TRIBAL ENERGY DEVELOPMENT TEMPLATE

A product of the Quapaw Tribe of Oklahoma

Department of the Interior
Office of Indian Energy and Economic Development

INTRODUCTION TO THE INDIAN TRIBAL ENERGY DEVELOPMENT PRIMER

Indian Tribes in the United States are poised to play an important role in the future energy security and economic stability of the country. Collectively, the Tribes' land bases and locations provide excellent opportunities to develop both renewable and traditional sources of energy including the renewable resources of wind, solar, geothermal, biomass, and low-impact hydropower, as well as traditional natural gas, oil and coal. Development of tribal energy resources holds great potential to create jobs, generate revenues, and aid strengthening tribal economies and the national economy as well as meeting our need for a stable energy supply. Given certain economic advantages available to the Tribes, many are expressing substantial interest in determining the viability of developing tribal resources in a prudent and sustainable manner.

At the same time as tribal interest and activity is increasing, the United States is undergoing a comprehensive review of its national energy policy. The country is determining the future direction of how and under what circumstances the United States derives the energy required to light and heat American homes, power the American economy, and fuel the automobiles Americans have come to depend on for work and for pleasure.

The emerging national energy policy appears to reflect a strong national desire to diversify American energy from a nearly complete reliance on fossil fuels to the increased use of renewable energy resources. Fortunately for Tribes, many renewable energy resources exist in Indian Country. For instance, solar resources in the southwestern part of the United States offer some of the best development opportunities for large-scale solar plants in the world. These solar resources exist in Arizona, California, Colorado, Nevada, New Mexico, and Utah --- all states with large numbers of Tribes and substantial Indian land areas. Similarly, wind power potential includes Indian lands in the upper northwest and the southwest part of the country. Geothermal opportunities of different magnitude may include Tribes throughout the nation. As

consumers of energy, tribal governments have the opportunity to contribute energy savings (known in the power industry as “nega-watts”) through conservation and efficiency programs – reducing demand and saving money for tribal governmental programs and needs.

Even with energy diversification, traditional energy resources will continue to play an enormous role in the American energy portfolio. Domestic production of traditional energy resources is critical to national security and economic stability. Indian tribal lands have been the source of significant production of traditional energy resources for at least the last 75 years and by some estimates hold substantial additional reserves of coal (53 billion tons), natural gas (37 billion cubic feet), and oil (5.3 million barrels).

Recognizing the importance of Tribes to the national energy portfolio, Congress has acted to provide Indian Tribes with additional legal tools to address energy development and environmental regulation on tribal lands. On August 8, 2005, the *Energy Policy Act of 2005* was signed into law and included as Title V the *Indian Tribal Energy Development and Self Determination Act*. The new law authorizes a variety of Federal technical and financial assistance to participating Tribes. It also seeks to reduce Federal administrative obstacles to greater levels of energy development on tribal lands. This still relatively-new Indian tribal energy law applies equally to both the development of renewable and traditional energy resources. The law leaves to the Tribe and the market the decision whether and under what circumstances to develop energy resources on tribal lands.

The centerpiece of the new law is the authority provided to the Secretary of the Interior to negotiate and enter agreements with willing Tribes that would govern energy and related environmental activities on tribal lands. These agreements, known as Tribal Energy Resource Agreements or “TERAs,” would scale back the role of the Secretary and enhance the role of tribal governments on tribal trust lands --- but only if the Tribe has the requisite financial, regulatory, and technical capacity to develop their resources and regulate their physical environmental in a responsible manner. Once the Tribe has an approved TERA, it (and not the Secretary) may negotiate and enter agreements with outside parties without the review or approval of the Federal government.

Regulations to implement the new Indian tribal energy law went into effect in April 2008. In addition to new legal tools, Congress has provided financial assistance to foster development of energy resources on tribal lands. For the last several fiscal years, Congress has appropriated funding for both the Department of Interior's Office of Indian Energy and Economic Development, and the Department of Energy's Office of Indian Policy and Programs.

With these developments in mind, Tribes who are interested in developing energy resources on their lands face many steps in actual project development, such as inventorying their energy resources, identifying potential projects, and working with the relevant Federal agencies as well as energy and financial partners to bring these projects to completion.

The following Indian Tribal Energy Development Primer (Primer) is designed to provide fundamental information to interested Tribes, their partners, and potential investors. The Primer sets out the areas of inquiry that should be explored in order to plan for, build, and operate successful energy projects on tribal lands. After this Introduction, the Primer provides in order: (1) a general overview of the need for and role of infrastructure planning in Indian Country, (2) an assessment of the resources subject to potential development, (3) a discussion of the environmental and cultural issues that may impact an energy project, (4) a discussion of the institutional issues of tribal governance and related matters, (5) an assessment of the market potential and pricing environment for various resources, (6) an analysis of suitable business structures to use for a given energy project, (7) a discussion of available financing options, (8) a discussion of miscellaneous other project-related matters, and finally (9) a discussion of issues of tribal capacity and managerial acumen necessary to enter into a Tribal Energy Resource Agreement with the Secretary.

The materials in this Primer are designed to provide a basic understanding of the fundamentals of energy projects on tribal lands and the issues that should be addressed. It does not purport to offer legal, tax, or technical advice and readers are encouraged to consult with attorneys and other professionals accordingly.

INFRASTRUCTURE PLANNING IN INDIAN COUNTRY

It is a truism that the most advantageous and informed decision-making about infrastructure investment (such as in the development of an energy project) will be proceeded by a comprehensive planning process to ensure that the infrastructure project is properly targeted, appropriately leveraged and coherently fitted to the needs of the community within which the project takes place. Thus, the need for infrastructure planning in Indian Country increasingly is a topic of interest and debate by tribal leaders, development experts and Federal officials.[1]

Traditionally, Indian Country has experienced limited infrastructure planning. Future infrastructure planning in Indian Country should stress that "coordination of land-use and infrastructure planning should forward the public goals of sustainability in a manner that balances the ecology, economic development and the value system of its community."[2] Planning is especially crucial, since historically, "planning in Indian Country has largely taken place in response to sporadic governmental funding."[3] Indeed:

> Tribal planning is unique from mainstream America. Today, many tribal communities bear the imprint of successive waves of reform and development. Unlike the radial patterns that characterized early American cities, tribal development is a mosaic of land uses that are often noncontiguous and mixed use.[4]

In contrast to historical unplanned development, there are a variety of planning approaches occurring in Indian Country today: comprehensive planning, strategic

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[1] See White Paper, Ted Jojola, "Physical Infrastructure and Economic Development" (May 2007), commissioned for the National Congress of American Indians Policy Research Center, for discussion at the National Native American Economic Summit of May 15-17, 2007. The Primer discussion on this topic is not intended to be comprehensive, and reference should be made to that Paper and references cited therein for fuller discussion.

[2] Id. at p. 4.

[3] Id. at p. 4, citing Testimony of the National Congress of American Indians before the Senate Committee on Indian Affairs, Oversight Hearing On Economic Development, President Joe Garcia, May 10 2006.

[4] Id. at p. 8.

planning, performance zoning and indigenous planning.[5] Generally speaking, comprehensive planning is an all-encompassing plan that provides for the future growth of the Tribe. It is a complex plan that generally is legislated and carries the power of tribal enforcement. It is typified by comprehensive zoning and land-use controls. In contrast, strategic planning generally refers to planning for stated economic objectives related to specific development projects. It generally involves infrastructure projects that will generate revenue which in turn generates further development. The third type of planning, performance planning, is akin to the land-use zoning of the comprehensive planning, but is more serial/specific in nature. It looks at each parcel of land and project to match the use appropriately to the site characteristics. Finally, indigenous planning involves a planning process that includes those elements of "traditional" knowledge and cultural identity specific to a particular Tribe, so that the planning incorporates tribal values such as land tenure, collective rights and matters of inheritance. This approach is "heavily invested in consensus building and the community participatory approach."[6]

Regardless of the specific planning paradigm adopted by a particular Tribe, it is important for that Tribe to consider the development of an energy project in light of that paradigm. By ensuring that the infrastructure development that goes along with the energy project is consistent with the Tribe's concerns and intentions with regard to the Tribe's future, it will avoid missing the opportunity to ensure that its infrastructure improvements are made where they will provide the greatest good to the Tribe.

[5] Id. at p. 9-11.
[6] Id. at p. 11.

ASSESSING POTENTIAL INDIAN ENERGY RESOURCES

I. INTRODUCTION

Developing energy resources on tribal lands will involve research, exploration and development activities. Some Tribes have considerable experience with energy development projects, while others may have little or none. This Primer has been prepared, principally, for those Tribes with an interest in examining their options for energy development and desire to have basic information about the various topics and issues they will confront when deciding whether to who are not to go forward with such development. This chapter seeks to identify those topics and data sources that may pave the way to understanding the potential and pitfalls associated with tribal energy development options.

II. OVERVIEW

United States Energy Overview

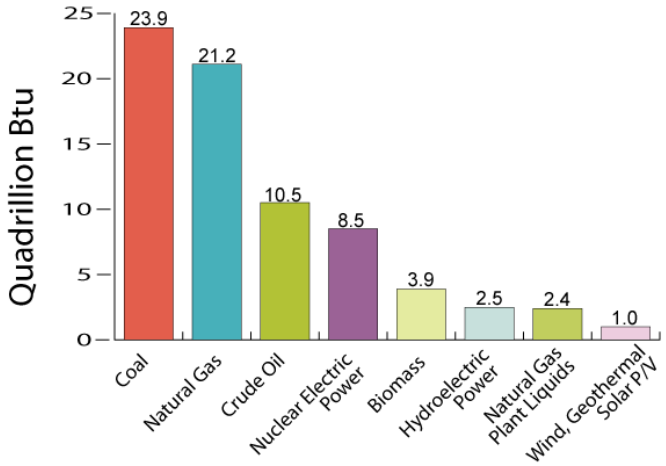
According to the Energy Information Administration (EIA), a Federal organization that provides official energy statistics from the U.S. Government, the United States consumed 99.305 quadrillion Btu's of energy in 2008. Key sectors of our economy consumed the vast majority of the energy, including transportation, industrial uses, and housing and commercial applications.

Most of the energy produced and consumed in the United States comes from fossil fuel sources (e.g. crude oil, coal, natural gas). Renewable energy resources (e.g. biomass, geothermal, hydropower, solar, wind) supply a relatively small (7%), but steady portion of our energy supply.

Generally, the difference between the energy the country consumed, 99.305 Quadrillion Btu's[7], and the energy the country produced, 73.531 Quadrillion Btu's, expresses the country's dependence on foreign energy sources, principally coming in the form of imported oil.

Domestically produced energy came from the following sources, all of which, with one exception, will be discussed in this Primer:[8]

U.S. Primary Energy Production by Major Source (2008)



Source: Energy Information Administration, *Annual Energy Review 2008*, Table 1.2. (June 2009)

Over the past century there has been considerable debate and scientific prognostication regarding the future availability of fossil fuel (non-renewable) resources, the United States' growing dependence upon foreign sources of crude oil, and the environmental impacts associated with the use of fossil fuels (e.g. climate change, pollution, etc.).

Today, there is considerable public and governmental interest and support for efforts to develop more environmentally-friendly, renewable, domestic energy resources.

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[7] See The Role of Renewable Energy in the Nation's Energy Supply, 2008. Energy Information Administration. http://tonto.eia.doe.gov/energyexplained/index.cfm. Retrieved 10/26/09.

[8] Energy from coal, natural gas, oil, biomass, hydroelectric, wind, geothermal and solar are discussed in this Primer; energy generated from nuclear reaction is not.

Tribal Energy Overview

All tribal lands have some developable energy resources. However, the extent and variety of available energy resources that a Tribe can economically develop varies widely, as does access to the energy infrastructure required and the economics of developing those resources. For instance, some Tribes have entered into large-scale coal and oil and gas production projects that have resulted in extensive revenues to the Tribes. Other Tribes have used even modest-sized tribal lands to develop renewable energy, such as solar energy, which are feasible for some uses even in cloudy or far northern climates.

Tribes possess the potential to develop a great range of *renewable energy resources.* Most renewable result in electric power or heat energy that is usually used at the generation location or (once converted to electricity) fed into the electric transmission grid. Though only about seven percent of all energy consumed in the United States is from renewable sources,[9] government policy is strongly supportive of development of these types of projects and serious consideration should be given to its potential. As renewable energy becomes an increasingly important part of the country's energy strategy, the Tribes' renewable energy resources will also gain importance and value.

In developing its tribal renewable energy resources, a Tribe may choose several different structures for projects such as a self-use scenario where the Tribe uses the energy for its own needs; a royalty-stream arrangement for a large-scale renewable energy project where the investment requirements are carried by someone else; or the Tribe may decide to own the project outright using funding from tribal sources.

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[9] US Energy Information Agency. http://tonto.eia.doe.gov/energyexplained/?page=renewable_home, retrieved 12/15/2009.

Historically, most *fossil-fuel* resources on tribal lands have been produced in cooperation with industrial partners and provide a royalty stream back to the Tribe for its benefit and use. In most cases, these projects have contributed little to the Tribe's energy self-sufficiency. But if natural gas is available—either on tribal lands or from outside tribal lands via a pipeline—it can serve as an energy source in ways similar to electricity. Natural gas can be used as both a heating source and a means of generating power on both small and large scales.

After a given Tribe assess its potential resources and determines that it is interested in developing a specific resource, the Tribe should undertake a project evaluation or feasibility. This Primer should not be considered the means by which a project evaluation or feasibility study is undertaken. Rather, this Primer is intended to provide information and raise topics that likely need to be discussed in a given project evaluation or feasibility study.

Useful Background Information Sources:

There are many information sources available to gain accurate background information about energy development on tribal lands.

The United States Department of the Interior's Assistant Secretary Indian Affairs (DOI), Office of Indian Energy and Economic Development has prepared a very informative website[10] that provides information about the various forms of Indian energy, how the resources are developed and used, the potential impacts of development and recommended mitigation measures. The website also describes the laws and regulations that are most relevant to energy projects.

[10] Tribal Energy and Environmental Information Clearinghouse (TEEIC), U.S. Department of the Interior. http://teeic.anl.gov. Retrieved 10/02/09.

The United States Department of Energy (DOE) has prepared extensive information focused on tribal energy development and posted the information on the web[11]. The site provides a detailed guide and discusses the key steps involved in successful energy development projects.

The Council of Energy Resource Tribes (CERT)[12] has taken a leadership role in the development of tribal energy resources. CERT members and organizational staff provide a unique perspective regarding energy development activities within tribal communities. CERT has also worked extensively with DOE and DOI in promoting tribal energy development. Presentations provided by CERT to DOE (October 2005)[13] and (November 2007)[14] illustrate the tribal energy development roles and activities.

State government websites also provide useful background information. For example:

Alaska[15] - Department of Natural Resources

California[16] - Energy Commission

Arizona[17] - Department of Commerce. Tribal Energy Programs

Oregon[18] - Natural Resources/ Energy/ Environment

N. Dakota[19] - Department of Commerce

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[11] Tribal Energy Program. U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy. http://apps1.eere.energy.gov/tribalenergy/. Retrieved 10/23/09.
[12] Council of Energy Resource Tribes. http://www.certredearth.com. Retrieved 10/23/09.
[13] PowerPoint Presentation, by Roger Fragua, Council of Energy Resource Tribes, to DOE, October, 2005. http://apps1.eere.energy.gov/tribal energy/pdfs/0510review_02fragua.pdf. Retrieved 10/10/09.
[14] PowerPoint Presentation, by David Lester, Council of Energy Resource Tribes to DOE, November, 2005. http://apps1.eere.energy.gov/tribalenergy/pdfs/0711review_lester.pdf. Retrieved 10/23/09.
[15] State of Alaska. Department of Natural Resources. http://dnr.alaska.gov/homepage/index_industry.htm. Retrieved 10/23/09.
[16] State of California. Energy Commission. http://www.energy.ca.gov/. Retrieved 10/23/09.
[17] State of Arizona, Department of Commerce. http://www.azcommerce.com/Energy/. In particular, one can access the "renewable energy" subpage from the menu on the left. Retrieved 10/23/09.
[18] State of Oregon, In particular, follow the links on the Natural Resource tab. http://www.oregon.gov/. Retrieved 10/23/09.
[19] State of North Dakota, Department of Commerce. http://www.business.nd.gov/target/energy/. Visit the webpage for the North Dakota Industrial Commission for "Renewable Energy",

II. POTENTIAL RENEWABLE ENERGY RESOURCES:

In 2008, renewable resources accounted for 7.3 Quadrillion Btu's of energy in the United States. Biomass contributed about 53% of that total, followed by hydropower (34%), wind (7%), geothermal (5%) and solar (1%). A broader description of each energy type is provided below. Renewable resources of energy include biomass, geothermal, hydropower, solar and wind energy.[20]

A. Biomass Energy

What is Biomass?

The term "biomass[21]" refers to raw organic material used to generate a number of energy resources, including heat, liquid or gaseous fuels, and electricity. Chemical energy stored in biomass can be converted to heat through combustion (burning). Biomass can be converted to liquid or gaseous fuels or can be used to generate electricity in the same way that coal is used.

Biomass includes all of the earth's living matter, plants and animals, and the remains of that living matter. Plant biomass is a renewable energy source that is produced through photosynthesis when plants capture carbon dioxide from the air and combine it with water to form carbohydrates and oxygen under the influence of sunlight. The chemical energy in plants gets passed on to animals and people that eat the plants. Biomass does not include plant or animal matter that has been converted by geologic processes to create fossil fuels such as oil or coal. Examples of key biomass energy resources include:

- **Woody Crops:** These are mainly trees grown in a forest or plantation that are used primarily for burning to generate heat or electricity. The critical aspect of

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http://www.nd.gov/ndic/renew-infopage.htm and "Bio-Mass Program," http://www.nd.gov/ndic/biomass-infopage.htm.

[20] It is beyond the scope of this Primer to discuss energy generated from nuclear reaction.

[21] See Biomass Energy and Its Uses. TEEIC, Assistant Secretary Indian Affairs. http://teeic.anl.gov/er/biomass/restech/ uses/index.cfm. Retrieved 10/26/09.

harvesting woody crops from forests is the sustainability of the forest. For instance, hybrid poplars and cottonwood trees can be harvested every 5 to 8 years, and the stumps grow into new trees, so replanting is not required.

- **Agricultural Crops:** These types of crops mainly fall into two categories: (1) crops that are grown to make biofuels (mainly ethanol) for use as a gasoline additive, and (2) crops that are grown for their oily seeds, which can be converted to a diesel substitute known as biodiesel. The most widely used crops for ethanol production are annual crops such as corn and sugar cane that must be planted every year. Use of perennial crops, such as switchgrass and other crops with cellulose in their body mass, is also increasing because they are easier to grow (e.g., they don't need to be replanted after harvesting) and they require less water than corn and sugar cane. Plants grown for their oily seeds include annual crops such as soybeans, sunflowers, rapeseed, and castor beans. Perennial crops include seeds from the oil palm.

- **Waste Streams:** A wide variety of wastes can be used to generate energy in the same way that energy crops can. These include residues from forestry operations, wastes from the construction and furniture making industries, agricultural wastes such as corn stover and animal wastes, municipal solid waste, food waste, and commercial and industrial waste.

Where does one find biomass energy resources?

Because biomass encompasses all of earth's living matter, it is located everywhere on earth; however, not all biomass resources can be developed economically.

Utility-scale biomass energy projects require sufficient crop production (woody or agricultural) or waste production and the appropriate processing facilities, and must have access to transmission or pipeline systems to send the electricity they generate or the fuels they produce to consumers. The most cost-effective biomass power plants are located near biomass feed-stocks.

The National Renewable Energy Laboratory (NREL) maps[22] provide information on the biomass resources available in the United States based on known existing agricultural and wood residues, landfills, and dedicated energy crops by thousand tons per year and tons per square kilometer per year, respectively. These maps indicate a low inventory of biomass resources across much of the West, with greater inventories available in the Midwest, Northwest, East, and Southeast.

According to Energy Efficiency and Renewable Energy (EERE) map[23], the biomass inventory in the Midwest is largely composed of agricultural residues and in the East the inventory is largely composed of woody residues. In the Southeast and Northwest, the inventory includes both agricultural and woody residues.

An emerging biomass source grows in vats, not fields. A tremendous amount of research is currently underway to evaluate the potential for cultivatating for biomass energy resource purposes an oil producing algae. Algae are fast growing and due to their nature, take less energy for oil extraction.

What determines the quantity of biomass energy available?

