(1), 42 U.S.C. 15801 (2005).

⁸³ *Id.*

⁸⁴ *Id.* at § 369(b)(3).

⁸⁵ *Id.* at § 369(d)(1).

⁸⁶ Oil Shale and Tar Sands Leasing Programmatic EIS Schedule, <http://ostseis.anl.gov/eis/schedule/index.cfm> (last visited May 25, 2007).

⁸⁷ Energy Policy Act of 2005 at § 369(d)(2).

⁸⁸ *Id.* at § 369(e).

lease sales in those states may begin under the commercial leasing program regulations.⁸⁹

The Act also creates a task force and calls for assistance from local universities and/or geological surveys. The Task Force is created to “develop a program to coordinate and accelerate the commercial development of strategic unconventional fuels [including tar sands]...in an integrated manner.”⁹⁰ Its members include the Secretary of Energy (or designee), the Secretary of the Interior (or designee), the Secretary of Defense (or designee), the Governors of the affected States, and representatives from the local governments in affected areas.⁹¹ The Task Force is required to make recommendations regarding development to the government, initiate a partnership with the Province of Alberta Canada in order to gather information related to developing tar sands, and make an initial report to the President and Congress with these recommendations as well as subsequent annual reports.⁹² The Act also requires that a National Oil Shale and Tar Sands Assessment take place and with the assistance of local universities and state geological surveys.⁹³

2. Incentives

Perhaps the most important part of this Act is the incentives provided therein. As previously discussed, part of the problem with developing tar sands for production in the 1970s and 1980s was the cost-prohibitive technology required to produce oil. In order to combat this, the Act sets up a cost sharing system, under which the Secretary of Energy identifies technologies that are “ready for demonstration at a commercially representative scale; and have a high probability of leading to commercial production.”⁹⁴ More importantly, for each technology listed by the Secretary, the Secretary of Energy is allowed to provide “technical assistance, assistance in meeting environmental and regulatory requirements, and cost-sharing assistance.”⁹⁵ While all of these are boons to the oil industry, perhaps the cost-sharing measure will be sufficient to help companies implement technologies that allow production to be a profit making endeavor. Other incentives created in the Act include land exchanges and royalty rates that “shall encourage development of the oil shale and tar sands resource.”⁹⁶

The incentives offered by the Energy Policy Act of 2005 are infusing energy in the oil industry and pushing the industry to look for technologically feasible ways to develop tar sands. The incentives, according to James Bunker, Acting Energy Director for the Utah Governor’s Economic Development Office in 2005,

⁸⁹ *Id.*

⁹⁰ *Id.* at § 369 (h)(1).

⁹¹ *Id.* at § 369 (h)(2).

⁹² *Id.* at § 369 (h)(3).

⁹³ *Id.* at § 369(m).

⁹⁴ *Id.* at § 369(l)(1).

⁹⁵ *Id.* at § 369 (l)(2)

⁹⁶ *Id.* at §§ 369(n), (o).

are in the very least “making [the industry] sit up and take notice.”⁹⁷ He continued, “The words I’ve heard from the industry are that it appears as though government is genuinely interested in oil sands and shale. And if government is, then we should be.”⁹⁸

B. Differences between Today and the 1970s and 1980s

The situation at present and the excitement about tar sand production is very similar to the late 1970s and early 1980s. Watching this scenario replay today is somewhat akin to waking up as Bill Murray in *Groundhog Day*⁹⁹ finding each day the same. The most significant differences between today and the early 1980’s are that (1) Canada, has developed a booming tar sands industry, which was created from a similar government administration policy to the Energy Policy Act of 2005; (2) the United States is implementing parts of the Canadian policy model by implementing cost-sharing incentives and building relationships between the federal government, state governments, and the oil industry to reach a common goal of production; and (3) questions regarding the status of CHLs in the process of conversion from the 1980s have arisen. Other than these changes, production technologies remain essentially the same and while they have been streamlined over the years, create the same environmental concerns as they did in the 1980s.