The amount of energy released when a given unit of fuel is combusted is referred to as the energy content of that fuel. For example, the energy content of wood is generally in the range of 2,579 to 7,737 Btu per pound (Btu/pound) of wood, depending on the moisture content of the wood. Freshly cut wood could have as much as 60% moisture and would have relatively low energy content (2,579 Btu/pound) whereas oven-dried wood with close to zero moisture content could have up to 7,737 Btu/pound. An average commonly used value for wood is 6,448 Btu/pound. Representative values for the energy content of other types of biomass varies (grass 1,719 Btu/pound, paper

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[22] See Biomass Resources of the United States - Total Resources By County. National Renewable Energy Laboratory. http://www.nrel.gov/gis/images/map_biomass_total_us.jpg. Retrieved 10/26/09

[23] See Biomass Resources Available in the United States, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www.afdc.energy.gov/afdc/data/images/biomass_map.jpg. Retrieved 10/26/09.

7,307 Btu/pound, straw 6,448 Btu/pound, dung 6,878 Btu/pound, domestic waste 3,869 Btu/pound , etc.).

By comparison, the energy content of fossil fuels outstrips biomass. Generally, coal has an energy content of 10,746 to 12,895 Btu/pound; conventional gasoline has about 15,045 Btu/pound; and crude oil has about 18,054 Btu/pound.

The biomass production rate in terms of the quantity of biomass that can be grown on a parcel of land per unit time (generally given as pounds of biomass per acre per year or pounds/acre/year) varies greatly depending on the crop, soil type, availability of water, and so forth.

Given an average yield of 13,385 pounds/acre/year and an energy content of 6,448 Btu/pound, the amount of thermal energy that can be expected to be available from cultivated wood production in a year would be about 86 million Btu/acre/year (86 MMBtu/acre), which would be about the same amount of energy contained in approximately 16,538 pounds (about 8.3 “short” (U.S. tons) of coal or 86,000 Mcf of natural gas.

What determines the quality of biomass energy resource?

The amount of energy available per unit of resource consumed determines the quality of biomass resources. For example, for a given quantity, kiln dried wood has three times the energy content of freshly cut wood, so it would be a higher quality biomass energy resource.

How are biomass energy resources developed?

Biomass energy development[24] begins with feedstock (e.g. corn, soybeans, wood, algae, switchgrass, etc.) cultivation, harvesting and transportation to a bio-refinery[25].

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[24] See Biofuels Lifecycle. Biomass Program, Office of Energy Efficiency and Renewable Resources, Department of Energy. http: www1.eere.energy.gov/biomass/. Retrieved 10/26/09.
[25] See Integrated Biorefineries. Biomass Program, Office of Energy Efficiency and Renewable Resources, Department of Energy. http://www1.eere.energy.gov/biomass/integrated_biorefineries.html. Retrieved 10/26/09.

Examples of bio-refineries[26] include: corn ethanol production facilities; cellulosic ethanol production facilities; bio-diesel production plants utilizing chemical processes; bio-diesel production plants using pyrolysis or gasification processes; biogas production plants or landfill gas collection processing.

After processing and conversion of the feedstock at the bio-refinery, the products are distributed to end users.

Given the relatively new and important contributions of biomass energy resources, one other aspect of development needs mentioning - research. NREL is focused on developing new technologies related to biomass energy utilization.[27]

What impacts occur from developing biomass energy resources?

The impacts[28] of a specific project will be determined by factors such as the type and size of the biomass facility, the amount of land disturbed by construction activities, the amount of land occupied by facilities long term, the location of the site with respect to other resources (e.g., species use of the site, distance to surface water bodies), and other factors.

The various types of biomass facilities (such as power plants, ethanol production plants, biodiesel and biogas production plants, and landfills) may involve different activities and, as such, result in different impacts.

The impacts of biomass feedstock production are essentially the same as those of farming and forestry. Feedstock involves activities including the cultivation of crops such as corn, soybeans, or grasses and the collection of crop residues and woody residues from forests.

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[26] See Biomass Energy Project Phases and Activities. TEEIC, Assistant Secretary Indian Affairs. http://teeic.anl.gov/er/biomass/activities/act/index.cfm. Retrieved 10/26/09.
[27] See Biomass Energy Basics. National Renewable Energy Laboratory. http://www.nrel.gov/learning/re_biomass.html. Retrieved 10/26/09.
[28] See Potential Impacts of Biomass Energy Development. TEEIC, Assistant Secretary Indian Affairs, U.S. Department of Interior. http://teeic.anl.gov/er/biomass/impact/index.cfm. Retrieved 10/26/09.

A Tribe considering a biomass energy project should also consider the total energy balance of the energy required to grow, harvest and refine a particular biomass project into a useable energy source versus the amount of usable energy resource produces. Some biomass resources may not result in a high total gain in energy (such as traditional ethanol production).

What infrastructure is required for biomass energy production?

The biomass energy feedstock requires land for growing, perhaps irrigation systems if it is a cultivated crop, and the availability of roads (or rail) to transport the feedstock to a bio-refinery.

Depending upon the output products of the bio-refinery, and where it is built or located, distribution to customers may involve roads, rail, petroleum product pipelines, or electrical transmission lines.

What other biomass energy related information resources may be of assistance?

The DOI Tribal Energy and Environmental Information Clearinghouse has compiled a list[29] and the DOE has compiled a list[30] of other resources that would be helpful to an evaluation of biomass energy resources.

B. GEOTHERMAL ENERGY

What Is Geothermal Energy?

Geothermal energy is energy derived from the natural heat of the Earth. Utility-scale geothermal resources are typically underground reservoirs of hot water or steam created by heat from the Earth, but can also include subsurface areas of dry hot rock. Direct-use geothermal energy simply uses the temperature differential associated with

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[29] See Biomass: Government Programs and Tribal Incentives. TEEIC, Assistant Secretary Indian Affairs, U.S. Department of the Interior. http://teeic.anl.gov/er/biomass/incentive/index.cfm. Retrieved 10/26/09.
[30] See Biomass Program - Related Links. Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www1.eere.enrgy.gov/biomass/printable_versions/related_links.html. Retrieved 10/26/09.

the heat of the earth within a relatively short distance from the surface and the surface. Geothermal energy is considered a renewable resource because the heat emanating from the interior of the Earth is essentially limitless.

Geothermal hot water and steam can naturally reach the Earth's surface in the form of hot springs, geysers, mud pots, or steam vents. Geothermal reservoirs of hot water and steam are also found at various depths below the Earth's surface. Utility-scale geothermal resources can be accessed by wells. They can be used to provide heat or to commercially generate electricity.

A utility-scale geothermal system[31] requires heat, water, and permeable host rock (called a reservoir). Heat from the Earth's interior flows continuously outward. In some places, heat flow causes the partial melting of crustal rock creating magma (molten rock), which rises to the Earth's surface. Magma that reaches the Earth's surface and issues from volcanoes is called lava. Magma remaining below the Earth's surface heats nearby rock and water, sometimes to levels as hot as 700°F (371°C). As a result, hot water and steam become trapped in the permeable and porous rocks underlying impermeable rock layers, forming a geothermal reservoir that can be tapped to generate electricity.

Where are geothermal energy resources located?

A map of utility-scale geothermal resources in the United States is available from the NREL.[32] The Department of Energy also has a map[33] of geothermal resources in the U.S.

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[31] See How is a Geothermal Reservoir Formed? TEEIC, Assistant Secretary Indian Affairs, U.S. Department of the Interior. http://teeic.anl.gov/er/geothermal/restech/uses/index.cfm. Retrieved 10/26/09.

[32] See Geothermal Maps. National Renewable Energy Laboratory. http://www1.eere.energy.gov/geothermal/geomap.html. Retrieved 10/26/09.

[33] See U.S. Geothermal Resource Map. Office of Energy Efficiency & Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/geothermal/geomap.html. Retrieved 10/26/09.

The Idaho National Laboratory also provides geothermal maps[34] showing geothermal resources in the western states, including Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

DOE's Tribal Energy Program web site provides maps showing potential geothermal resources in the vicinity of individual Indian reservations. The map to the right shows which reservations are located in areas where potential geothermal resources have been mapped. The maps for individual reservations are presented on the program's web page Geothermal Energy Resources,[35] and are searchable by state.

Direct-use geothermal resources exist nearly everywhere. A number of Tribes in various locations are using geothermal heating and cooling resources as part of their energy plan.

What determines the quantity of the geothermal resource?

In this case, the term "quantity" can be replaced by a more relevant term of "capacity". Unlike other types of energy that is measured on a volume basis, utility-scale geothermal energy resource potential is relative to the capacity of the reservoir to generate useable heat energy. The key factors determining geothermal reservoir capacity[36] include the average temperature of the reservoir, size of the reservoir, porosity, recovery and heat capacity of the rock.

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[34] See Geothermal Energy Maps. Idaho National Laboratory, U.S. Department of Energy. http://inlportal.inl.gov/portal/server.pt?open=512&objID=422&&PageID=3487&mode=2&in_hi_userid=200&cached=true. Retrieved 10/26/09.

[35] See Geothermal Energy Resources. Office of Energy Efficiency & Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/tribalenergy/guide/geothermal.html. Retrieved 10/26/09.

[36] See Moving Geothermal Sites from Exploration Prospects to Economic Project. Jim Lovekin, GeothermEx, Inc., June 9, 2005. http://ww.energy.ca.gov/geothermal/documents/2005-06-09_summit/2005-06-09_MOVE_SITES_LOVEKIN.PDF. Retrieved 10/26/09.

What determines the quality of the geothermal resource?

Utility-scale geothermal[37] energy generation requires hot geothermal reservoirs with a temperature above 200°F (93°C); however, new technologies are proving that lower-temperature water (e.g., below 165°F [74°C]) can also be used for commercial purposes. Utility-scale power plants range from small (300 kW) to large (50 MW and greater).

Direct use involves the utilization of low- to moderate-temperature geothermal resources (68°F to 302°F [20°C to 150°C]) for commercial, residential, agricultural, or public facilities, or energy needs other than the commercial production of electricity.

Direct use includes using heat energy from naturally occurring hot water or using other technology (e.g., heat pumps) to capture the heat from the Earth.

How are geothermal resources developed?

If utility-scale geothermal reservoirs are close enough to the surface, they can be reached by drilling wells, sometimes over two miles deep. Scientists and engineers use geological electrical, magnetic, geochemical and seismic surveys to help located potential reservoirs.

After exploratory wells confirm a presence and capacity of utility-scale geothermal energy reservoir, various types of production wells[38] are drilled. These include:

- **High-temperature, Water-dominated Reservoirs:**

  The methods and equipment used to drill geothermal wells in high-temperature, water-dominated reservoirs are very similar to those used to drill oil and gas wells. Conventional rotary drilling rigs and drilling equipment are used and drilling fluid—also called drilling mud—is circulated through the well to bring the cuttings back to the surface and to cool the well.

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[37] See Utility-Scale and Direct Use Geothermal Energy Generation. TEEIC, Assistant Secretary Indian Affairs, U.S. Department of the Interior. http://teeic.anl.gov/er/geothermal/restech/scale/index.cfm. Retrieved 10/26/09.

[38] See Oil, Gas & Geothermal - Geothermal Production Wells. Department of Conservation, State of California. http: www.conservation.ca.gov/dog/geothermal/general_info/Pages/production_wells.aspx. Retrieved 10/26/09.

- **Steam-dominated Reservoirs:**

  Because conditions in steam-dominated reservoirs differ significantly from those in water-dominated reservoirs, drilling procedures do as well. In a steam-dominated reservoir, a typical well is drilled with drilling mud to a point above the first anticipated steam entry. Then high-pressure air is used. Mud would plug the fractures and pore spaces in the formation and much less steam would be produced.

- **Low-temperature Water-dominated Reservoirs:**

  As conditions in low-temperature, water-dominated reservoirs usually are similar to those found when drilling water wells, the same equipment can be used and water can be substituted for drilling mud as the circulating fluid.

What impacts occur from developing geothermal energy resources?

The significance of the impacts depends upon factors such the amount of land disturbed by drilling and construction activities, the number and size of well pads, the type of power plant technology used, the amount of land occupied by facilities over the life of the geothermal facility, and the facility's location with respect to other resources (e.g., other land uses, wildlife use, and distance to surface water bodies).

Impacts from typical exploration and drilling activities include localized ground clearing, vehicular traffic, seismic testing, positioning of equipment, and drilling. Most impacts during the resource exploration and drilling would be associated with the development (improving or constructing) of access roads and exploratory and flow testing wells.

Activities that may cause environmental impacts during construction include site preparation (e.g., clearing and grading); facility construction (e.g., geothermal power plant, pipelines, transmission lines); and vehicular and pedestrian traffic. The construction of a utility-scale geothermal power plant would disturb between 15 to 25 acres of land. Transmission line construction would disturb about one acre of land per mile of line.

These activities create a variety of impacts[39], in varying degrees that can affect noise levels, air quality, cultural resources, ecological resources, hazardous materials and waste management, health and safety, land use, soils and geological resources and visual resources.

What infrastructure is required for geothermal energy development?

Infrastructure requirements would include; production wells; gathering lines; water supply and/or water rights; waste water treatment; transportation (e.g. roads, pipelines, etc.) of the hot water or steam to the geothermal processing plant or direct use facility; for high-temperature resources, a processing plant to generate electricity; and electrical transmission lines to distribute the power.

In addition to physical infrastructure, a Tribe must consider the permitting requirements, a utility agreement to interconnect with the electrical grid, and a power sales agreement with one or more customers.

What other geothermal energy related information resources may be of assistance?

The DOI Tribal Energy and Environmental Information Clearinghouse [40] has prepared a list of other information resources that may be helpful to Tribes exploring their geothermal energy resources potential.

The DOE[41] has also prepared a list of other information resources that may be helpful. Also visit the web pages for Geothermal Publications[42], National Laboratory Geothermal Publications [43]and, Software and Data.[44]

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[39] See Potential Impacts of Geothermal Energy Development. TEEIC, Assistant Secretary Indian Affairs, U.S. Department of the Interior. http://teeic.anl.gov/er/geothermal/impact/index.cfm. Retrieved 10/26/09.
[40] See Geothermal: Government Programs and Tribal Incentives. TEEIC, Assistant Secretary Indian Affairs, U.S. Department of the Interior. http://teeic.anl.gov/er/geothermal/incentive/index.cfm. Retrieved 10/26/09.
[41] See Geothermal Technologies Program - Related Links. Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/geothermal/related_links.html. Retrieved 10/26/09.
[42] See Geothermal Technologies Program - Geothermal Publications. Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/geothermal/publications.html. Retrieved 10/26/09.

C. HYDROPOWER ENERGY

What are hydropower energy resources?

Hydropower[45] harnesses the energy of moving water to power machinery or make electricity.

Water constantly moves through a vast global cycle, evaporating from lakes and oceans, forming clouds, precipitating as rain or snow, and then flowing back down to the ocean. The energy of this water cycle, which is driven by the sun, can be tapped to produce electricity or for mechanical tasks like grinding grain. Hydropower uses the energy created by gravity and the mass of flowing water rather than a combustible fuel to produce useable mechanical or electrical energy. Because the water cycle is an endless, constantly recharging system, hydropower is considered a renewable energy.

When flowing water is captured and turned into electricity, it is called hydroelectric power or hydropower. There are several types of hydroelectric facilities; they are all powered by the kinetic energy of flowing water. Turbines and generators convert the water's kinetic energy into electricity, which is then fed into the electrical grid to be used in homes, businesses, and by industry.

Where are hydropower resources located?

The Idaho National Laboratory has compiled a potential hydropower resource assessment[46] for 49 States (Delaware was not included due to scarce hydropower potential). The completed work has identified 5,677 sites in the United States with undeveloped hydropower capacity of about 30,000 megawatts energy.

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[43] See Geothermal Technologies Program - National Laboratory Geothermal Publications. Energy Efficiency and Renewable Efficiency, U.S. Department of Energy. http://www1.eere.energy.gov/geothermal/national_pubs.html. Retrieved 10/26/09.
[44] See Geothermal Technologies Program - Software and Data. Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/geothermal/software_data.html. Retrieved 10/26/09.
[45] See Wind & Hydropower Technologies Program - How Hydropower Works. Energy Efficiency and Renewable Energy, U.S. Department of Energy. http:www1.eere.energy.gov/windandhydro/hydro_how.html. Retrieved 10/26/09.
[46] See State Resource Assessment Reports. Idaho National Laboratory. http://hydropower.id.doe.gov/resourceassessment/states.shtml.

High-resolution tribal hydropower maps can be found at the Virtual Hydropower Prospector,[47] which was also developed by the Idaho National Laboratory for the Department of Energy's Hydropower Program.

After entering the site, use the Region Selector to choose the region. (Browser "pop-ups" must be enabled for the Region Selector to work.) Once viewing the map of the applicable region, select Land Use under the Legend, click on the square Feature Select box next to BIA, and then click Refresh Map to highlight reservation lands. The applicable lands may then be viewed by using the zoom feature to the level of detail desired.

These maps can display a variety of features simultaneously. For example, to display areas with micro-hydro potential on BIA managed lands, select Water Energy Resource Sites under the Legend, click on the Feature Select box next to Micro-hydro, then click Refresh Map to add micro-hydro sites to the map.

Detailed instructions can be found on the Virtual Hydropower Prospector main page.

What determines the quantity of hydropower resource?

The quantity of a hydropower resource is a measure of the average potential kinetic energy of a water source that can be directed and utilized to produce power. The kinetic energy is governed by water flow and head. Water flow is essentially a measure of the volume of water that passes a particular point. Water "head" represents the kinetic energy, generated by gravity, associated with the vertical drop as water moves from higher to lower elevations naturally or through impoundments which increases available water volume and elevation.

[47] See Virtual Hydropower Prospector. Idaho National Laboratory. http://hydropower.id.doe.gov/prospector/index.shtml. Retrieved 10/26/09.

What determines the quality of the hydropower resource?

Potential hydropower resource quality is related an intended use. So, quality, in this case, means is there enough kinetic energy in the water available to meet a project objective?

For example, hydroelectric power facilities range in size from large power plants that supply many consumers with electricity to small and micro plants that individuals operate for their own energy needs or to sell power to local utilities.

Although definitions vary, DOE defines[48] large hydropower facilities as those that have a capacity of more than 30 megawatts; small hydropower as facilities that have a capacity of 100 kilowatts to 30 megawatts; and micro hydropower as facilities have a capacity up to 100 kilowatts.

How are hydropower resources developed?

Hydropower projects vary considerably based upon factors such as location, topography, water volumes and flow rates, and hydropower project type. Generally, engineering efforts will design a specific hydropower plant to use the available water resource in a cost effective and efficient manner. The hydropower plant must be constructed, operated and maintained.

In marketing a commercial hydropower development, a Tribe should consider that most states with Renewable Portfolio Standards (requirements for utilities to purchase renewable energy) do not classify new, large hydropower projects as a renewable resource. Most state Renewable Portfolio Standard programs allow only small low-impact or run-of-river facilities.

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[48] See Wind & Hydropower Technologies Program - Types of Hydropower Plants. Energy Efficiency & Renewable Energy, U.S. Department of Energy. http:www1.eere.energy.gov/windandhydro/hydro_plant_types.html. Retrieved 10/26/09.

What impacts occur from developing hydropower resources?

New hydropower facilities impact[49] the local environment and may compete with other uses for the land. Those alternative uses may be more highly valued than electricity generation. Humans, flora, and fauna may lose their natural habitat. Local cultures and historical sites may be impinged upon. Some older hydropower facilities may have historic value, so renovations of these facilities must also be sensitive to such preservation concerns and to impacts on plant and animal life.

Hydropower can impact water quality and flow. Hydropower plants can cause low dissolved oxygen levels in the water, a problem that is harmful to riparian (riverbank) habitats and is addressed using various aeration techniques, which oxygenate the water. Maintaining minimum flows of water downstream of a hydropower installation is also critical for the survival of riparian habitats.

Fish populations can be impacted if fish cannot migrate upstream past impoundment dams to spawning grounds or if they cannot migrate downstream to the ocean. Upstream fish passage can be aided using fish ladders or elevators, or by trapping and hauling the fish upstream by truck. Downstream fish passage is aided by diverting fish from turbine intakes using screens or racks or even underwater lights and sounds, and by maintaining a minimum spill flow past the turbine.

What infrastructure is required for hydropower resource development?

In addition to the hydropower facility, road access to the hydropower facility will be necessary. If the hydropower facility results in an impoundment, the project will require easements or purchase of land to be submerged or affected. In addition, the project will require transmission lines to access the electrical grid and associated consumers.

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[49] See Wind & Hydropower Technologies Program - Advantages and Disadvantages of Hydropower. Energy Efficiency & Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/windandhydro/ hydro_ad.html. Retrieved 10/26/09.

In addition to the physical infrastructure requirements, hydropower projects require a great deal of permitting, an interconnect agreement with the power grid, and a power sales agreement.

What other hydropower related information resources may be of assistance?

Although it is unclear whether licensing requirements would apply to tribal hydropower projects, a data source[50] with significant involvement in hydropower project licensing is the Federal Energy Regulatory Commission.

D. SOLAR ENERGY

What is Solar Energy?

Solar energy[51] is the radiant (light and heat) energy produced by the sun. The solar energy that reaches the earth can be used to produce electricity or heat through the use of solar collectors. As an example, a closed car can be viewed as a solar collector—the light energy that passes through the window glass is absorbed by the car's interior and is converted into heat energy, which becomes trapped inside the vehicle. Solar energy is a renewable resource whose use does not affect its future supply.

Where are solar energy resources located?

Areas suitable for solar energy production require high direct normal insolation (DNI)[52] and a large area of nearly level topography. Under clear sky conditions, about 85% of the sunlight is DNI and 15% is scattered light that comes in at all different angles. DNI can be used by all solar energy systems, whereas the scattered light can only be used by photovoltaic systems. The size of a solar field for a given power plant generating capacity is, in general, directly proportional to the DNI level. The solar resources in the

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[50] See Industries-Hydropower-Industry Activities: Federal Energy Regulatory Commission. http: www.ferc.gov/ industries/hydropower/indus-act.asp. Retrieved 10/26/09.
[51] See What is Solar Energy? TEEIC, Assistant Secretary Indian Affairs, U.S. Department of the Interior. http://teeic.anl.gov/ er/solar/restech/uses/index.cfm. Retrieved 10/26/09.
[52] See Where Are Solar Resources in the United States Strong Enough To Be Economical for Energy Production? TEEIC, Assistant Secretary Indian Affairs, U.S. Department of the Interior. http://teeic.anl.gov/er/solar/restech/ dist/index.cfm. Retrieved 10/26/09.

southwestern United States (Arizona, California, Colorado, Nevada, New Mexico, and Utah) are among the best in the world for large-scale solar power plants, having suitably high DNI. Most commercial-scale solar energy projects of 10 megawatts (MW) or more that are currently operational or under development are located in Arizona, California, Nevada, and Florida.

An atlas of solar radiation data[53] from 1961 to 1990 is available from NREL. NREL also provides various solar maps[54] on its web site. In addition, NREL provides concentrating solar power resource maps[55] for the southwestern United States, including separate maps for Arizona, California, Colorado, New Mexico, Nevada, Texas, and Utah.

What determines the quantity of solar energy resources?

As the sun shines everywhere on Earth, some level of solar energy resources exist everywhere. However, a utility-scale solar energy project requires the sun to shine. So quantity of the solar energy resource is measured by the number of hours and days of direct sunshine.

The best sites for a solar energy project are where most days are sunny. Hence, as the maps above demonstrate, the areas of the U.S. that are most attractive are those in the drier, southern part of the country.

What determines the quality of solar energy resources?

Solar energy quality is a function of the amount of time that sunlight will fall directly upon the solar collector without interference (clouds).

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[53] See U.S. Solar Radiation Resource Maps: Atlas for the Solar Radiation Data Manual for Flat Plate and Concentrating Collectors. National Renewable Energy Laboratory. http://rrede.nrel.gov/solar/old_data/nsrdb/redbook/atlas/. Retrieved 10/27/09.
[54] See Dynamic Maps, GIS Data, & Analysis Tools - Solar Maps. National Renewable Energy Laboratory. http://www.nrel.gov/gis/solar.html. Retrieved 10/26/09.
[55] See Concentrating Solar Resource Maps. National Renewable Energy Laboratory. http://www.nrel.gov/csp/maps.html. Retrieved 10/27/09.

How are solar energy resources developed?

- **Concentrating solar power:** Solar energy facilities use concentrating solar power (CSP)[56] as the heat source to boil water in a generator system designed to produce electricity. The CSP technologies are also referred to as solar thermal or thermoelectric technologies. The main types of CSP systems are linear (i.e., parabolic trough and compact linear Fresnel reflector), power tower, and dish engine. CSP plants consist of two parts: one that collects solar energy and converts it to heat, and another that converts the heat energy to electricity.

- **Photovoltaics**: Photovoltaics (PV) convert sunlight directly into electricity using solar cells, while PV technologies are also referred to as solar electric or photoelectric technologies. The two types of PV technologies are flat plate and concentrating PV. Both PV technologies use solar cells that are made of semiconductor materials to absorb sunlight. The solar energy knocks electrons loose from their atoms, allowing electrons to flow through the material to produce electricity.

A brief animation[57] showing how a solar cell works is available on the DOE Solar Energy Technologies Program. More information about PV technologies[58] is available through DOE.

What infrastructure is required for solar energy development?

Commercial scale CSP solar energy development requires large expanses of open land and typically water resource infrastructure required to supply water for the steam cycle. Electricity must then have transmission lines connecting the generation unity to the power grid. Commercial scale facilities would require permitting, an interconnect agreement with the power grid and a power sales agreement.

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[56] See Concentrating Solar Power. Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/solar/csp.html. Retrieved 10/27/09.
[57] See Animations - Sunlight to Electricity. Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/solar/animations.html. Retrieved 10/27/09.
[58] See Solar Energy Technologies Program - Photovoltaics. Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/solar/photovoltaics.html. Retrieved 10/27/09.

The power generated by PV solar systems is typically of the magnitude where the local host consumes the power. Therefore, no infrastructure is required beyond the PV system and its relatively simple interconnection with the host power system.

In developing solar energy infrastructure, the intermittent nature of solar power (it occurs only during daylight hours and can be obscured by clouds, rain, fog, and other climatic conditions) creates challenges for integrating the power into a portfolio. For commercial-scale facilities, the intermittency of sunlight creates concerns for the stability and reliability of utility-scale solar energy developments. The integration of solar energy into an energy plan of a transmission system requires careful planning to balance the mix of solar energy with other sources of generation. This issue is alleviated[59] where at solar energy facilities that have heat or electric storage capacity or that are part of a hybrid system (e.g., co-located with one or more conventional fossil-fueled generation technologies). For PV installations, intermittency requires either a power storage technique (such as batteries) or a backup power arrangement.

What other solar energy related information resources may be of assistance?

The DOI has prepared a list[60] of other information resources that may be helpful to Tribes exploring their solar energy resources potential.

E. WIND ENERGY

What Is Wind Energy?

Wind is simply air in motion. Winds are created by the sun's uneven heating of the atmosphere in combination with the irregular surface of the earth and the earth's rotation. These winds can be "harvested" using wind turbines and used to make electricity. The force of the wind[61] makes the wind turbine blades spin, and the energy

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[59] See Utility-Scale and Distributed Solar Energy Generation. TEEIC, Assistant Secretary Indian Affairs, U.S. Department of the Interior. http://teeic.anl.gov/er/solar/restech/tech/index.cfm. Retrieved 10/27/09.
[60] See Solar: Case Studies and General Information. TEEIC, Assistant Secretary Indian Affairs, U.S. Department of the Interior. http://teeic.anl.gov/er/solar/case/index.cfm. Retrieved 10/27/09.
[61] See Wind Energy and It's Uses. TEEIC, Assistant Secretary Indian Affairs, U.S. Department of the Interior. http://teeic.anl.gov/er/wind/restech/uses/index.cfm. Retrieved 10/27/09.

of this motion is converted into electricity by a generator. Wind energy is a free, renewable resource. Its use does not affect its future supply.

Where are wind energy resources located?

The wind blows everywhere on Earth, and some level of wind resources are found everywhere; however, not all wind resources can be developed economically.

Wind resources for a select number of Indian reservations are presented by the U.S. Department of the Interior's Division of Energy and Mineral Development in the National Wind Resource Atlas: Native American Lands[62]. The atlas provides maps of wind power classes and existing power plants, substations, and transmission lines in the vicinity of 17 reservations.

In addition, the U.S. Department of Energy's Tribal Energy Program web site provides maps showing wind resources in the vicinity of individual reservations, i.e., the maps show which reservations are located in areas where wind resources have been mapped. The maps for individual reservations are presented on the program's Wind Energy Resources[63] page and they are searchable by state.

What determines the quantity of available wind energy resources?

Quantity is a function of the number of hours of wind, the speed and variation, and average wind speeds and duration.

What determines the quality of available wind energy resources?

Wind energy is rated by wind power density classes, ranging from Class 1 (the lowest) to Class 7 (the highest).

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[62] See National Wind Resource Atlas - Native American Lands. TEEIC, Assistant Secretary Indian Affairs, U.S. Department of the Interior. http://teeic.anl.gov/documents/maps/TribalWindResourceAtlas_April_2009.pdf. Retrieved 10/27/09.
[63] See Wind Energy Resources. Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/tribalenergy/guide/wind.html. Retrieved 10/27/09.

Wind power density of Class 3 (an average speed of at least 13 miles per hour) or greater is generally considered adequate for utility-scale wind energy generation. The most economical sites for large wind farms have power density of Class 4 or higher.

How are wind energy resources developed?

Before a wind farm can be planned and built, the wind regime at a potential site must be characterized precisely. Meteorological monitoring towers ("met towers"), which can be of varying heights, are installed to transmit data on weather conditions, wind speed, direction, and shear on a continuous basis to a remote monitoring facility. The data is used as the basis for a siting strategy that places turbines on the site in locations where maximum power production is possible throughout the year and interference between the towers is mitigated.

Throughout wind energy project construction,[64] the entire project area would be temporarily impacted by site preparation activities such as clearing; construction of access and on-site roads; preparation and use of material and equipment staging areas; erection of turbines; construction of the electrical substation, central control facility and ancillary facilities; and installation of power and signal cables (typically buried or vaulted). Concrete ingredients (sand, aggregate) may also need to be extracted and hauled to the site.

Utility-scale wind energy projects require strong winds that blow consistently, and must have access to transmission systems to send the electricity they generate to consumers.

Small scale wind generation may be economically feasible for lower wind classifications.

What impacts occur from developing wind energy resources?

The impacts of a specific project will be determined by specific factors such as the number and size of turbines, the amount of land disturbed by construction activities, the

[64] See Wind Project Phases and Activities. TEEIC, Assistant Secretary Indian Affairs, U.S. Department of the Interior. http://teeic.anl.gov/er/wind/activities/act/index.cfm. Retrieved 10/27/09.

amount of land occupied long term by facilities, the location of the site with respect to other resources (e.g., bird and bat use of the site, distance to surface water bodies), and other factors.

Typical activities during wind energy facility construction include ground clearing (removal of vegetative cover), grading, excavation, blasting, trenching, vehicular and pedestrian traffic, and drilling. Activities conducted in locations other than the facility site include excavation/blasting for construction materials such as sands and gravels, and access road construction.

These activities create a variety of impacts,[65] in varying degrees, that can affect noise, air quality, cultural resources, ecological resources, hazardous materials and waste management, health and safety, land use, soils and geological resources, or visual resources.

What infrastructure is required for wind energy production?

Commercial-scale wind generators require rail or road access capable of handling heavy loads and machinery. They also require electrical transmission line access to an end user, or the utility grid.

Small scale wind generators typically generate only enough power that can be consumed by a host. Therefore, large scale infrastructure is not required.

In addition to the physical infrastructure requirements, wind's intermittent quality creates similar balancing and storage issues as solar energy. For small scale wind, a user must have a backup power source. For commercial-scale wind, a developer will need permitting, an interconnect agreement with the power grid, and a power sales agreement.

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[65] See Potential Impacts of Wind Energy Development. TEEIC, Assistant Secretary Indian Affairs, U.S. Department of the Interior. http://teeic.anl.gov/er/wind/impact/index.cfm. Retrieved 10/27/09.

What other wind energy related information may be of assistance?

The DOI has compiled a list of government programs and tribal incentives[66] that might be helpful and a list of case studies and general information[67].

III. POTENTIAL (FOSSIL-FUEL BASED) NON-RENEWABLE ENERGY RESOURCES:

Typical fossil-fuel based resources include coal, crude oil, and natural gas, although oil shale and tar sands represent sources of energy with tremendous potential at some point in the future. According to the EIA, crude oil provided 37% of energy in 2008, followed by natural gas (24%) and coal (23%). A more detailed discussion of these energy resources follows:

A. COAL

What is Coal[68]?

Coal is a combustible sedimentary rock composed mostly of carbon and hydrocarbons. It is the most abundant fossil fuel produced in the United States, but it is a nonrenewable resource. The energy in coal comes from the energy stored by plants that lived hundreds of millions of years ago in swampy forests. Over time, layers of dead plants at the bottom of the swamps were covered by layers of water and dirt, trapping the energy of the dead plants. The heat and pressure from the top layers turned the plant remains into coal.

Coal is a complex resource and can vary in composition even within the same deposit. Generally, there are four different types or ranking levels of coal, each with differences in energy output as a result of increased pressurization, heat, and time.

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[66] See Wind: Government Programs and Tribal Incentives. TEEIC, Assistant Secretary Indian Affairs, U.S. Department of the Interior. http://teeic.anl.gov/er/wind/incentive/index.cfm. Retrieved 10/27/09.
[67] See Wind: Case Studies and General Information. TEEIC, Assistant Secretary Indian Affairs, U.S. Department of the Interior. http://teeic.anl.gov/er/wind/index.cfm. Retrieved 10/27/09.
[68] See TEEIC webpage, http://teeic.anl.gov/er/coal/restech/uses/index.cfm.

Lignite – This is a brownish-black coal with high moisture and ash content, which has the lowest heating value of the four types of coal. It is considered an “immature” coal that is still soft. It is used for generating electricity, and is generally found in deposits located in Montana, Texas and North Dakota.

Sub-bituminous coal – This is a dull black coal with a higher heating value than lignite, and is used principally for electricity and space heating. Sub-bituminous coal is generally found in deposits located west of the Mississippi River, mostly in Montana and Wyoming.

Bituminous coal – This is the most common type in the United States, accounting for over 50% of the demonstrated reserve base. It is the most commonly used type of coal for electric power generation in the United States. It is a dark, hard coal that has a higher heating value than lignite and sub-bituminous coal, but a lower heating value than anthracite. Bituminous coal is generally found in deposits located east of the Mississippi River, most notably in Illinois, Kentucky and West Virginia.

Anthracite – This is also known as “hard coal” that was formed from bituminous coal under increased pressures in rock strata during the creation of mountain ranges. In the United States, it is located primarily in the Appalachian region of Pennsylvania. It is very hard and shiny. This type of coal is the most compact and therefore, has the highest energy content of the four levels of coal. It is used for space heating and generating electricity, but makes up only 1.5% of the demonstrated reserve base of coal in the United States.

Where is coal located?

During the past 100 years, extensive research and development efforts have yielded a wealth of information regarding the location and attributes of coal resources in the United States.

The DOI provides a summary map of coal resources[69] and DOE provides a map of coal bearing areas of the United States.[70] A detailed report[71] on U.S. coal reserves, updated with 1997 data, is available from the EIA.

If the Indian tribal lands in question have not been evaluated for their potential coal resources, then more research will be needed. Regional summaries of coal geology are usually available from the U.S. Geological Survey (USGS) or state geological survey reports. In addition, regional resource and geologic maps to note past mining activities or the presence of coal bearing rocks can be reviewed. There are also maps available showing geologic structures and studies describing geologic characteristics of the area being evaluated. Other information may include government or company files, oil and gas well logs, low-level color aerial photography for clinker evidence and field traverses.

What determines the quantity of coal?

The quantity of coal is determined by the size of the deposit in three dimensions - length, width and depth. This information can be obtained through a well-designed drilling program that can measure the size and location of the coal seam underground and the overburden that covers it.

There is an extensive database of information available for coal resources in the U.S. One can review the information in the **U.S. Coal Resource Database**[72] which is a part of the National Coal Resources Data System (NCRDS). This USGS data base contains published coal-resource estimates for coal-bearing states listed by state, county, coal field, geologic age, formation, rank, coal thickness, overburden thickness, and reliability of resource estimates.

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[69] Coal Resources in the United States. TEEIC. Assistant Secretary Indian Affairs. http://teeic.anl.gov/er/coal/restech/dist/index.ctm. Retrieved 10/02/09.
[70] Coal Bearing Areas of the United States. Office of Energy Efficiency and Renewable Energy, Department of Energy. http://www1.eere.energy.gov/tribalenergy/guide/printable_versions/fossil_fuel_resources.htm. Retrieved 4/26/09.
[71] U.S. Coal Reserves: 1997 Update, February, 1999. Energy Information Administration, Department of Energy. http://www.eia.doe.gov/cneaf/coal/reserves/front-1.html. Retrieved 10/24/09.
[72] U.S. Coal Resource Database. U.S. Geological Survey. http://energy.er.usgs.gov/coalres.htm. Retrieved 10/16/09.

What are the quality characteristics of the coal deposit?

For known coal deposits, information related to the quality of coal can be found in the **U.S. Coal Quality Database**[73]**,** which is also a part of the National Coal Resources Data System**.** This (CoalQual) data base contains coal point-source and chemical data including geodetic location, field observations, sample analyses, bed thickness; lithology; depth of burial, moisture, ash, and sulfur content, heat value, and major/minor trace element contents.

For newly identified coal deposits, representative samples would need to be obtained and tested to identify the quality information noted above.

How are coal resources developed?

Before a coal mine can be planned and built,[74] a number of tests and surveys must be conducted to make sure the project is economically viable, technically feasible, and environmentally sound. These activities include mapping, drilling (to obtain geological samples and test those samples for coal quality and sulfur content), and geophysical exploration. Geophysical exploration methods can include aerial photography, airborne geophysical surveys (magnetic, radiometric, and electromagnetic), and on-the-ground geophysical surveys (drill-hole logging; electrical, magnetic, electromagnetic, radiometric, gravimetric, and refraction-seismic surveys; induced polarization surveys using exposed electrodes). Field surveys for identifying cultural resources, paleontological resources, and ecological resources (habitats, species) in the project area should also be conducted.

Activities during construction and mining include either surface or underground mining, and facility (e.g., shaft construction) and coal transport system (e.g. access roads, rail lines, pipelines, conveyor systems) construction.

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[73] U.S. Coal Quality Database. U.S. Geological Survey. http://energy.er.usgs.gov/products/databases/CoalQual/index.htm. Retrieved 10/16/09.

[74] See Project Phases and Activities. TEEIC, Assistant Secretary Indian Affairs. http://teeic.anl.gov/er/coal/activities/act/Index.cfm

The process of surface mining includes clearing the topsoil and stockpiling it for reclamation, removing and stockpiling the overburden, mining the coal seam, and transporting the mined coal with dump trucks or high-capacity conveyor belts to a preparation plant. As the mining of the coal seam moves forward, the mined area is reclaimed by replacing and recontouring overburden and replacing topsoil. With an open-pit mine, the mining begins by drilling and blasting waste rock to expose the coal seam, excavating additional overburden, and removing and transporting the coal. The coal is removed one bench layer at a time (terracing) and the mine continues to get wider and deeper as the mining continues.

The process of underground mining includes cutting into the coal deposit and removing it from the coal face through room-and-pillar[75] methods using a continuous mining machine, or through longwall methods using a longwall cutting machine. In either method, once the coal is removed, the supports or pillars can be removed and the roof of the mine is allowed to collapse.

What impacts occur from developing coal resources?

Potential environmental impacts associated with coal mining vary by the stage of development and include direct, indirect and cumulative impacts. The impacts of a specific project can vary substantially and will be determined by specific factors such as the method of mining employed, the amount of land being disturbed by the mine, the location of the site with respect to other resources (e.g. use of the site by threatened or endangered species, distance from surface water bodies) and other factors.

Typical activities during construction and mining include ground clearing (removal of vegetation and topsoil), drilling, blasting, trenching, excavation, and vehicular and pedestrian traffic. Activities conducted in locations other than the facility site include construction of transport systems, such as access roads, rail lines and conveyor systems.

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[75] See Coal Mining Technologies, Assistant Secretary Indian Affairs. http://teeic.anl.gov/er/coal/restech/tech/index.cfm. Retrieved 10/24/09.

These activities create a variety of impacts,[76] in varying degrees, that can affect noise, air quality (including greenhouse gas emissions), cultural resources, ecological resources, hazardous materials and waste management, health and safety, land use, soils and geological resources, or visual resources.

What infrastructure is required to develop coal?

The coal transport system will depend on site-specific and project-specific factors and could be a conveyor system within the mine site to the coal preparation plant or a rail system. A system of haul roads is also likely to be present. Transporting coal off-site may be accomplished by rail, truck, barge, or some combination thereof. A coal-slurry pipeline also may be used to send coal off-site.

What other coal related information resources may be of assistance?

The DOI has compiled a list of resources[77] that would be helpful to Tribes evaluating their potential coal resources. In addition, SourceWatch has written a summary of coal mining activities in Indian Country.[78]

B. Crude Oil and Natural Gas

What are Crude Oil and Natural Gas?

Crude oil and natural gas[79] are nonrenewable sources of energy (fossil fuels).