1. Canada’s Oil Fields

Alberta Canada is home to the world’s largest tar sands oil fields. The Alberta Energy and Utilities Board estimates that there are approximately 1.6 trillion barrels of oil lying in Alberta’s tar sands.¹⁰⁰ Of that, nearly 175 billion barrels are currently recoverable by modern technologies.¹⁰¹ Most of Canada’s tar sands are located in the Athabasca oil field in northern Alberta, which according to the Alberta Research Council, holds 1,369 billion barrels of oil.¹⁰² Currently, Canada is producing hundreds of thousands barrels of oil daily and claims that in the next two decades, Canada’s oil production will increase to 3 to 5 million barrels per day (bpd).¹⁰³

⁹⁷ Mary O’Driscoll, *Alberta’s Tar Sands Development may Offer Lessons for Western U.S.*, (Aug. 18, 2005), available at http://www.eenews.net/specialreports/tar-sands/sr_tarsands3.htm (last visited May 25, 2007).

⁹⁸ *Id.*

⁹⁹ Columbia Pictures, 1993.

¹⁰⁰ Canada to Compete in the Oil Market, http://www.forbes.com/energy/2005/02/17/cz_0217oxan_canadaoil.html (last visited May 25, 2007).

¹⁰¹ *Id.*

¹⁰² Presentation by John McDougall, Western Oil Sands Workshop 4, (Sept. 26, 2006), available at <http://www.uhoc.utah.edu>, click on conference page, presentations, and access link; add user name - Utah, password - oilsands (last visited May 25, 2007).

¹⁰³ *Id.* at 3.

The reason the United States is monitoring Canada's success closely and creating a Task Force to work with Canada is that Canada's model of producing oil from the tar sand resources is likely similar to the one that will have to be followed in the United States and Utah. However, there are concerns that Canada's tar sands and tar sands found in Utah are dissimilar and Canada will be unable to help establish production fields in Utah. First, the tar sand resource in Utah is significantly smaller than Canada's resource, creating questions of sustainable growth and whether the impact on the environment is worth potentially short term gains. In addition, the tar sand in Canada's oil fields is more wet and crumbly than that found in Utah, making both extraction of the resource and upgrading it for transfer to processing plants much easier. In other words, it will take much more money and energy to create a barrel of oil from Utah's tar sands than from Canada's. In fact, for oil from Utah's tar sand deposits to be worth the energy put into processing oil, oil prices would have to consistently remain above \$60 dollars per barrel.¹⁰⁴

Furthermore, while oil companies have been exemplary in mitigating environmental damages and reclaiming the lands that they strip mine, serious environmental concerns still abound. These concerns are no different than those discussed previously. James McDougal from Alberta's Research Council, has listed air quality, water use, and environmental footprint as challenges that Canada is currently dealing with.¹⁰⁵ While many of the technologies being implemented in Canada are indeed impressive, the differences in location may very well be a determining factor in the success or failure of developing tar sand in Utah. Again, many of Utah's tar sand locations are extremely remote, arid, and neighboring National Parks. If air quality, water use, and environmental impact are three major concerns in Canada's oil fields, where allocating water has not been a problem and re-vegetation techniques have covered many of the scars created by strip mining the tar sands, these problems will only be exacerbated in Utah.

Despite differences with Canada in the type of tar sand and in development of that resource, Canada is at the forefront of developing new technologies to make production of oil from tar sands more economically feasible and environmentally friendly. For example, Alberta Research Council is looking at ways to reduce air quality problems by reusing by products that burn off to make construction materials and fertilizer.¹⁰⁶ They are also looking to reduce natural gas use, gasify bitumen residue, reduce coal transportation costs, reuse chemical byproducts created by upgrading the bitumen, pump excess carbon dioxide into coal beds deep within the earth, and move from using freshwater sources to brackish water while implementing steps to reuse water efficiently.¹⁰⁷ By being at

¹⁰⁴ Patty Henetz, *The Potential in Utah's Tar Sands not Worth the Trouble*, Experts Say, THE SALT LAKE TRIBUNE (Oct. 4, 2006).

¹⁰⁵ McDougal, *supra* note 102, at 19.

¹⁰⁶ *Id.* at 22-39.

¹⁰⁷ *Id.*

the forefront of creating these technologies, Canada is a valuable partner if Utah can implement these technologies in efficient and profitable ways.