Crude oil is a mixture of various hydrocarbon compounds and other materials; usually containing about 84% carbon; 14% hydrogen; 1 to 3% sulfur; and nitrogen, oxygen, heavy metals, and salts that total less than 1%. Crude oil can range from light, volatile

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[76] See Coal Construction and Mining Impacts. TEEIC, Assistant Secretary Indian Affairs. http://teeic.anl.gov/er/coal/impact/ construct/index.cfm. Retrieved 10/24/09.
[77] See Coal: Case Studies and General Information. TEEIC, Assistant Secretary Indian Affairs. http://teeic.anl.gov/er/coal/ case/index.cfm. Retrieved 10/24/09.
[78] See Coal and Native American tribal lands. SourceWatch, a project of the Center for Media and Democracy. http://www.sourcewatch.org/index.php?title=Coal_and_Native_American_tribal_lands. Retrieved 10/11/09.
[79] See Oil and Gas Resources and Their Uses, Assistant Secretary Indian Affairs. http://teeic.anl.gov/er/oilgas/ restech/uses/index.cfm. Retrieved 10/24/09.

oils that are highly fluid to non-fluid oils (e.g., residual oils, heavy crude oils, and some high paraffin oils).

When it is brought to the surface, crude oil may also contain natural gas and product fluids such as salt water (i.e., produced water) and both dissolved and suspended solids. The natural gas is either separated at the well site if natural gas pipelines are nearby, used as fuel for production operations, reinjected into the reservoir, or flared as a waste. The produced water and other materials also are typically separated from the crude oil at the well site and normally disposed of by injection into a disposal formation. Once produced, crude oil is transported to refineries via truck or pipeline. Within the refinery complex, crude oil undergoes a series of heat and chemical treatments that break the crude oil hydrocarbons into usable liquid petroleum products, such as gasoline, diesel, jet fuel, lubricating oils and gaseous products such as ethane and butane (main feedstocks for the plastics industry) and propane. When a gathering system is available to gather the natural gas stream associated with crude oil production, the natural gas is processed at natural gas processing plants, where using compression and cryogenics, heavier products such as pentane, butane, propane and ethane are removed from the gas stream, leaving a relatively pure methane (what is commonly referred to as “natural gas”) stream.

Petroleum is a broad term that includes both crude oil and petroleum products, and is sometimes used interchangeably with the term oil. Crude oil is measured in barrels (one barrel equals 42 gallons).

About 85% of natural gas produced from conventional wells is methane, a compound comprised of one carbon atom and four hydrogen atoms. Ethane, propane, and butane also occur in natural gas and are often separated and processed as natural gas liquids. Typically, produced natural gas will contain other trace gases such as carbon dioxide, nitrogen and helium. In fact, most mainline natural gas transmission systems require that the majority of the ethane, propane and butane e removed in order to meet pipeline quality specifications. Natural gas exists as:

- Associated gas in crude oil wells where natural gas exists separate from the crude oil in the underground formation or is dissolved in the crude;

- Non-associated gas in dry gas wells that generally produce only natural gas that does not contain any hydrocarbon liquids;
- Wet gas (a type of non-associated gas) in condensate wells where natural gas occurs along with natural gas liquid;
- As coal-bed methane (CBM) in coal seams.

Currently, about 35% of natural gas recovered in the United States is associated with oil recovery. Non-associated gas generally occurs at great depths where heat has split all of the hydrocarbons into smaller, lighter gas molecules or at shallower areas where the natural gas migrates away from oil deposits until it is trapped by a layer of impermeable rock. Sour gas is an undesirable type of natural gas that contains a high concentration of hydrogen sulfide (a lethal substance) and requires expensive treating and handling techniques.

CBM consists primarily of methane (typically 95% or more), with varying amounts of heavier hydrocarbon fractions (e.g., ethane) and, in some cases, traces of nitrogen, carbon dioxide and a few other gases. CBM rarely has more than 2% of the more complex hydrocarbons. In eastern coal fields, CBM is generally 98 to 99% pure methane and requires little dehydration of the gas to remove moisture to achieve pipeline quality. In western coal fields, CBM sometimes requires either carbon dioxide or nitrogen to be stripped out, and produced waters to be managed. CBM accounts for about 8% of natural gas production in the U.S.

Recent advances have made a new production from “tight” shale reservoirs (meaning the gas does not easily move through the rock) economically feasible. In the lower 48 states, a wide distribution of shales contains a vast amount of natural gas. For instance, the newly producing Barnett Shale play in Texas accounted for 6% of the natural gas production in the lower 48 states. Three recent advances have allowed for the economic production of shale gas: 1) advances in horizontal drilling techniques, 2) advances in hydraulic fracturing, and 3) rapid increases in natural gas prices in recent years. Current predictions indicate that within two years unconventional shale gas reservoirs will

account for at least half of all new reserve growth (approximately 3 bdf/day). [80] The gas that can be economically produced from the four new shale gas plays (Hynesville, Fayetteville, Marcellus, and Woodford) is estimated at over 550 Tcf with a total production of 3 to 4 Tcf per year. Further, the geologic characteristics of the shale make production from these reserves sustainable for decades.[81]

Where are oil and gas resources located?

Most oil and natural gas deposits commonly occur in sedimentary rocks that are porous (meaning they have tiny spaces between the rock grains that allow a place for the crude oil and/or natural gas to accumulate) An oil or gas reservoir requires the combination of this porous rock to hold the oil and gas with a sealing mechanism that traps the oil or gas. The most common sealing mechanism is low-permeability rock (permeability measures the ability of oil or gas to move through the rock). Layering and faulting of the rock creates what is commonly referred to as “structural traps” or “stratigraphic traps.” Most structural traps are created by anticlines (upward folds in the rock layers) and faults (fractures in the earth's surface where layers are shifted). CBM is trapped within coal seams and held in place by hydraulic pressure. To produce CBM, a wellbore reduces the coal bed’s hydraulic pressure in the vicinity of the wellbore. As the water is produced, the gas is released, flowing to the pressure sink created by the wellbore.

Within the United States,[82] crude oil is produced in 31 states and off the coasts of Alaska, California, Louisiana, and Texas. The top crude oil producing states are Texas, Alaska, California, Louisiana, and Oklahoma. About one-fourth of the crude oil produced in the U.S. is produced offshore in the Gulf of Mexico. Over the last several decades, the amount of domestically produced crude oil has been decreasing while the use of

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[80] See Modern Shale Gas Development in the United States: A Primer. U.S. Dept. of Energy Office of Fossil Energy, National Energy Technology Laboratory, http://www.netl.doe.gov/technologies/oil-gas/publications/EPreports/Shale_Gas_Primer_2009.pdf.

[81] Id.

[82] See Where in the United States Are Oil and Gas Resources Concentrated Enough for Commercial Production. TEEIC, Assistant Secretary Indian Affairs. http://teeic.anl.gov/er/oilgas/restech/dist/index.cfm. Retrieved 10/24/09.

products made from crude oil has been increasing. About 58% of crude oil and petroleum products are imported.

Natural gas is found in 33 states. In 2006, the U.S.-marketed production of natural gas was 19.4 trillion cubic feet (Tcf). The top natural gas-producing states were Texas (5.5 Tcf), Wyoming (1.8 Tcf), Oklahoma (1.7 Tcf), New Mexico (1.6 Tcf), Louisiana (1.4 Tcf), and Colorado (1.2 Tcf).

Extensive oil and gas related map information[83] is available from the EIA.

What determines the quantity of crude oil and natural gas resources?

Because crude oil and natural gas resources are located deep underground, a determination of the quantity of resources available is a based upon determinations, where the greater the number of data points available will provide greater certainty in the estimates. Probably of most relevance to a Tribe interested in developing its crude oil and natural gas resources is the term "proved reserves"[84] (or "proven reserves") which is the best indication of the quantity of the resource. The EIA defines "proved reserves" as those volumes of oil and gas that geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.

Proved reserves cannot be measured precisely, but rather they are estimated quantities that are inferred on the basis of the best geological, engineering and economic data available to the estimator, who generally uses considerable judgment in the analysis and interpretation of the data. Consequently, the accuracy of a given proved reserve estimate varies with and depends on the quality and quantity of raw data available, the

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[83] See Maps: Exploration, Resources, Reserves and Production. Energy Information Administration, Department of Energy. http://www.eia.doe.gov/pub/oil_gas/natural_gas/analysis_publications/maps/maps.htm. Retrieved 10/24/09.

[84] See Appendix G - Estimation of Reserves and Resources, Oil and Gas Resource Base. U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2007 Annual Report. Energy Information Administration, DOE. http://www.eia.doe.gov/pub/oil_gas/natural_gas/data_publications/crude_oil_natural_gas_reserves/current/pdf/appg.pdf. Retrieved 10/24/09.

estimation method used and the training and experience of the estimator. Advances in technology or estimating methodology may affect the proved reserved estimates.

What determines the quality of crude oil and natural gas resources?

Crude Oil Quality: The physical characteristics of crude oils differ. Crude oil with a similar mix of physical and chemical characteristics, usually produced from a given reservoir, field or sometimes even a region, constitutes a crude oil "stream." Most simply, crude oils are classified by their density and sulfur content[85]. Less dense (or "lighter") crudes generally have a higher share of light hydrocarbons -- higher value products -- that can be recovered with simple distillation. The denser ("heavier") crude oils produce a greater share of lower-valued products with simple distillation and require additional processing to produce the desired range of products. Some crude oils also have a higher sulfur content, an undesirable characteristic with respect to both processing and product quality. For pricing purposes, crude oils of similar quality are often compared to a single representative crude oil, a "benchmark," of the quality class. The quality of the crude oil dictates the level of processing and re-processing necessary to achieve the optimal mix of product output. Hence, price and price differentials between crude oils also reflect the relative ease of refining.

In addition to gravity and sulfur content, the type of hydrocarbon molecules and other natural characteristics may affect the cost of processing or restrict a crude oil's suitability for specific uses. The presence of heavy metals, contaminants for the processing and for the finished product, is one example. The molecular structure of a crude oil also dictates whether a crude stream can be used for the manufacture of specialty products, such as lubricating oils or of petrochemical feed-stocks.

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[85] See Refining: Crude Oil Quality. Energy Information Administration, DOE. http://www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/oil_market_basics/refining_text.htm#Crude Oil Quality. Retrieved 10/24/09.

Natural Gas Quality: Raw natural gas[86], as produced at the wellhead, consists primarily of methane, the shortest and lightest hydrocarbon molecule. The raw natural gas also contains varying amounts of heavier gaseous hydrocarbons (e.g. ethane, propane, butane, isobutane, pentanes, etc.); acid gases (e.g. carbon dioxide, hydrogen sulfide, mercaptans); other gases (e.g. nitrogen, helium); water (e.g. water vapor, liquid water); and liquid hydrocarbons (e.g. natural gas condensates, crude oil).

Consequently, raw natural gas must be processed, or "cleaned," before the high-pressure, long-distance pipeline operators can safely accept it. The natural gas received and transported by the major intrastate and interstate mainline transmission systems must meet quality standards that vary by specific needs of each pipeline.[87] In general, "transportation quality gas" must:

- Be within the pipeline's specific Btu content (or "heating value") range – typically, this is approximately (1,000 Btu per cubic feet);
- Be delivered at a specified hydrocarbon dew point temperature level (this prevents some heavier gases from precipitating as liquids in the pipeline, clogging the line and causing damage to compressors);
- Contain no more than trace amounts of elemental contaminants, such as sulphur; and
- Be free of particulate solids and water.

The composition of the raw natural gas will dictate the cost of processing required and the value of the constituent products.

How are crude oil and natural gas resources developed?

To identify potential production areas both remote sensing (e.g., photography, radar, infrared images, and microwave frequency receivers) and geophysical exploration (e.g., seismic tests) are used. Generally, seismic testing involves sound waves produced at or near the surface that travel downward and outward and then bounce back from

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[86] See Natural Gas Processing. Citizendium, the Citizens' Compendium. http://en.citizendium.org/ wiki/Natural_gas_processing. Retrieved 10/24/09.

[87] See Natural Gas Processing: The Crucial Link Between Natural Gas Production and its Transportation to Market. Energy Information Administration, Office of Oil and Gas, January 2006. http://www.eia.doe.gov/pub/oil_gas/ natural_gas/feature_article/2006/ngprocess.pdf. Retrieved 10/24/09.

subsurface features (e.g., faults, formation boundaries) at different rates and strengths depending on the underground substances through which the waves pass. The data produced from seismic testing provides a great deal of subsurface information, such as the depth, location, and reservoir shape of oil and gas deposits.

After geology experts correlate all the known data for a virgin reservoir, they will propose an "exploratory drilling program." The exploratory drilling[88] program contains the most amount of risk of all exploration programs because typically no direct information is available on the geology beyond the seismic data. Recent advances in three-dimensional seismic techniques have greatly enhanced the usefulness of seismic date and decreased the risks associated with this phase of exploration. After all the study is complete, a well must be drilled to verify the existence and economic viability of reservoir development.

Generally, this stage includes building roads for access to the drilling area; clearing vegetation and leveling the drilling area; constructing a drill pad and pits to hold water and drilling wastes; and installing the drill rig and associated engines, pumps and equipment. If enough hydrocarbons are present to possibly warrant commercial production, additional exploratory wells would be drilled to test the production conditions and further delineate the boundaries of the reservoir. It is important to note that oil and gas reservoirs exist in layers at different depths under the surface known as "productive zones." A wellbore may pass through more than one productive zone.

Full field development involves the construction of well pads, access roads, gathering pipelines, and other ancillary facilities (e.g., wellhead compressors, separators, dehydrators, storage tanks, reserve pits, flare pits, and so forth) and the drilling and completion of wells. During production, additional wells may be drilled within the development area to enhance hydrocarbon recovery. Once the fluid starts flowing, it must be separated into its components (oil, gas, and water). Other activities that occur during production include production enhancement, well servicing (routine maintenance

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[88] See Oil and Gas Production Activities. TEEIC, Assistant Secretary Indian Affairs, DOI. http://teeic.anl.gov/er/oilgas/ activities/act/index.cfm. Retrieved 10/25/09.

such as replacing worn or malfunctioning equipment), and well workover (a more extensive equipment repair or change to a new productive zone) and waste water disposal. Depending upon the geology and market condition, production activities will most likely last for a number of decades.

What impacts occur from developing crude oil and natural gas resources?

Several factors influence the significance of the impacts from developing oil and gas reserves. Geological factors such as reservoir depth, pressure, porosity and permeability and oil and gas quality will influence the type of equipment required, the number of wells required to drain the reservoir efficiently, and the work that must be done to the wells and the frequency of such work. All of these factors will impact the amount of land disturbed by drilling activities, the amount of land occupied by facilities over the life of the oil and gas field and the frequency with which equipment will be on site. All these factors must interrelate with the field's location with respect to other resources, such as culturally sensitive areas, wildlife and traditional uses and distance to surface water bodies.

Typical activities during the drilling and development of an oil or gas well include ground clearing and removal of vegetative cover, grading, drilling, waste and runoff management, vehicular and pedestrian traffic, and construction and installation of facilities. Activities conducted in locations other than at the oil and gas well pad site may include: excavation/blasting for construction materials (sand and gravel); construction of access roads and storage areas; installation separators and treatment facilities; installation of waste water gathering, storage and disposal systems; and construction, gathering pipelines and compressor or pumping stations.

These activities create a variety of impacts[89], in varying degrees, that can affect noise, air quality (including greenhouse gas emissions), cultural resources, ecological resources, hazardous materials and waste management, health and safety, land use, soils and geological resources, or visual resources.

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[89] See Potential Impacts of Oil and Gas Production. TEEIC, Assistant Secretary Indian Affairs. http://teeic.anl.gov/er/oilgas/ impact/index.cfm. Retrieved 10/25/09.

What infrastructure is required for crude oil and natural gas production?

Oil and gas production requires a variety of different infrastructure requirements. At the wellhead, the well site will most likely contain the wellhead equipment, separation units, product and waste water storage units and product and waste water pipelines. The road infrastructure must be sufficient to support drilling, constructing and maintaining this equipment. Crude oil can either be gathered on site and trucked or gathered by pipelines to a central location. Natural gas must be gathered by a pipeline infrastructure. Once gathered, both cure oil and natural gas require processing infrastructure. From the refiner (for crude oil) and the processing plant (for natural gas) the sellable commodity is moved to market (by pipeline generally for natural gas, whereas petroleum products can be moved by pipeline, truck, rail or barge).Transporting[90] crude oil and natural gas from the wellhead to the final customer involves several physical transfers of custody and multiple processing steps.

What other crude oil or natural gas related information resources may be of assistance?

The DOI Tribal Energy and Environmental Information Clearinghouse has compiled a list of resources[91] that would be helpful to Tribes evaluating their potential crude oil and natural gas resources.

C. Oil Shale

What is oil shale?

The term oil shale[92] generally refers to any sedimentary rock that contains solid bituminous materials that are released as petroleum-like liquids when the rock is heated. To obtain oil from oil shale, the shale must be heated and resultant liquid must

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[90] See Transportation Process and Flow. Energy Information Administration, Department of Energy. http://www.eia.doe.gov/pub/oil_gas/natural_gas/analysis_publications/ngpipeline/process.html. Retrieved 10/25/09.

[91] See Oil and Gas: Case Studies and General Information. TEEIC, Assistant Secretary Indian Affairs. http://teeic.anl.gov/er/oilgas/case/index.cfm

[92] See Oil Shale Development in the United States - Prospects and Policy Issues, 2005. Rand Corporation.

be captured. This process is called retorting, and the vessel in which retorting takes place is known as a retort.

Where is oil shale located?

The largest known oil shale deposits in the world are in the Green River Formation that covers portions of Colorado, Utah, and Wyoming. Estimates of the oil resource in place within the Green River Formation generally range from 1.5 to 1.8 trillion barrels. Not all resources in place are recoverable. For potentially recoverable oil shale resources, an upper bound of 1.1 trillion barrels of oil and a lower bound of about 500 billion barrels is derived.

What determines the quantity of an oil shale deposit?

Much like characterizing a coal deposit, a well-designed seismic testing and exploratory drilling program can characterize the extent (length, width and depth) of the oil shale deposit. Deposits in Colorado have been estimated to be as much as 2,000 feet thick.

What determines the quality of the oil shale deposit?

Rich ores that yield 25 to more than 50 gallons per ton are the most attractive for development. Deposits that would likely yield below 10 gallons per ton are generally not counted as developable, because it is commonly assumed that such low yields do not justify the costs and energy expended in mining and processing. The richest deposits in Colorado could produce as much as 1 million barrels[93] of oil equivalent per acre over their productive life.

How is the oil shale resource developed?

Processes for producing shale oil generally fall into one of two groups: mining followed by surface retorting, and *in-situ* retorting.

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[93] See Expectations for Oil Shale Production. Energy Information Administration, DOE. http://www.eia.doe.gov/ oiaf/aeo/otheranalysis/aeo_2009analysispapers/eosp.html. Retrieved 10/25/09.

- **Mining and Surface Retorting.**

  Oil shale can be mined using one of two methods: underground mining using the room-and-pillar method, or surface mining. The current state of the art in mining (both room-and-pillar, and surface techniques, such as open pit mining) appears to be able to meet the requirements for the commercial development of oil shale. Technical viability has been demonstrated, but significant scale-up problems have been encountered in building and designing commercial plants.

- **In-Situ Retorting.**

  In-situ retorting entails heating oil shale in place, extracting the liquid from the ground, and transporting it to an upgrading or refining facility. Because in-situ retorting does not involve mining or aboveground spent shale disposal, it offers an alternative that does not permanently modify land surface topography and may be significantly less damaging to the environment.

What impacts occur from developing oil shale?

Even though some very rich oil shale resources have been identified, oil shale has not been commercially exploited in the United States because the energy industry, after some halting efforts, has not found that developing oil shale was economically viable. Over the past two decades, research and development efforts have been directed at reducing the costs of surface retorting and possibly finding other methods to extract the oil from the shale. As discussed above, some significant developments have been occurring in the technologies and viability of shale projects.

If oil shale development were to occur, the impacts would be similar to those associated with coal mining or oil and gas production, depending upon the development techniques employed.

What infrastructure is required to develop oil shale resources?

Depending upon the character of newly developed technologies, one would expect the infrastructure requirements to be similar to those of a coal mine if surface mining and retorting is employed or to oil/gas gathering systems if in-situ retorting is used.

What other oil shale related information resources may be of assistance?

Other oil shale related information resources include the U.S. Department of the Interior, Bureau of Land Management sponsored document, "Oil Shale and Tar Sands Resource Management Plan Amendment to Address Land Use Allocation in Colorado, Utah, and Wyoming and Programmatic Environmental Impact Statement." It provides additional information about this subject.

D. Tar Sands

What are tar sands?

Tar sands[94] (also referred to as oil sands) are a combination of clay, sand, water, and bitumen, a heavy, black, viscous oil. Tar sands can be mined and processed to extract the oil-rich bitumen, which is then refined into oil. The bitumen in tar sands cannot be pumped from the ground in its natural state; instead tar sand deposits are mined, usually using surface mining or open pit techniques, or the oil is extracted by underground heating with additional upgrading.

Where are tar sands located?

Much of the world's oil (more than 2 trillion barrels) is in the form of tar sands, although it is not all recoverable. While tar sands are found in many places worldwide, the largest deposits in the world are found in Canada (Alberta) and Venezuela, and much of the rest is found in various countries in the Middle East. In the United States, tar sands resources are primarily concentrated in Eastern Utah, mostly on public and tribal lands. The in-place tar sands oil resources in Utah are estimated at 12 to 19 billion barrels.

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[94] See About Tar Sands - Oil Shale & Tar Sands Programmatic EIS, U.S. Department of the Interior, Bureau of Land Management. http://osteis.anl.gov/guide/tarsands/index.cfm. Retrieved 10/22/09.

What determines the quantity of tar sands available for development?

Much like characterizing a coal deposit, a well-designed seismic testing and exploratory drilling program can characterize the extent (length, width and depth) of the tar sands deposit.

What determines the quality of a tar sand deposit?

The quality of a tar sand deposit depends upon the amount of bitumen that can be extracted from each ton of processed sand.

How are tar sands developed?

Tar sands are mined and processed to generate oil similar to oil pumped from conventional oil wells, but extracting oil from tar sands is more complex than conventional oil recovery. Oil sands recovery processes include extraction and separation systems to separate the bitumen from the clay, sand, and water that make up the tar sands. Bitumen also requires additional upgrading before it can be refined. Because it is so viscous (thick), it also requires dilution with lighter hydrocarbons to make it transportable by pipelines.

Currently, oil is not produced from tar sands on a significant commercial level in the United States; in fact, only Canada has a large-scale commercial tar sands industry, though a small amount of oil from tar sands is produced commercially in Venezuela. The Canadian tar sands industry is centered in Alberta, and more than one million barrels of synthetic oil are produced from these resources per day. The tar sands are extracted both by mining and *in situ* recovery methods.

What impacts occur from developing tar sands?

Both mining and processing of tar sands involve a variety of environmental impacts, such as greenhouse gas emissions, disturbance of mined land; impacts on wildlife and air and water quality. The development of a commercial tar sands industry in the U.S. would also have significant social and economic impacts on local communities. Of special concern in the relatively arid western United States is the large amount of water

required for tar sands processing; currently, tar sands extraction and processing require several barrels of water for each barrel of oil produced, though some of the water can be recycled.

What infrastructure is required for tar sands production?

Depending upon the character of newly developed technologies, one would expect the infrastructure requirements to be similar to those of a coal mine if surface mining and processing is employed or to oil/gas gathering systems if in-situ methods are used.

What other tar sands related information resources may be of assistance?

Review and explore the information on the Oil Shale and Tar Sands PEIS links[95] page.

IV. SUMMARY OF ENERGY RESOURCES

Indian Country has the potential to contribute significant amounts of energy from all of the sources described above. Recently, Secretary of the Interior Ken Salazar said that one of the greatest opportunities for economic development for Tribes can be the development of alternative energy sources and that Indian lands have major resources for renewable energy as well as rich sources of conventional fossil fuels.[96]

"Indian country offers some of the premier wind energy sites in the United States," Secretary Salazar noted. "I look forward to exploring with Tribes the potential for wind, geothermal, biomass, and solar energy development that exists on those lands".

Economic development will depend upon a host of factors and will vary from reservation to reservation. The array of various renewable energy, conventional energy, and

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[95] See Oil Shale and Tar Sands PEIS Links. U.S. Department of the Interior, Bureau of Land Management. http://osteis.anl.gov/guide/links/index.cfm. Retrieved 10/22/09.

[96] See Secretary Salazar: Recovery Plan to Create Jobs, Stimulate Economic Activity in Indian Country. People, Land and Water, U.S. Department of the Interior, September 18, 2009. http://www.peoplelandandwater.gov/bia/03-10-09_secretary-salazar-recovery.cfm?renderfor... Retrieved 1/1/10.

energy efficiency options bring with them a wide range of both real and perceived risks. These risks[97], which must be considered and planned for carefully, involve:

Technical risks - including errors in resource assessment or changes in resources over time, technology performance and maturity, future maintenance requirements, and competing technology advancements that may make a currently utilized technology obsolete.

Institutional risks - including changes in Federal or tribal policies and challenges to the formation of legal entities (such as a tribal utility, energy service company, or business).

Environmental risks - including air, water, and land pollution; destruction of sacred sites or native plants; harm to protected species, such as avian impacts; and contributions to climate change.

Financial risks - including potential cash flow difficulties and volatility in commodity prices (of the output or fuels) that can negatively impact the project.

Other parts of this Primer discuss the technical, institutional, environmental and financial risks to be considered in much greater detail.

[97] See Risk Assessment, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/tribalenergy/guide/printable_versions/risk_assessment.html. Retrieved 7/29/09.

ASSESSING ENVIRONMENTAL AND CULTURAL ISSUES

I. INTRODUCTION

When deciding whether to pursue an energy project, in addition to understanding the resource options and the tribal capacity issues, the Tribe will need to evaluate the environmental and cultural resources and characteristics potentially impacted by the project. To begin with, the Tribe should ascertain whether the proposed energy project will meet the applicable environmental laws and regulations that apply to the project and whether it is consistent with the cultural environment in which the project would take place.

II. ENVIRONMENTAL MATTERS

What Types Of Matters Should Be Included In An Environmental Evaluation?

Every type of energy project will impact the environment to some degree. Because the Tribes possess a wide variety of energy project options, they must consider a wide variety of potential environmental issues. Most of these potential impacts are governed one way or another by Federal environmental laws and regulations, executive orders and judicial opinions, tribal environmental laws and regulations, and even some state laws and regulations that are by Federal law made applicable to tribal lands.

The Department of the Interior, Assistant Secretary of Indian Affairs, Office of Indian Energy and Economic Development provides a listing of various laws and regulations that are or may be applicable to energy development on tribal lands. These laws and regulations, as well as others, can help to delineate the environmental issues or compliance obligations a Tribe should assess when considering development of an energy project.

This Primer does not attempt to list exhaustively or discuss comprehensively the laws and regulations that might be applicable to the wide variety of energy projects, nor does it discuss the application of those laws to any particular project or Tribe.[98] Nevertheless, a general review of the laws and regulations can generate questions that illustrate the topics which should be covered in a Tribe's environmental analysis of an energy project.[99] It should be noted that while a number of the statutes and regulations are not directly applicable to tribal lands, those statues and regulations could still affect a tribal energy project when the Tribe must obtain a permit or other permission or action on the part from Federal government (for instance, an approval by the Bureau of Indian Affairs of a lease on tribal trust land would likely require it to undertake either an environmental impact assessment or environmental impact statement prior to such approval), and sometimes a state government (for instance, if the pipeline bringing fuel to a power plant on tribal trust land crosses state lands, a state permit and thus compliance with state environmental laws for that pipeline may be required).

The following suggests the types of questions that a Tribe should assess, when considering developing an energy project. Each question lists the source of law or regulation. The Tribe should analyze these laws and regulations to gain an understanding of the full regulatory or compliance standards and processes that may be necessary:[100]

- Will the intended project result in noise emissions from the operation of construction equipment, or by transportation equipment, motor carriers, or

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[98] See Tribal Energy and Environmental Information Clearinghouse (TEEIC), U.S. Department of the Interior, Assistant Secretary Indian Affair, Office of Indian Energy and Economic Development. http://teeic.anl.gov. Retrieved 11/02/09.

[99] The TEEIC website categorizes the environmental laws and regulations as generally falling into the following categories: Acoustics, Air Quality, Cultural and Paleontological Resources, Ecological Resources, Energy Resource Development, Environmental Justice, Hazardous Materials, Health and Safety, Land Use and Siting, the National Environmental Policy Act, Solid and Hazardous Waste and Water Quality.

[100] This list is not intended to be comprehensive, but rather illustrative of the scope of the inquiry that should be undertaken. Moreover, not all questions will apply to every type of potential energy project. Additionally, the focus is on federal or applicable state laws, and should not be read to exclude those questions which should be analyzed with regard to any applicable tribal environmental law or in some cases applicable state law.

inter-state rail carriers and what are the limitations and requirements? If so, then reference should be made to 42 USC 4901-4918 and its implementing regulations at 40 CFR 201-211.[101]

- Are there primary and secondary National Ambient Air Quality Standards in the area, and how will the intended project impact or be impacted by those standards? If so, then reference should be made to the Clean Air Act 42 USC 7401 et seq. and implementing regulations at 40 CFR 50–99, especially 40 CFR 50.

- Does the energy project qualify as a new stationary source of air pollution, and if so, what will necessarily need to be done to meet the permit requirements and what type of permit will be necessary (e.g., nonattainment New Source Review permit, prevention of significant deterioration permit, minor new source permit)? See the Clean Air Act 42 USC 7401 et seq. and implementing regulations at 40 CFR 50–99, especially 40 CFR 51-52.

- If the energy project is a new stationary source of air pollution emission, what emission standard will apply to the particular project (e.g., is it an oil and gas production facility, onshore natural gas-processing plant, petroleum refinery, bulk gasoline terminal, petroleum liquid storage vessel, coal preparation plant, steam generator)? See the Clean Air Act 42 USC 7401 et seq. and implementing regulations at 40 CFR 50–99, especially 40 CFR 60.

- Will the new project be considered a source of hazardous air pollutants (air toxics) and if so, what are the requirements that need to be met under the National Emission Standards for Hazardous Air Pollutants? See the

[101]Throughout this Primer, all references to statutes and regulations should be deemed to include any judicial or administrative opinions interpreting those statutes and regulations.

Clean Air Act 42 USC 7401 et seq. and implementing regulations at 40 CFR 50–99, especially 40 CFR 63.

- Does the project require a Clean Air Act Operating Permit issued by the United States Environmental Protection Agency, and what needs to be done in order to meet the permitting requirements? See the Clean Air Act 42 USC 7401 et seq. and implementing regulations at 40 CFR 50–99, especially 40 CFR 71.

- Has the Tribe been given the authority by the United States Environmental Protection Agency to be treated in the same manner as a state, that is, for certain purposes does the Tribe have an approved tribal air quality program? See the Clean Air Act 42 USC 7401 et seq. and implementing regulations at 40 CFR 50–99, especially 40 CFR 49.

- Will the intended project impact green house gas emissions (e.g., will it increase green house gas emissions such as from a natural gas fired project or will it reduce green house gas emissions, such as from a wind or solar project)? If the intended project will increase emissions, what is the Tribe's position on requiring mitigation of green house gases? If it will reduce emissions, are there renewable energy or green house gas credits that may be available to the Tribe, and what is the value of such credits?

- Are any of the facilities needed to interconnect the intended project to power, gas, fuel, water or other existing infrastructure off trust land? If so, what coordination is required with local, state or federal agencies for the intended project to build such infrastructure? Can the intended project contract with the infrastructure owner to build the interconnection facilities thus having the infrastructure owner undertake the permitting (and expense) required?

- Will the intended project affect places and practices of religious importance to American Indians, Alaska Natives and Native Hawaiians? If

so, then reference should be made to the American Indian Religious Freedom Act, 42 USC 1996.

- Will the intended project impact a historic landmark, historic and pre-historic structure or other object of historic or scientific interest that has been under the control of the Federal government as a “national monument”? If so, then reference should be made to the Antiquities Act, 16 USC 431-433, and implementing regulations at 43 CFR 3.

- Will the intended project result in the loss or destruction of historical and archeological data, or result in destruction or alteration of cultural resources on Indian lands, or historic resources, or impacts on such resources? If so, then reference should be made to the Archaeological and Historic Preservation Act, 16 USC 469-469c-2, and implementing regulations, at 36 CFR 79 and also the Archaeological Resources Protection Act, 16 USC 470aa-470mm, and regulations at 43 CFR 7, the Historic Sites Act 16 USC 461-467, and implementing regulations at 36 CFR 1-65, and also the National Historic Preservation Act 16 USC 470 et seq. and implementing regulations at 36 CFR 36 CFR 60-79 and 36 CFR 800-812.

- Will the intended project result in the excavation or human remains, funerary objects, sacred objects or objects of cultural patrimony? Then reference should be made to the Native American Graves Protection and Repatriation Act, 25 USC 3001-3013, and implementing regulations at 43 CFR 10.

- Will the intended project impact bald eagles and/or golden eagles, including their parts, nests, or eggs and if so, can the Tribe obtain the necessary permits? If so, reference should be made to the Bald and Golden Eagle Protection Act, 16 USC 668-668c, and implementing regulations at 50 CFR 22.

- Will the intended project impact any native animal and plant species that has been listed by the Federal government as endangered or threatened or their listed habitat? What is the nature of that impact? Can the impact be permitted, mitigated or otherwise offset, or the project modified to avoid the impact? To answer these questions, reference should be made to the Endangered Species Act, 16 USC 1531 et seq. and implementing regulations at 50 CFR 17 and at 50 CFR 216-296.

- Is the intended project in a floodplain? Is there a practicable alternative to the site under consideration for development? This may impact the issuance of any permits by the Federal government. See Executive Order 11988 (Floodplain Management).

- Is the intended project in or will it impact or modify a wetland, as defined under Federal law? Can the impacts be mitigated or permitted? This may impact the issuance of any permits by the Federal government. See Executive Order 11990 (Protection of Wetlands).

- Will the intended project impact fish and wildlife and their habitat associated with the Federal government's management of the National Wildlife Refuge System? This may impact the issuance of any permits by the Federal government. See Executive Order 12996 (Management and General Public Use of the National Wildlife Refuge System). In addition, reference should be made to the National Wildlife Refuge System Administration Act, 16 USC 668dd et seq. and implementing regulations at 50 CFR 25-38.

- Will the intended project involve the introduction of any invasive species? This may impact the issuance of any permits by the Federal government. See Executive Order 13112 (Invasive Species).

- Will the intended project impact migratory birds, their eggs, or nests? This may impact the issuance of any permits by the Federal government. See

Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds). Reference should also be made to the Migratory Bird Treaty Act, 16 USC 703 et seq. and implementing regulations at 50 CFR parts 10, 14, 20 and 21.

- Will the intended project include a water resource project component that might impact fish and wildlife resources? If so, a number of statutes might apply, including the Fish and Wildlife Coordination Act, 16 USC 661et seq.

- Will the intended project cause or involve the importation, transportation or sale of noxious weeds? If so, then see the Noxious Weed Act, 7 USC 2801 et seq. and it implementing regulations at 7 CFR 360.

- Will the intended project impact wild free-roaming horses and/or burros? If so, reference should be made to Wild Free-Roaming Horses and Burros Act, 16 USC 1331 et seq., and the implementing regulations at 43 CFR 4700.

- If the intended project involves geothermal resources, what compliance or other issues are raised by the Geothermal Steam Act of 1970 (30 USC 1001 et seq.) and its implementing regulations at 43 CFR 3200, the Indian Mineral Lasing Act of 1938 (25 USC 396a-g), the Indian Mineral Development Act of 1982 (25 USC 2103 et seq.), and the Bureau of Indian Affairs regulations (25 CFR 211 and 25 CFR 225), promulgated relevant to development of geothermal development?

- If the intended project involves development of oil and gas resources, what compliance or other issues are raised by the Mineral Leasing Act of 1920 (30 USC 181 et seq.), the Mineral Leasing Act for Acquired Lands of 1947 (30 USC 351 et seq.), the Mining and Minerals Policy Act of 1970 (30 USC 21 et seq.), the Federal Land Policy and Management Act of 1976 (43 USC 1701), the Indian Mineral Leasing Act of 1938 (25 USC 396a-g), the Indian Mineral Development Act of 1982 (25 USC 2102) and

the various implementing regulations of these statutes have on the intended project?

- If the intended project involves rights-of-way over land held in trust for the Tribe, how will the Bureau of Indian Affairs regulations regarding issuance of rights-of-way affect it? See 25 USC 323 (Rights-of-Way on Indian Lands) and implementing regulations at 25 CFR 169.

- Does the intended project involve coal mining and/or reclamation activities that subject the project to the Federal Surface Mining Control and Reclamation Act (30 USC 1201-1328) and regulations implementing it (30 CFR 700-955), raising questions such as the suitability of the area for mining, performance standards governing the conduct of surface coal mining and reclamation operations, permitting requirements and procedures to ensure that operations are located and designed to achieve certain performance standards, the posting of a performance bond to provide a financial guarantee for completion of the reclamation plan if the entity holding the permit defaults on reclamation obligations, and compliance with mandatory inspection and enforcement requirements?

- If the intended energy project involves coal mining and/or reclamation activities, has the Tribe developed and obtained Federal Office of Surface Mining (OSM) approval of a mining reclamation and enforcement regulatory program which gives it “primacy,” in whole or in part, allowing it regulate surface coal mining and reclamation and enforcement operations? Has OSM otherwise authorized the Tribe to assist OSM with inspections, permitting activities, mine plan review and bond release?

- Will the intended energy project have disproportionately high and adverse human health or environmental effects on minority and low-income populations, raising issues of environmental justice? If so, it may impact Federal permitting of the project. See Executive Order 12898 (Federal

Actions to Address Environmental Justice in Minority Populations and Low-Income Populations).

- Will the intended energy project involve chemical substances that are manufactured, processed, used, produced or otherwise handled by a facility or that will be in inventory that are deemed hazardous? What measures will need to be taken to ensure compliance with each Tribe's obligation under Federal regulations to implement Federal law regarding emergency planning, maintenance, notification and reporting requirements for such chemicals? For answers to these kinds of questions, see 40 USC 11001 et seq., and 40 CFR parts 302, and 350-374.

- Will the intended energy project potentially result in toxic chemical entering any waste stream, including releases to the environment? Are such releases reported? What obligations on the part of Federal agencies will impact the Tribe's project, such as the Federal agency obligation to encourage markets for clean technologies and safe alternatives to extremely hazardous substances or toxic chemicals?[102] See for example Executive Order 12856 (Federal Compliance with Right-to-know laws and Pollution Prevention Requirements).

- Will the intended energy project involve the use of any regulated pesticide? If so, reference should be made to the Federal Insecticide, Fungicide, and Rodenticide Act (7 USC 136) and implementing regulations at 40 CFR 150-189.

- Will the intended energy project involve the transportation of any materials or classes or materials regulated as hazardous, and is so, what must be undertaken to comply with the requirements for the safe handling and

[102] A number of the demands or obligations in this list may not apply to the tribe directly but will be an issue for the tribe to the extent that there is a federal government action involved in the project, such as issuance of a permit, record of decision, or final analysis document under the National Environmental Policy Act, since the requirement (in this case compliance with an Executive order to federal agencies) will apply to the federal agency from whom the permit or other action is sought.

transportation of such materials, whether via rail, air, water and highway? For answers to these questions reference should be made to the Hazardous Materials Transportation Act, 49 USC 5101-5128 and implementing regulations at 49 CFR 100-185.

- Will the intended energy project involve the any chemical substance that is regulated and controlled by Federal regulation, and what must be done to comply with those regulations? See the Toxic Substances Control Act, 15 USC 2601 et seq., and implementing regulations at 40 CFR 700-766.

- Will the intended energy project provide an environmental health and safety risk that may disproportionately affect children? See Executive Order 13045 (Protection of Children from Environmental Health Risks and Safety Risks).

- If the intended energy project involves either a surface or underground mine, what are the compliance obligations that the Tribe will have to deal with regarding safety and health standards, education programs related to mine safety, and mining, education and training plans? See the Federal Mine Safety and Health Act, 30 USC 801 et seq., and implanting regulations at 30 CFR 1-199.

- Since the intended energy project will require employees, what are the occupational health and safety measures to be undertaken so that employees are not subject to recognized hazards such as exposure to toxic chemicals, excessive noise levels, mechanical dangers, heat or cold stress or unsanitary conditions? See Occupational Safety & Health Act, 29 USC 651 et seq., and implementing regulations at 29 CFR 1-3058.

- Will the intended energy project comply with standards established to promote aircraft safety, such as height of structures and offsets from public or military airports? See the Air Commerce and Safety Act, 49 USC 44718 et seq., and implementing regulations at 14 CFR 77.

- Will the intended project be in a coastal zone (e.g., affecting wetlands, beaches, and dunes, barrier islands and/or floodplains), such that certain regulations and restrictions will apply? If so, see the Coastal Zone Management Act, 16 USC 1451 et seq., and implementing regulations at 15 CFR 921-930.

- Will the intended energy project result in the irreversible conversion of farmland to non-agricultural uses and are their alternative actions that could lessen this impact? See the Farmland Protection and Policy Act, 7 USC 4201 et seq., and implementing regulations at 7 CFR 658.