2. *Technological Changes*

The technologies for developing tar sands are essentially the same as they were in the 1980s. Strip mining and in-situ mining are still the two dominant methods used to extract oil from tar sands. While the trucks and shovels used in strip mining have gotten bigger and the process has been streamlined to decrease costs, the process of digging up shovelfuls of tar sands and transporting them to upgrading facilities is still standard fare. Upgrade facilities employ newer technologies that extract higher percentages of oil and generate higher profits than their counterparts of decades ago, but the basic technology remains the same.

Technology in in-situ mining has also improved, resulting in higher percentages of yield. Furthermore, in-situ mining has developed horizontal drilling techniques which create less environmental impact than vertical drilling operations. However, like strip mining, the bitumen extract has to be transported to an upgrade facility where it can be processed. While technology has made great strides in streamlining the process and increasing productivity, the bottom line is that these technologies still create the exact same problems as they did in the 1980s.

Strip mining requires that extensive and expensive environmental reclamation follow. While Canada touts their reclamation program, the landscape can never be returned to its original state. Upgrade facilities still produce massive amounts of greenhouse gases. For example, the Alberta Research Council estimates that the majority of Canada's greenhouse gases are produced in Western Canada's tar sand production facilities.¹⁰⁸ While Canada is working to resolve these problems using various technologies, including introducing the gasses back into the earth (coal-beds) or into peat, which absorbs the carbon produced in the upgrade facilities, until those technologies are implemented, severe air quality and environmental impacts will be felt.¹⁰⁹

Extraction and upgrade technologies have improved over the years. However, these changes have focused primarily on increasing production, while the more important problems of environmental impact have largely been left alone. Utah should refrain from tar sand production until air quality, CO₂ emissions, and damage to the earth are more fully explored and technology proves it can properly mitigate these serious concerns.

3. *Suspension of Converting Oil and Gas Leases*

One of the more important discussions arising from this resurgence of interest in tar sands is what becomes of all the oil and gas leases that were in the

¹⁰⁸ *Id.*

¹⁰⁹ *Id.*

conversion process before interest waned in the 1980s. Many of these leases were in the process of conversion to CHLs. However, when the market in crude oil dropped and took with it the economic incentives for domestic production, many leases were shelved before the conversion process was completed. The concern is whether these leases should be pulled off the shelf and reinstated or whether they expired and are no longer valid. This is a discussion that will largely take place between environmental organizations, lease owners, and the BLM.

One argument that environmental groups are sure to consider is that the language of the statute, which requires that all statutory steps be met before the conversion could be granted and the oil and gas leases suspended. If the requirements were not met, environmental organizations will argue that time has expired for conversion and the CHL conversions should not be granted.

These CHL leases were shelved because the interest in developing tar sands waned with the drop in foreign oil prices in the 1980s. Today, however, the BLM might be inclined to complete the CHL conversion process on the leases that were shelved. Another argument against pulling the leases and allowing the conversion process to continue is that the statute places the burden of meeting all of the statutory requirements on the lessee. If those who applied to have their leases converted wanted them converted, they had a duty to make sure that the entire conversion process was followed. If their disinterest in developing tar sands due to a drop in international oil prices led to the conversion process being shelved without requiring the BLM to take formal action, these owners should have no recourse if it is determined those leases expired.

Early legislative intent supports this argument. Congress stated “[i]f the applicant does not have sufficient commitment by the necessary parties to enable the resource to be developed then the applicant does not have the right to convert.”¹¹⁰ This language seems to put the burden of meeting the statutory requirements directly on the lessees rather than the governments. However, some involved in the BLM process feel that the Interior Board of Land Appeals or the courts would not likely reject the renewal of these applications because the BLM failed to take final action on the application within 15 months, placing the shelving blame on the BLM, not the applicants.¹¹¹

Many of the oil and gas leases being converted were likely in the middle of BLM review when interest in the project waned and the leases were shelved. Therefore, many conversions likely never reached the completed status or were acted on by the BLM. James Kohler, head of the Hard Minerals Division of the Salt Lake Division of the Bureau of Land Management, recognized that the BLM was required to take action within 15 months of receiving the proposed plan of action, but also noted that it is less clear whether the plan had to be complete.¹¹²

¹¹⁰ Combined Hydrocarbon Leasing, *supra* note 52.