- Will the intended energy project involve any public lands (e.g., a right-of-way) the use of which (or land sale, disposal or exchange) will require permits or other permissions from the Federal government under the Federal Land Policy and Management Act (43 USC 1701 et seq.) and its implementing regulations at 43 CFR 1600-9260, the Federal Land Transaction Facilitation Act (43 USC 2301) or the Federal Land Exchange Facilitation Act (43 USC 1716)?

- Will the intended energy project impact any part of the national trail system, and if so what must be done to comply with the regulations issued by the agencies who manage those trails (US Bureau of Land Management, US Forest Service, National Park Service)? See the National Trails System Act, 16 USC 1241 et seq. and implementing regulations at 43 CFR 8351.

- Does the intended energy project involves the construction of any bridge, dike, dam or causeway in or over any navigable water or cause any diversion or obstruction to the navigable capacity of any water of the United States, including any pier, boom, breakwater, or jetty, and what actions will the Tribe need to do to comply with regulations governing such activities? See Rivers and Harbors Act, 33 USC 401, and especially sections 401 and 403 and implementing regulations at 33 CFR 320-332.

- Will the intended project impact the use of soils, plants woodlands or watersheds? If so, among other statutes, reference should be made to the Soil and Water Resources Conservation Act, 16 USC 2001 et seq. and implementing regulations at 7 CFR 600-699.

- Does the intended energy project impact a river or its immediate environment that has been designated by the United States as a wild and scenic? See the Wild and Scenic Rivers Act, 16 USC 1271 et seq., and implementing regulations at 43 CFR 8351.

- Does the intended energy project impact lands that are designated by the Federal government as either a Wilderness area or a Wilderness Study area? See the Wilderness Act, 16 USC 1131, et seq and implanting regulations at 43 CFR 6301-6305.

- Will any part of the intended energy project involve a Federal government action (e.g., approval of specific project, such as taking land-into-trust, or approval of a land lease, a permit, or approval of a TERA), such that the obligations of the National Environmental Policy Act will need to be complied with by the Federal agency undertaking that action? See the National Environmental Policy Act, 42 USC 4321 et seq., the Council on Environmental Quality implementing regulations at 40 CFR 1500-1508, and individual agency regulations implementing the statute.

- Will the intended energy project involve a contaminated site that might pose a risk to the public or environment or otherwise subject to the provisions of the Comprehensive Environmental Response Compensation and Liability Act, 42 USC 9601 et seq., and implementing regulations at 40 CFR 305-307?

- What will the Tribe need to do to comply with Federal government regulations governing pollution prevention and waste management, such as recycling, treatment and disposal? See the Pollution Prevention Act, 42 USC 13101 et seq.

- Will the intended energy project create or otherwise involve certain solid wastes, hazardous wastes or underground storage tanks that will require management of those wastes in compliance with the Resource Conservation and Recovery Act? See 42 USC 6901 et seq. and implanting regulations at 40 CFR 239-282.

- Will the intended energy project impact the chemical, physical and biological integrity of surface waters? See the Clean Water Act, 33 USC 2701 et seq., and implementing regulations at 40 CFR 100-136, 401-471, and 500-503.

- Will the intended energy project require compliance with laws and regulations for the prevention of, preparedness for and response to oil spills? See the Oil Pollution Act, 33 USC 2701 et seq. and 40 CFR 112.

- Will the intended project result in the discharge of pollutants from a point source into navigable waters, such that there is a need for a National Pollutant Discharge elimination System permit and compliance with effluent guidelines and standards? See generally 33 USC 1251-1387 and 40 CFR 122-136 and 401-471. Specific standards will apply to petroleum refining (40 CFR 419, coal mining (40 CFR 434), oil and gas extraction (40 CFR 435) and mineral mining and processing (40 CFR 436).

- Will the intended project involve the discharge of dredge and fill material into waters of the United States, including wetlands? See 33 USC 1251-1387, 40 CFR 230-233 and 33 CFR 323.

- In undertaking the intended energy project will the Tribe need to undertake efforts to meet drinking water standards and source water protection programs (such as wellhead protection and sole source aquifer protection)? If so, see the Safe Drinking Water Act, 42 USC 300 et seq., and implementing regulations at 40 CFR 141-149.

It should be noted that while some of the answers to these questions may preclude the project altogether, most will simply require adherence to or compliance with standards and permits, or regulatory obligations when moving forward with the project.

III. CULTURAL MATTERS

What Types of Cultural, Traditional or Religious Issues Will The Tribe Wish To Consider When Considering A Potential Energy Project?

Tribes in general have cultural, traditional and/or religious sensitivities regarding the land, air, and water environment that should be taken into account when considering development of an energy project. In addition to the environmental concerns, other tribal values specific to each Tribe will also impact project decision-making. The analysis of these views and tribal norms play a major factor in deciding the type of project a Tribe may determine to develop. Therefore, it is essential for the Tribe (and its non-tribal partners, if any) to take these considerations into account early in the development process.[103]

An initial area of inquiry is how the development of an energy project will impact the critical issue of tribal sovereignty. On one hand, energy production may increase the energy self-sufficiency and help the Tribe's economic self-sufficiency. On the other hand, if the Tribe develops an energy project with a non-Indian partner or customer, the Tribe may decide to agree to the use processes or mechanisms that will (for that project) limit the Tribe's sovereignty in specific areas (e.g., dispute resolution in contracts employment or other claims). When a Tribe considers a proposed energy

[103] The following is not an exhaustive discussion of these cultural, traditional or religious norms or issues, but is intended to illustrate the kinds of issues that should be considered.

project, the Tribe should develop a conceptual ideal of how it will approach issues involving its sovereignty.

Second, development of an energy project will possibly involve greater interaction with the Tribe's neighbor State(s) and sub-agencies (e.g., negotiating an interconnection agreement with a local public electric utility for a power project). While this may not pose any problems or issues for some Tribes, other Tribes may be more uneasy with the prospect. The Tribe should take this issue into account when considering the type of energy project to undertake.

Third, development of certain energy projects may involve private non-Indian financiers. This may or not be an issue of concern to a particular Tribe (again, for example in the area of jurisdiction over contract enforcement, choice of laws, etc.) In fact, many projects in Indian Country are financed using capital arranged with non-Indian financiers, and with great success. It is nevertheless an issue that should be evaluated early in the process.

Fourth, the development of an energy project on tribal lands will entangle the Tribe with a myriad of non-tribal laws and regulations. Such entanglement is not a problem in itself, but does require the Tribe to decide whether it wishes to be involved in such an enterprise for a sustained time, which is the hallmark of most energy projects.

Fifth, the Tribe should consider its appetite for sustained education of non-tribal entities and persons about the Tribe's cultural norms, practices, concerns, habits, laws, requirements and expectations, because an energy project will often but not always require working with many non-Indians. This process of educating non-Indian entities and persons can be time consuming and distracting, as well as rewarding. The Tribe should consider this time commitment when making the decision whether to undertake an energy project. In addition, Tribes should seek to understand the corporate culture and fiduciary duty to shareholders of their non-Indian partners. Successful joint ventures require understanding on both sides.

Sixth, one of the values of undertaking an energy project is that it can develop internal capacity and experience within the Tribe and tribal members. If that capacity and

experience does not currently exist, the Tribe will need to evaluate the need to engage external expertise to assist with the project until internal expertise and experience is developed. Also, the Tribe should consider negotiating for provisions that require the transfer of the external expertise to the Tribe such as training and internship programs.

Seventh, most energy projects require the Tribe to devote serious consideration to the existence of any cultural, historical and sacred sites potentially impacted by the project. The extent of the impacts and the level of sensitivity of the site may determine whether or under what constraints the project should proceed, if at all. This factor should be considered and weighed early in the decision process.

Eighth, the Tribe should evaluate whether the proposed project is generally supported by the Tribe, its leadership and members, and not a potential cause of internal schism or strife.

Finally, the Tribe should evaluate any proposed energy project in light of the Tribe's capacity for continuity of project leadership, as well as its own cultural norms regarding input on or ratification of decisions of this nature. As an example, for any given Tribe, how are decisions about the energy project going to be decided? Will all decisions be made by the Tribal Council, Business Council, or General Council, and what are the ramifications of this decision-making process on the proposed energy project and on other tribal operational norms? As part of this evaluation, the Tribe should keep in mind that potential non-Indian partners or financiers will consider at least three factors when investing in Indian energy projects: 1) efficiency – can the project move forward with as little wasted effort and time as possible?; 2) predictability – will the favorable conditions present at the outset of the project remain in place during the project's lifetime?; and 3) enforceability – can the terms of project agreements be reliably enforced in an appropriate forum?[104]

[104] For fuller discussion of these factors, see John L. Williams, "Paving the Way for the Future: Potential Structures for Economic Development," *UCLA Indigenous Peoples Journal* (2005).

INSTITUTIONAL ASSESSMENT

I. INTRODUCTION

For decades the Congress, economists and political observers have sought to identify inhibitors to investment and impediments to economic growth and development on Indian reservations. In 1934, as part of the "New Indian Deal," Congress passed the Wheeler-Howard Act, [105] known colloquially as the Indian Reorganization Act, primarily to staunch the hemorrhaging of Indian lands into non-Indian hands but also to encourage the rehabilitation of Indian tribal governments and tribal economies.

Similarly, in his Special Message to Congress on Indian Affairs, President Nixon formally renounced the disastrous policy of Termination, replacing it with Indian Self Determination. Nixon's Message recognized that Indian Self Determination rests on a foundation of healthy tribal economies coupled with capable tribal governments and governing structures. [106] The Special Message, in part, states that "[t]he time has come to break decisively with the past and to create the conditions for a new era in which the Indian future is determined by Indian acts and Indian decisions."

What Are Institutional Best Practices For Business Development in Indian Country?

The last major Federal effort to carefully study the role of institutional governance and economic development in tribal communities came in November 1984, with the issuance of the Report and Recommendations of the Presidential Commission on Indian Reservation Economies. [107] The number one inhibitor identified through its research and investigation was weak business management by Indian tribal

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[105] Pub.L. 73-383, June 18, 1934.
[106] Public Papers of the Presidents of the United States – Richard Nixon, Special Message to Congress on Indian Affairs, July 8, 1970.
[107] Report and Recommendations of the Presidential Commission on Indian Reservation Economies, November 30, 1984. The Commission was established by President Reagan's Executive Order 12401, issued on January 14, 1983 and was co-chaired by Robert Robertson and Ross O. Swimmer.

governments. Accordingly, among the 37 recommendations made in the report were the following:

- That Indian tribal governments undertake a process of modernizing their constitutions to achieve an effective separation of governmental powers in which the tribal judicial system can operate without political interference from tribal government; and in which there is an effective separation between the tribal executive and tribal legislative branches of government;

- That Indian tribal governments undertake a process of separating their corporate business functions from political or management interference by tribal governments;

- That Indian tribal governments make private ownership or private management of tribal enterprises an objective of their involvement in business activity; and

- That Indian tribal governments exercise sovereignty in ways which enhance opportunities for individual Indian businesses and improve the climate for private sector investment by developing policies and enacting model codes, such as commercial codes, which minimize risks to investors and which encourage private initiative.

Since the late 1980's, the pre-eminent authority on institution-building and economic growth in tribal communities has been the Harvard Project on American Indian Economic Development.[108] After exhaustive study and the publication of hundreds of case studies and reports, the Harvard Project has determined the following key elements of successful tribal development strategies:

- **Sovereignty Matters.** When Indian tribal governments make their own decisions about what development approaches to take, they consistently out-perform

[108] The Harvard Project on American Indian Economic Development is housed within the John F. Kennedy School of Government at Harvard University and was founded in 1987 by Professors Stephen Cornell and Joseph P. Kalt. In its own words, the Harvard Project is the "systematic, comparative study of social and economic development on American Indian reservations. What works, where and why?"

external decision makers—on matters as diverse as governmental form, natural resource management, economic development, health care, and social service provision.

- **Institutions Matter.** For development to take hold, assertions of sovereignty must be backed by capable institutions of governance. Indian tribal governments do this as they adopt stable decision rules, establish fair and independent mechanisms for dispute resolution, and separate politics from day-to-day business and program management.

- **Culture Matters**. Successful economies stand on the shoulders of legitimate, culturally-grounded institutions of self-government. Indigenous societies are diverse; each Indian Tribe must equip itself with a governing structure, economic system, policies, and procedures that fit its own contemporary culture.

- **Leadership Matters**. Nation building requires leaders who introduce new knowledge and experiences, challenge assumptions, and propose change. Such leaders, whether elected, community, or spiritual, convince people that things can be different and inspire them to take action.

In its seminal report *What Determines Indian Economic Success? Evidence from Tribal and Individual Indian Enterprises,*[109] the Harvard Project reports that "successful tribal governments share a few core institutional attributes. They settle disputes fairly, they separate the functions of elected representation and business management, and they successfully implement tribal policies that advance tribal strategic goals."

[109] What Determines Indian Economic Success? Evidence from Tribal and Individual Indian Enterprises, Miriam Jorgensen and Jonathan Taylor, at 4.

The Harvard Report goes on to explain why these features are integral to any Indian tribal government's effort to revive and grow its economy.

> "Fair dispute resolution is essential to the accumulation of human financial, and infrastructural capital because it sends a signal to investors of all kinds that their contributions will not be expropriated unfairly. Separating businesses and government is critical because many Indian businesses are government-owned (occasionally by law and frequently by design). This feature invites the conflation of two contradicting institutional virtues --- good constituent service to voters and fiduciary duty to shareholders --- and thereby creates tremendous risk to profitability as elected leaders are pressured to interfere in business on behalf of voters. Finally, effective administration is a feature of successful tribes because, without it, legitimacy deteriorates and sovereignty is eroded as opportunities go untapped or other powers fill the vacuum left by weak tribal government."

Key to the development of energy resource development is the issue of ownership and management of the development entity. In a study comparing independent enterprises versus those controlled by tribal councils, the Harvard Project determined that of 39 independent enterprises, 34 were profitable and 5 were not profitable, generating an odds-of-profitability ratio of 6.8 to 1. Similarly, of 34 council-controlled enterprises, 20 were profitable and 14 were not profitable, generating an odds-of-profitability ratio of 1.4 to 1. Clearly, independently-managed enterprise have greater chances of being profitable than those whose business decisions are dominated by tribal councils.

What Are Institutional Best Practices and Examples of Successful Indian Tribal Governments?

The Harvard Project's analysis reveals that enterprises with corporate boards did not perform remarkably differently than those without corporate boards. However, the Project noted that a keenly important success factor is that the boards be non-politicized – that the corporate boards essentially act as "buffers" between the political functions of a tribal government and the specialized tasks of managing enterprises.

Example: The Benefits of an Independently-Managed Corporate Entity – The Southern Ute Indian Tribe.

The Southern Ute Indian Tribe in Ignacio, CO represents one of the (if not the best) illustrations of the benefits of an independently-managed corporation pursuing revenues

and profitability. In 1990, the tribal economy relied almost exclusively on a combination of royalties paid by lessees of its rich natural gas fields and Federal expenditures. In terms of energy production, the tribal government played essentially a passive role, where its resources were being developed without the major benefit accruing to the Tribe and its members.

Tribal leadership determined that real tribal sovereignty requires vigorous tribal institutions and a healthy tribal economy. Accordingly, the Tribe retained outside financial expertise and systematically began to buy back the leases of Southern Ute lands from private energy companies. At the same time, the Tribe developed a world-class tribal energy corporation to manage and maximize the Tribe's assets. Today, the Tribe generates 1% of all natural gas used in America, generates hundreds of jobs for tribal members and non-members, as well as hundreds of millions in revenues. The Tribe also launched an equity fund for investment in real estate, energy development, and other activities outside the Tribe's reservation.

In 1998, the Harvard Project launched *Honoring Contributions in the Governance of American Indian Nations,* to identify and herald examples of governance-related excellence by Indian tribal governments. In the intervening years, the Harvard Project has recognized hundreds of tribal best practices and good governance including the following:

- **Stable Institutions and Policies – The Swinomish Indian Tribal Community***.* With many reminders out of the developing world that abrupt changes in government can result in weak investment, the Swinomish Indian Tribal Community in Washington State provides an encouraging example. Through the 1980s, the Tribe and surrounding county were administering conflicting zoning, permitting, and regulatory regimes. The results were predictable: tribal-county friction, litigation, and a poor investment climate on the Tribe's lands. Through negotiated memoranda of understanding, the Tribe and the county reached accord on new regimes that provide fairness and predictability to tribal members and non-members alike.

- **Separating Politics from Business Management – The Winnebago Tribe**. Many Indian economies are centrally-planned, with the tribal government in control of the business activities --- including personnel and other day-to-day decisions. The Winnebago Tribe of Nebraska has demonstrated the benefits of separating politics from business. The Tribe founded Ho-Chunk, Inc. and embedded the following in the corporation's mission statement: "Ho-Chunk was established so that tribal business operations would be free from political interference and outside the bureaucratic process of the government." As late as 1990, when the Tribe's sole source of income derived from land leases, revenues were $190,000. In 2000, the economic success of the corporation was evident with more than $25 million generated for the Tribe and its members.

- **Capable Bureaucracies – Kayenta Township, Navajo Nation**. Since the early 1970s, the pendulum of Federal Indian policy has been clearly swinging in the direction of greater assumption of responsibilities by Indian tribal governments. Through "638" contracting and Tribal Self Governance compacts, Indian Tribes now manage nearly half of the funding of the Bureau of Indian Affairs and the Indian Health Service. This trend will only accelerate as additional tribal governments realize the benefits of tribal management, as opposed to Federal management, of programs and services for their benefit. The Kayenta Township on the Navajo Reservation enjoys some governmental latitude under a decentralization effort launched in the late 1990s by the Navajo Nation. Kayenta has streamlined its bureaucracy for handling business site leases and having eliminated dozens of steps and required signatures, Kayenta has experienced growth in the new businesses willing to locate on its lands.

ASSESSING MARKET POTENTIAL OF INDIAN ENERGY PROJECTS

I. INTRODUCTION

Resource availability on tribal lands opens up the possibility of energy project development, but it does not guarantee project success. For projects to succeed financially, Tribes must be able to profitably sell their natural resources, or the finished products made from those resources, in a manner that allows the Tribe to pay back their up-front development costs and retain a profit. Most energy projects have long development lead-times, and usually require significant financial commitments both during development and construction. Complicating the economic analysis of an energy project, the energy industry tends to follow a very cyclic “boom and bust” trend. This trend indicates that demand conditions and pricing for both the energy commodity and sold and the costs of producing that energy commodity can change quickly and repeatedly. As a result, Tribes considering projects must carefully assess energy market volatility, including how competing fuels and technologies, macroeconomic changes and non-market forces like government policy could alter demand expectations and commodity pricing.

This chapter presents a framework for preliminary tribal assessments of market potential, identifying useful analytical techniques and relevant data sources.

II. OVERVIEW

Energy supply is often expressed as the actual physical quantity of atoms that can be produced by an existing technology at a given cost. As fuel and product prices rise, producers generally will attempt to maximize production until they reach the limits of their resources or technologies. Although supply projections are seldom perfect, experts can provide reliable projections of potential resource production coupled with reasonable estimates of fixed and variable project costs to allow the Tribe to properly assess its supply (production) risks.

Demand, by contrast, can be much harder to predict. As a result, most market assessments describe the expected behaviors of different **end-user segments** within one or several specific **geographic markets**, usually taking into account multiple **economic scenarios**. Many market assessments also consider **global dynamics**, even for projects with relatively local scope, because global supply, demand and price trends tend to influence end-user behaviors associated with all fuels and technologies, across all regions and countries. Finally, market assessments for energy projects typically examine **government policy** considerations because local, state and national governments regulate energy production and associated environmental impacts. Changes to these regulatory frameworks can alter costs of production or use, supply, demand and price.

In general, the Tribe should recognize that expert projects are not guarantees. Therefore the Tribe should assess market risks by including different scenarios in its evaluations that reflect differing supply and market assumptions and risks. In evaluating an energy project, the Tribe should base its decision by analyzing (a) what the experts project is the “most likely case, along with (b) the results of one or more “low cases” cases that investigate the impacts if certain key assumptions are lower than projected, combined with (c) a few “high cases” that show the upside if things go better than expected. Overall the Tribe should consider that economic models and projections are only as good as the underlying assumptions included in the model. Tribal decision makers should concentrate on asking difficult questions and understanding all of the complex assumptions that are included in the analysis of any given energy project.

Each of the five elements, highlighted above, is addressed in turn.

1. Defining End-User Segments

Although end-user segments may differ depending on the type of project a Tribe might pursue, most energy end-users fall into three basic categories:

- **Residential** (or household) end-users;
- **Commercial** (or business) end-users; and

- **Industrial** (or manufacturing) end-users.

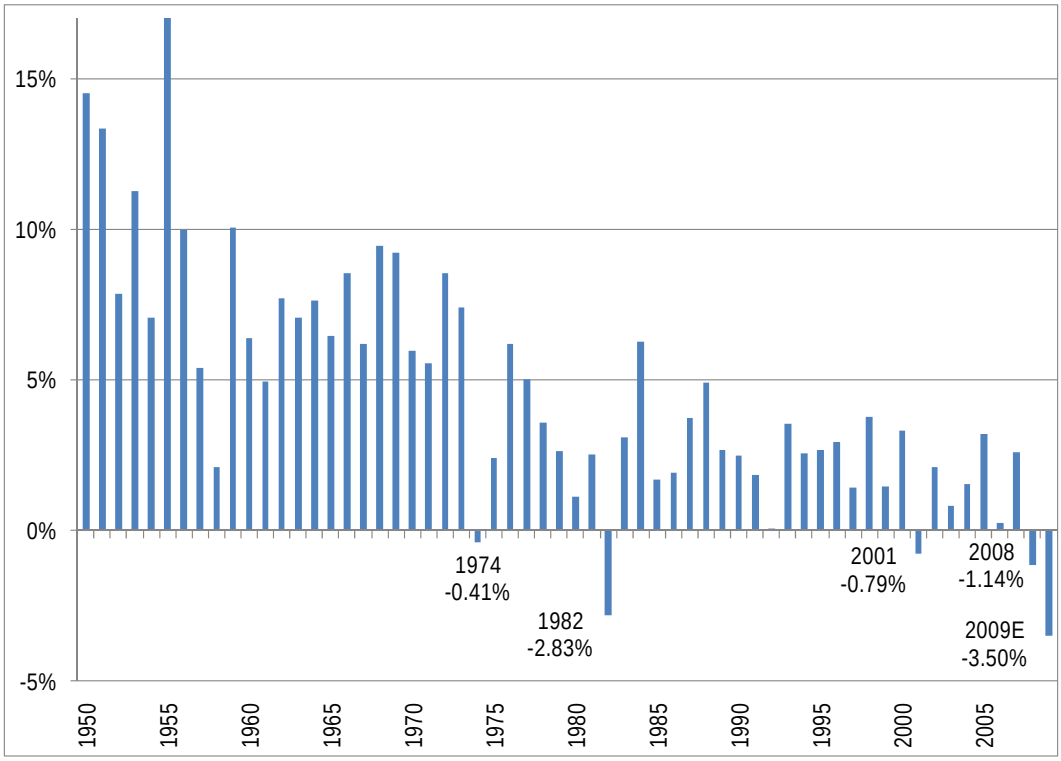
Different end-user segments tend to use energy differently. Two types of differences that may be especially pronounced are:

- **Continuity.** Residences and commercial enterprises tend to use more energy during the day than at night; industrial energy use often continues at high levels all day long.

- **Variability (or seasonality).** Residential energy use usually includes a significant discretionary or elective component. Commercial and industrial energy usage patterns tend to be less variable.

These usage scenarios create “peak” times of usage that may affect the price of an energy commodity or the transmission services providing the energy on either a daily basis (for commodities like natural gas) or an hourly or minute basis (for an instantaneous commodity like electricity). Typically, prices are higher during peak times than off-peak times.

Figure 1 – The Big Picture: Annual Change in U.S. Electric Power Demand, 1950-2009



Source: ClearView Energy Partners, LLC, EIA

Different end-user segments also tend to use different types of energy.

- **Finished products.** Residential and commercial end-users primarily purchase finished products, usually electric power and gasoline.

- **Natural resources.** Industrial energy end-users may purchase natural resources, like coal, corn, crude oil or natural gas, as well as a broader array of finished products, including gasoline, diesel fuel and petrochemicals.

Defining a project's end-user segment(s) requires answers to several questions:

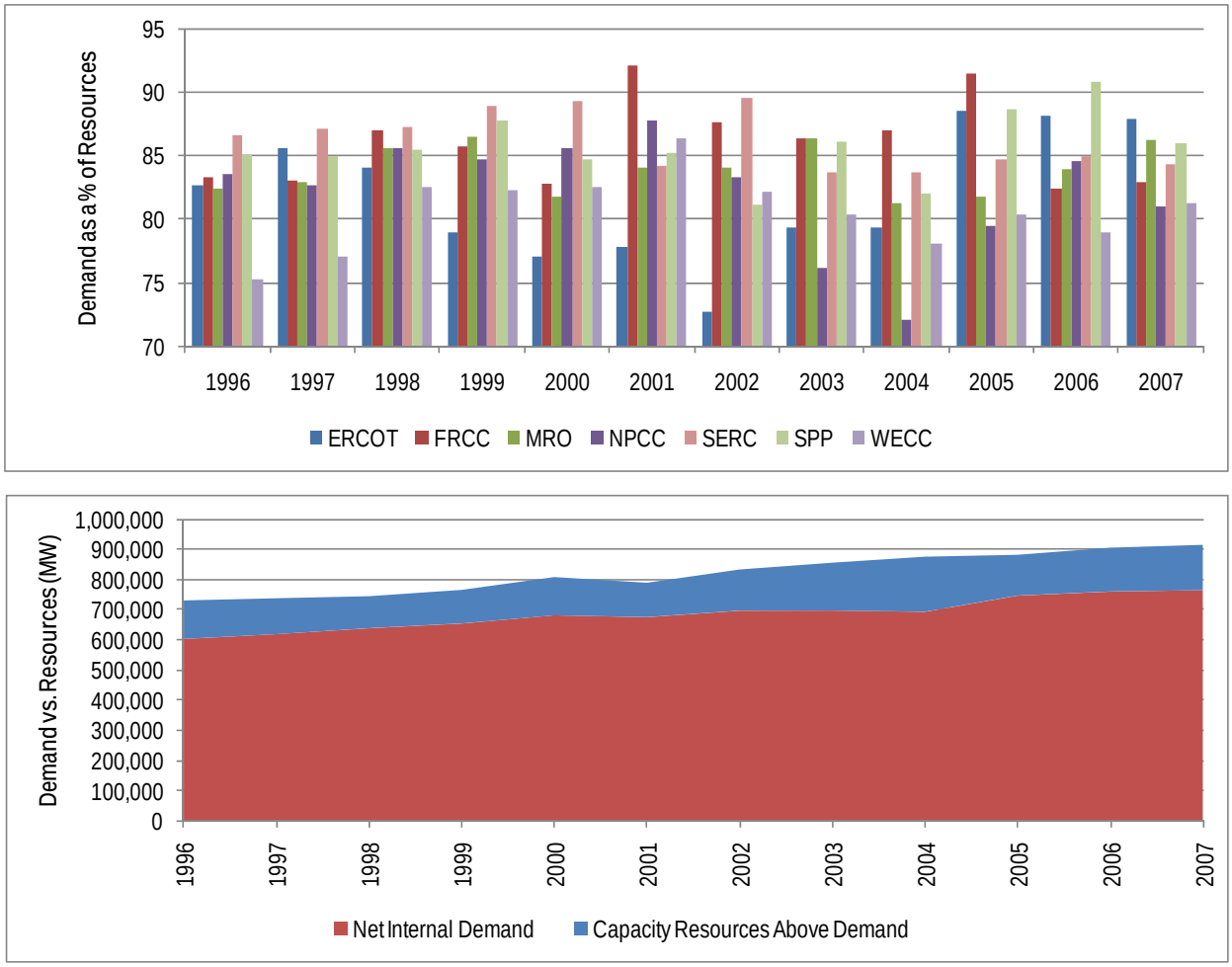
- **Who are the primary end-users**, or customers, of/for the resources or finished products the Tribe intends to produce? Will the Tribal project sell to industrial customers, who typically buy on a wholesale basis, or to residential and commercial customers who may sign short-term contracts or purchase resources and finished products on a "spot" market? What is known about primary these

end-users' past buying behaviors and future plans? What is the creditworthiness of the primary customer? Will a contract from this customer survive a financier's due diligence efforts?

- **Who are the secondary end-users** who will buy from the Tribe's intended customers and what is known about their past behaviors and future plans?

- What **competitors**, if any, currently supply the Tribe's intended, primary customers? What middlemen transport the resources or products to market today, and how much capacity is available, or will be required, to transport resources or products to the intended end-users?

Figure 2 – Regional Demand Dynamics: U.S. Summer Electric Demand vs. Capacity Resources, by Selected NERC Regions and Nationally, 1996-2007



Source: ClearView Energy Partners, LLC, using EIA data

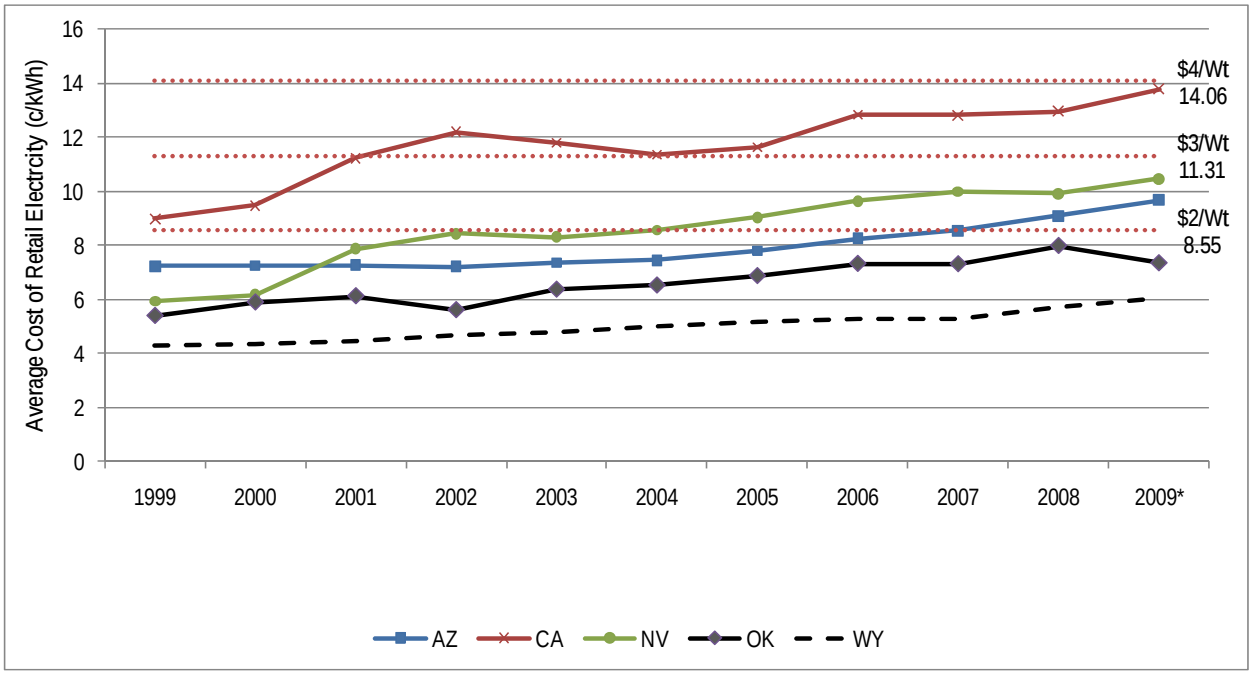
Outlining the value chain. The vast majority of energy projects can be described by a simplified “value chain” comprising between three and five links:

- **Extraction** of natural resources;
- **Transportation** of natural resources (not always necessary);
- **Conversion** of natural resources into finished products;
- **Transportation** of finished products (not always necessary); and
- **Consumption** of finished products.

Value chain analyses can help Tribes refine their understanding of demand potential, the current competitive landscape a project might face and possible changes to that landscape.

For example, a coal mine on tribal lands might ship via rail to one or several nearby power plants. These power plants, in turn, might sell wholesale or retail electricity to one or several power markets. Identifying the players at each link of the value chain can provide focus for future areas of inquiry and analysis, such as determining whether a customer is about to expand its facility or whether a competitor going out of business or reducing its capacity.

Figure 3 – Viability vs. Other Sources: Average Retail Electricity Prices, Selected States vs. Theoretical Levelized Silicon PV Power Cost at $4, $3 and $2/Installed Watt



Assumptions: 4.88 kWh/m^2/Y average insolation (five-state average); 16% panel efficiency; $10/kW/Y maintenance; $1/ft^2/Y land rental; 8% cost of debt; 100% of balance financed through 20-year debt; 30-year equipment life; 30% Federal ITC taken as grant; 15% state rebate; 95% inverter efficiency.

Source: ClearView Energy Partners, LLC, EIA

Figure 4 – Resources, Finished Products and the Energy Value Chain

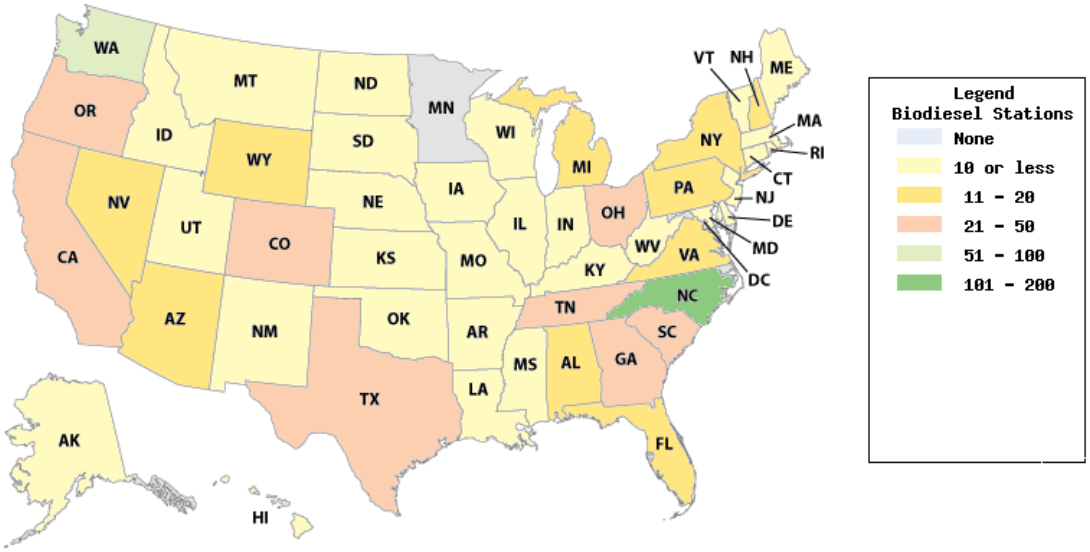
Resource Extraction	Resource Transportation	Conversion	FinishedProduct Transportation	Consumption
Oil production	Ship, pipeline, truck and rail	Refining into gasoline, distillate fuels and other products	Ship, pipeline, truck and rail	Motor and aviation fuels; petrochemical feedstocks
Corn harvesting	Rail and barge	Fermentation and distillation into bio-ethanol	Rail, barge and truck	Motor vehicles
Coal mining	Rail and barge	Combustion and steam turbine to generate electricity	Transmission and distribution lines	Electric motors, heaters and lighting
Natural gas production	Pipeline and ship (LNG)	Finishing and separation to create dry gas	Transportation and distribution lines	Space heating (furnaces and boilers), industrial processes, power generation, petrochemical feed stocks
Solar energy absorption	N/A	Photovoltaic effect or steam turbine	Transmission and/or distribution lines	Electric motors, heaters and lighting
Wind energy capture	N/A	Wind turbine	Transmission and distribution lines	Electric motors, heaters and lighting

2. Identifying Market Geography

Tribes must analyze nearly all energy projects within the context of a larger market. For instance, larger-scale conventional and alternative power projects can provide electricity not only to neighboring communities but to customers many miles away. Due to the interconnectivity of the energy transmission systems and interrelated nature of energy commodities, the market for an energy project will nearly always include a regional, if not national, or global perspective. For instance, natural resource extraction projects, like natural gas wells or coal mines, may have local customers, but will still be competing with resources provided to a global marketplace. This is particularly true of

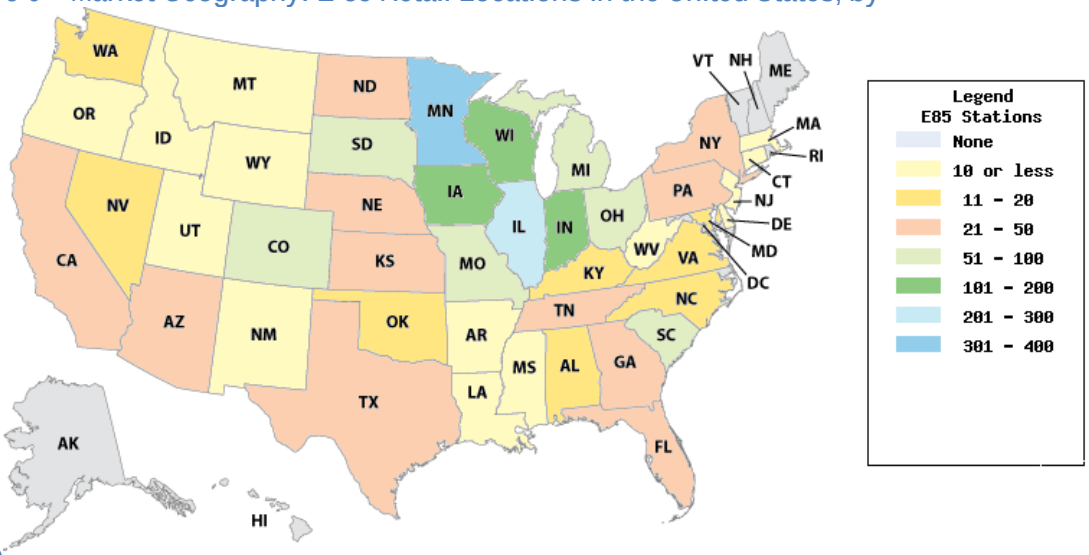
crude oil extraction, where a relatively-fixed number of known refinery customers tend to buy some portion of their feed-stocks and crude oils on the open market. For environmental "attributes" created by greenhouse gas (GHG) offset and renewable energy projects, the geographic market is developing across state and national boundaries. A limited number of projects, like distributed (non-grid connected) alternative power generation, may include only a local market analysis if the energy transmissions systems are too remote.

Figure 5 – Market Geography: Biodiesel Retail Locations in the United States, by State



Source: U.S. Department of Energy

Figure 6 – Market Geography: E-85 Retail Locations in the United States, by State



Source: U.S. Department of Energy

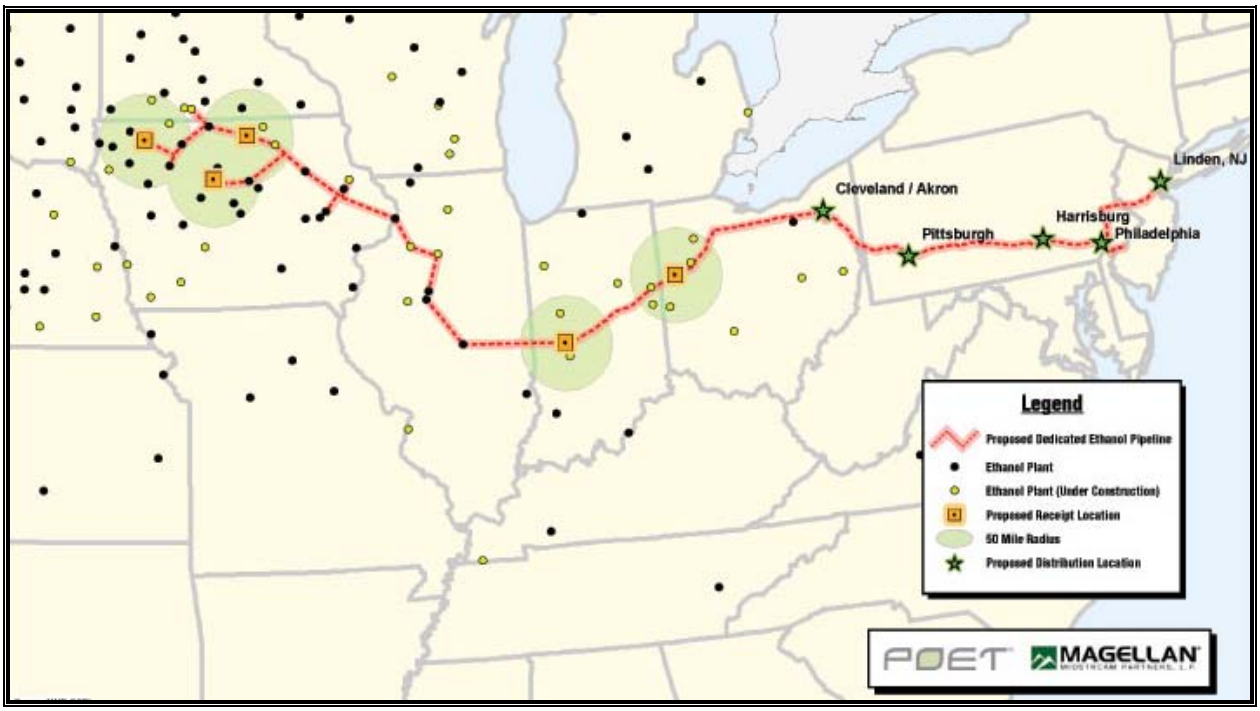
Transportation often defines market geography. Without a transportation provider with adequate capacity, the Tribe may not be to deliver its resources or finished products to the market. Several online resources can provide a preliminary assessment of transportation adequacy.