¹¹¹ E-mail from James F. Kohler, Chief, BLM Branch of Solid Minerals, Utah State Office (Oct. 5, 2006, 12:25 p.m. MST; Oct. 6, 2006, 8:27 a.m. MST)(on file with author).

¹¹² See *supra* note 81.

For example, if an oil and gas lease identified for conversion expired on January 1, 1986, it is clear that a proposal to convert that lease had to be filed by November 15, 1983. However, no one could argue that the applicant had additional time to perfect the plan that could be determined complete at a later date. The terms of the oil and gas lease would be suspended after the plan was determined to be complete. As long as the "complete" plan was filed prior to the 1986 expiration date of the lease, thereby allowing the oil and gas lease to be "kept alive" for conversion, the application could potentially go forward.¹¹³

Mr. Kohler then states that the time limitation that requires the BLM to take action on an application for conversion within 15 months of receiving the plan of operations may not be so clear because

[F]irst of all, one could argue that "taking action" does not necessarily imply taking final action. The 20-plus year hiatus in processing these conversions is somewhat problematic, but I believe that the Interior Board of Land Appeals or the Courts would not support the idea that an application could be rejected because BLM failed to take final action on the application within 15 months.¹¹⁴

It is unclear how the IBLA or the courts will resolve this problem because this issue has not reached that level. However, this may be viewed as a timing issue. In instances where the BLM formally suspended the original oil and gas lease, the conversion process can be completed and there should be no issue with pulling these leases off the shelf and allowing companies to exercise due diligence in putting them to use. However, where the process ended, and the application was shelved before a formal suspension was placed on the traditional oil and gas lease, it is possible that the time clock was never stopped, and the term of the lease expired rendering it impossible for conversion of those leases to be resurrected and completed.

Interestingly, variations on this argument were discussed during the comment period before the Combined Hydrocarbon Act of 1981 was passed. An important concern of owners of oil and gas leases trying to convert to CHL was that it was possible for an oil and gas lease to expire or statutory deadline to be missed when a plan of operations had been filed but no action or final determination were made. In order to avoid this situation, the wording of section (g)(1) was changed so that the suspension would begin at the date the complete plan was filed.¹¹⁵

Where complete plans were filed, the conversion process should continue and CHLs should be granted. However, the burden of ensuring a final plan was filed or the traditional lease was formally suspended belongs on the lease owners, not

¹¹³ Kohler, *supra* note 111.

¹¹⁴ *Id.*

¹¹⁵ 43 C.F.R. § 3140.2-3(g)(1).

the BLM. Therefore, if no final plan was filed, or the term of the traditional lease expired because it was not formally suspended, such leases should not be allowed to be taken off the shelf to complete conversion of the traditional leases to a CHL.

IV. CONCLUSION

The environmental, economic, and socio-economic concerns of developing tar sand in Utah that existed in the 1970s and 1980s remain unchanged. The EIS due this summer is not likely to look substantially different than the Tar Sand Triangle or Circle Cliff's DEISs of the early 1980s in the areas of topography, water and air-quality, and socio-economics. Additionally, the technologies proposed today are essentially the same technologies used during the early 1980's. While streamlined and more efficient, they still create enormous air quality, water, and topography concerns.

Economic concerns are still valid today. While the federal government has agreed to enter into cost-sharing agreements with private industry, the more pressing concern is that the amount of energy expended to produce oil from the tar sand resource is less than the energy created. Technologies will need vast amounts of water and electricity to power them and to upgrade the product for consumption, making it uncertain at best whether the cost of production is worth the benefits.

The continuation of environmental, economic, socio-economic, and technical concerns and the lack of concrete solutions do not meet this nation's new policy of resource development "in an environmentally sound manner, using practices that minimize impacts."¹¹⁶ As such, it is not yet worth it for the United States or Utah to expend the energy necessary to develop Utah's tar sand resource.

¹¹⁶ Energy Policy Act of 2005 § 369(b)(2), 42 U.S.C. § 15801 (2005).