- **For freight deliveries,** the U.S. Department of Transportation's Bureau of Transportation Statistics (BTS) maintains an online *Freight Data and Statistics* page at: http://www.bts.gov/programs/freight_transportation/. The BTS *Commodity Flow Survey,* at http://www.bts.gov/programs/commodity_flow_survey/, provides two-year-lagging data regarding energy and agricultural commodity shipments. Finally, although it is somewhat dated, the BTS also offers its *North American Transportation Atlas* online at http://www.bts.gov/publications/north_american_transportation_atlas_data/.

- **For pipeline transportation,** the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration's (PHMSA) *National Pipeline Mapping System,* accessible online at http://www.npms.phmsa.dot.gov/, offers a pipeline map viewer open to the public.

- **For power transmission,** local grid operators' websites contain specific information, a topic we will address in a subsequent section of this chapter. The North American Electricity Reliability Council (NERC) maintains its *Transmission Availability Data System* on its website at http://www.nerc.com/page.php?cid=4|62. As an overview, National Public Radio synthesized an interactive map of the three national grids (Western Interconnect, Eastern Interconnect and the Electricity Reliability Council of Texas, known as "ERCOT") at http://www.npr.org/news/graphics/2009/apr/electric-grid/.

Figure 7 – Related and Supporting Infrastructure: Proposed POET Ethanol Pipeline Route



Source: POET Ethanol

Tribes can also consider future projects using the following information sources:

- **Proposed interstate electricity transmission and pipeline projects** are listed on the Federal Energy Regulatory Commission's (FERC) website at http://www.ferc.gov/for-citizens/projectsearch/SearchProjects.aspx?Region=ALL

- **Rail construction permit applications** are available on the U.S. Surface Transportation Board's *Enhanced Search* page at http://www.stb.dot.gov/home.nsf/EnhancedSearch?OpenForm&Type=F by typing "construction" in the field labeled "complex search".

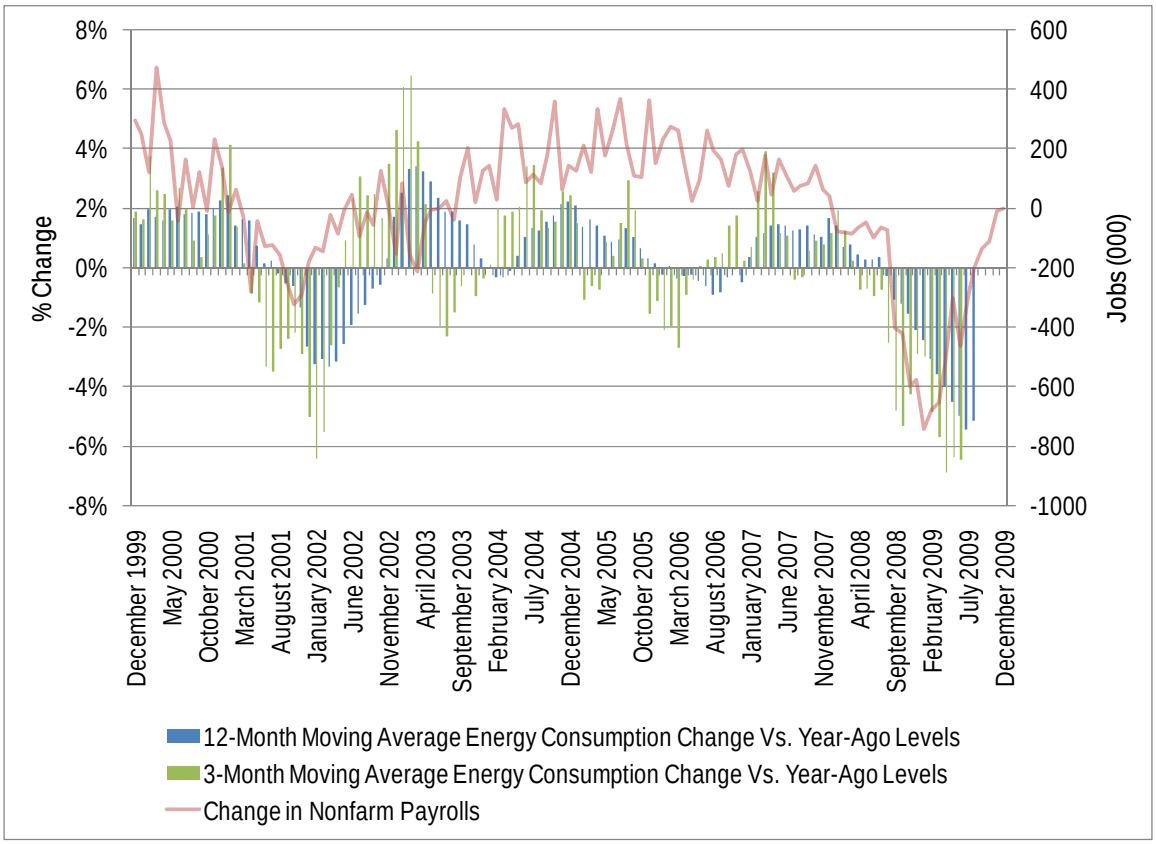
3. Constructing Economic Scenarios

Economic growth is usually the primary driver of energy demand. Industrialized economies tend to use more energy as they grow, and the pace of global energy demand growth typically corresponds to the economic well-being of energy end-users.

Government and private economists make regular forecasts of growth, but it is impossible to be sure what the future holds. As a result, most market assessments project end-user demand levels under different **scenarios.** Market assessments usually look back between five and ten years and often define low, medium and high growth scenarios as the historical minimum, maximum and average growth rates, respectively, that occurred during that prior period.

A cursory model of the relationship between energy demand and economic indicators can be constructed by preparing a **consumption function** based on historical relationships between demand data and economic indicators. This is usually done using a spreadsheet application like Microsoft Excel.

Figure 8 – Macroeconomic Factors in Demand: Total U.S. Energy Demand vs. Seasonally-Adjusted Nonfarm Payrolls



Source: ClearView Energy Partners, LLC, using BLS and DOE data

By running different growth scenarios through the consumption function, Tribes will be able to obtain high-level, preliminary projections of future demand (with the *caveat* that these projections are built upon the assumption that historical relationships will apply in the future). This method of analysis is only useful when a statistically-valid relationship exists between historical energy demand and the economic indicators in question.

Common economic indicators and statistics that can form the basis of a consumption function are readily available (project-specific sources of demand data are provided below).

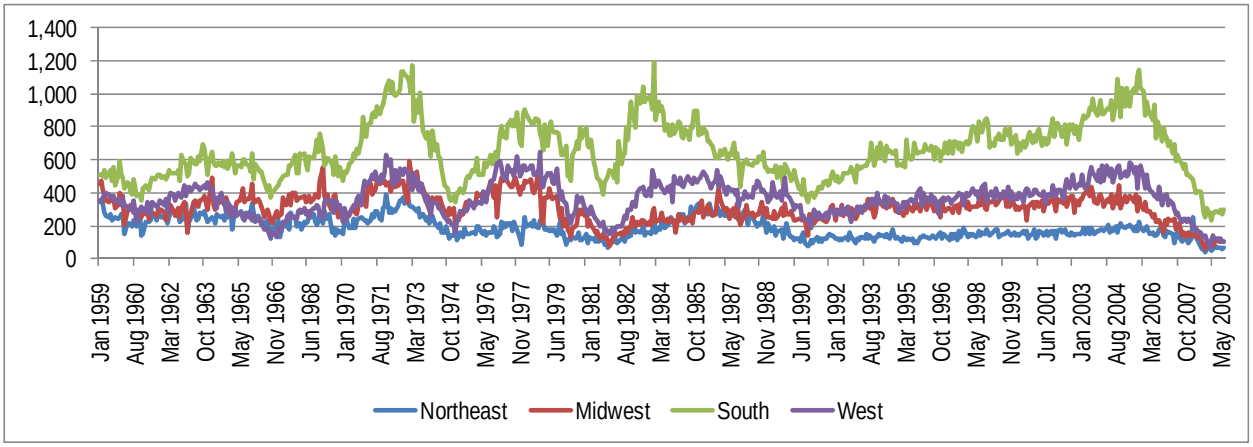
U.S. national and State economic statistics are available from many U.S. government sources.

- The U.S. Bureau of Economic Analysis (BEA) provides current and real (inflation-adjusted) gross domestic product (GDP) data on its website at http://www.bea.gov/national/xls/gdplev.xls. GDP data are available on a state and metropolitan level at http://www.bea.gov/regional/index.htm#gsp. Industry-specific data are available at http://www.bea.gov/industry/gdpbyind_data.htm.

- The U.S. Department of Labor's Bureau of Labor Statistics (BLS) provides national unemployment data on its website at http://www.bls.gov/bls/unemployment.htm and the U.S. consumer price index (CPI, a measure of national and metropolitan-area inflation) at http://www.bls.gov/cpi/#data. BLS publishes national and local nonfarm payrolls (job creation/loss) data at http://www.bls.gov/ces/#data and specific state- and metropolitan-area data at http://www.bls.gov/sae/.

Although it is best known for population and demographic data, the U.S. Census Bureau compiles and publishes economic statistics likely to be predictive of national and regional energy demand, especially monthly data regarding manufacturer's shipments, inventories and orders at http://www.census.gov/manufacturing/m3/. Tribes may also wish to consider is the advance monthly sales for retail and food services, at http://www.census.gov/retail/, another key indicator of economic activity.

Figure 9 – Regional Economic Factors in Demand: Seasonally-Adjusted Housing Starts, Monthly by Region, 1959-2009



Source: ClearView Energy Partners, LLC, using Census data

International economic statistics are available from several U.S. and U.N.-related sources.

- The International Monetary Fund's (IMF) *World Economic Outlook* database provides GDP and population data, both at a country level and on an aggregated basis at http://imf.org/external/ns/cs.aspx?id=28.
- The BEA also provides balance of trade data, a good measure of U.S. economic strength as an exporter, at http://www.bea.gov/agency/uguide1.htm#_1_19.

Demographic changes are also important. What will happen to energy demand if state or regional population increases? How might changes in home ownership or construction alter expectations of end-user behavior? How could increases or decreases in disposable income influence discretionary energy consumption?

The U.S. Census Bureau provides a comprehensive source of U.S. demographic data.

- Population data at national, regional, state and local levels are available at http://factfinder.census.gov/servlet/SAFFPopulation.
- Household income data are available on a national and state level at http://www.census.gov/hhes/www/income/statemedfaminc.html. Small-area

income and poverty estimate data are available at http://www.census.gov/did/www/saipe/index.html.

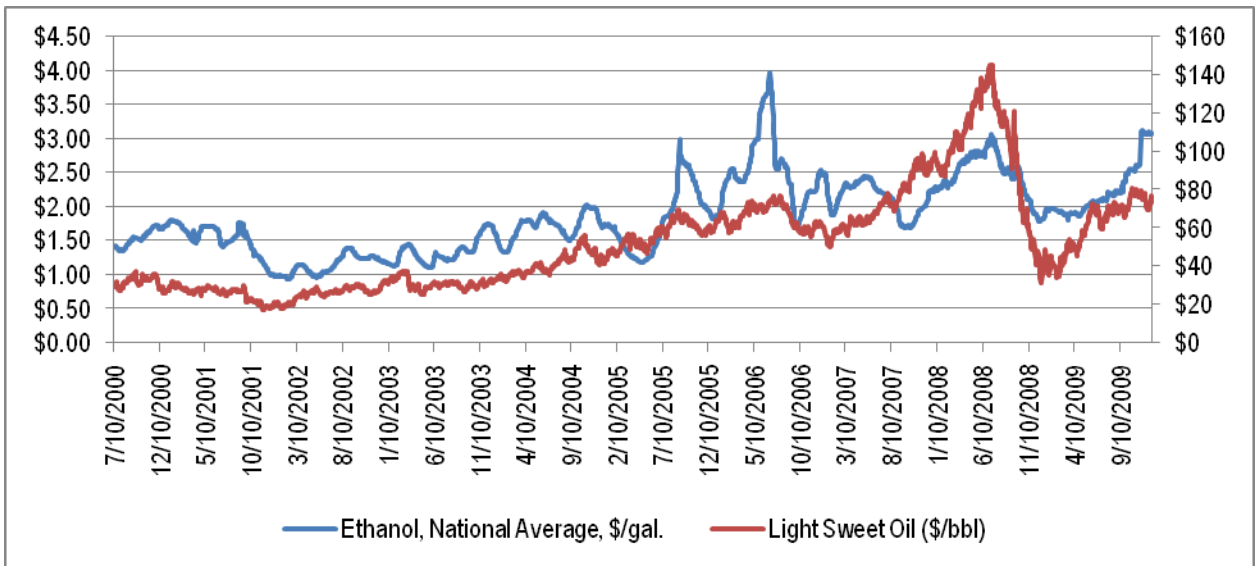
- Homebuilding and home ownership trends usually correlate closely to energy demand changes. Total housing units by state and county are available at http://www.census.gov/popest/housing/housing.html. There are different measures of home ownership available. New home sales data are presented at http://www.census.gov/const/www/newressalesindex.html. Housing vacancy rates are presented at http://www.census.gov/hhes/www/housing/hvs/.

- Construction activity also correlates with energy demand. State-level building permit data are presented at http://censtats.census.gov/bldg/bldgprmt.shtml, and new home construction data (also known as "housing starts") are presented at http://www.census.gov/const/newresconst.pdf.

4. Assessing Global Dynamics

Global energy demand influences the profitability of all energy projects, but global dynamics can disproportionately influence market conditions for non-renewable natural resources (e.g. oil, coal and natural gas). These resources typical travel on cargo ships between producer nations and destination markets, linking otherwise disconnected end-users together into a single marketplace.

Figure 10 – Global Linkages to Local Markets: U.S. Ethanol Price vs. Light Sweet Oil, Nominal Dollars



Source: ClearView Energy partners, LLC, using IEA, Bloomberg Data

By contrast, energy products like gasoline and electricity often travel shorter distances between the site where natural resources are converted into products and the destination markets where these finished products are sold. There are several reasons for this. First, specific products often require dedicated transportation infrastructure like pipelines and transmission lines. Second, infrastructure limitations can make it impossible, inefficient or prohibitively expensive to transport finished products over long distances.

Tribes preparing market assessments for natural resources extraction projects may wish to consider the following references:

- The U.S. EIA publishes an annual *International Energy Outlook* (IEO) that projects global demand 20 years into the future. The IEO provides U.S. and global demand projections for natural resources and finished products as well as different economic "cases" predicated on assumptions Tribes might choose to

incorporate into their market assessments. EIA's *Outlook* is available free of charge at: http://www.eia.doe.gov/oiaf/ieo/index.html.

- The International Energy Agency's (IEA) annual *World Energy Outlook* (WEO) presents global demand forecasts, including detailed country-specific projections based on prevailing local and global economic conditions. The WEO is available for sale at: http://www.worldenergyoutlook.org/.

BP publishes its annual *Statistical Review of World Energy,* which contains global and country-specific supply, demand and emissions data. The BP *Review* and an accompanying Microsoft Excel workbook are available for free on the company website at http://www.bp.com/productlanding.do?categoryId=6929&contentId=7044622.

Global demography can also play a role in domestic demand. The industrialization of fast-growing populations within developing countries generates new sources of demand, although the pace of energy demand growth can vary from region to region and depending on a nation's initial level of industrialization.

Industrialization does not always correlate positively with demand growth. Countries in the early stages of industrialization often exhibit rapid increases in energy demand. At the opposite extreme, many modern economies are becoming more energy-efficient every year.

By contrast, population growth usually increases energy demand at any level of economic development, especially for electric power demand: although wealthy end-users can maintain (or even improve) their lifestyles with smaller cars or public transit, a growing industrialized population usually requires an increased supply of modern amenities like space heating and cooling, lighting and labor-saving appliances.

These effects can offset one another. Today, small percentage reductions by the world's largest energy users can cause global energy demand to decline, despite the rapid growth of developing nations. In the future, developing-nation demand growth could overwhelm reductions by mature economies, but endlessly-rising demand is not the only possible outcome. The pace of developing nation demand could slow

considerably as these nations mature and become more efficient, particularly if they "leapfrog" directly into higher-efficiency technologies.

Tribes may wish to consult international statistical resources, including the following:

- The United Nations' (U.N.) *Energy Statistics Database,* at http://unstats.un.org/unsd/energy/edbase.htm, presents historical relationships between regarding international energy demand and demography. The U.N. *Energy Statistics Yearbook* presents latest-available data at http://unstats.un.org/unsd/energy/yearbook/default.htm.

- The IEA *World Energy Outlook* website presents formulas for determining approximate energy demand requirements in urban areas in the U.S. and abroad. These formulas, which require modest modeling skill, are available at http://www.worldenergyoutlook.org/docs/weo2008/WEO_2008_Energy_Use_in_Cities_Modelling.pdf.

5. Examining Government Policy

Energy production in the United States is highly-regulated. As set forth at length elsewhere in this Primer, tribal energy projects will be subject to regulation under Federal, State and tribal energy and environmental laws.

Trade Associations

Industry trade associations typically track relevant state and Federal issues that could impact production economics or end-user demand. These associations also provide data that can be useful for market analyses, although these data are typically sold to non-members. A few examples include:

- **Biomass power.** The Biomass Power Association (BPA) tracks relevant policy issues on its website at http://usabiomass.org/pages/gov.php.

- **Coal.** The National Mining Association (NMA) tracks relevant policy issues on its website at http://www.nma.org/issues/default.asp.

- **Crude oil.** The American Petroleum Institute (API) tracks relevant policy issues on its website at http://api.org/policy/.

- **Crude oil and products pipelines.** The Association of Oil Pipelines (AOPL) tracks relevant policy issues on its website http://www.aopl.org/policy/.

- **Electric utilities.** Several large, national associations represent electric utilities.

    i. The Edison Electric Institute (EEI) tracks policy issues relevant to investor-owned utilities on its website at http://www.eei.org/ourissues/Pages/default.aspx.

    ii. The National Rural Electric Cooperative Association (NRECA) tracks policy issues relevant to rural electric utilities on its website at http://www.nreca.org/PublicPolicy/issuespotlight.htm.

    iii. The American Public Power Association (APPA) tracks policy issues relevant to municipal electric utilities on its website at http://www.appanet.org/legislative/legreg.cfm?itemnumber=9673&navItemNumber=20942.

    iv. The Electric Power Supply Association (EPSA) tracks policy issues relevant to competitive or "merchant" generators on its website at http://www.epsa.org/positions/.

- **Ethanol.** The Renewable Fuels Association (RFA) tracks relevant policy issues on its website at http://www.ethanolrfa.org/policy/actions/.

- **Geothermal energy.** The Geothermal Energy Association (GEA) tracks policy issues on its website at http://www.geo-energy.org/publications/reports.asp.

- **Natural gas extraction.** Two primary natural gas trade associations are:

    i. The Natural Gas Supply Association (NGSA), which represents integrated oil companies and large independent producers, tracks relevant policy issues on its website at http://ngsa.org/issues/issues.asp.

    ii. The Independent Petroleum Association of America (IPAA), which represents largely gas-producing U.S. independent companies, tracks relevant policy issues on its website at http://ipaa.org/issues/index.php.

- **Natural gas pipelines.** The Interstate Natural Gas Association of America (INGAA) tracks issues related to pipeline safety and rate of return regulation. Links to relevant issues are available on its website at http://ingaa.org/.

- **Natural gas utilities.** The American Gas Association (AGA) tracks relevant policy issues on its website at http://www.aga.org/Legislative/issuesummaries/.

- **Nuclear power.** The Nuclear Energy Institute tracks relevant policy issues on its website at http://nei.org/publicpolicy/.

- **Petroleum refining.** The National Petrochemical Refiners Association (NPRA) tracks relevant policy issues on its website at http://npra.org/issues/.

- **Solar energy.** The Solar Energy Industries Association (SEIA) tracks relevant policy issues related to photovoltaic and thermal manufacturing and project development on its website. Federal issues are tracked at http://seia.org/cs/federal_issues, and state government issues are tracked at http://seia.org/cs/state_issues.

- **Wind energy.** The American Wind Energy Association (AWEA) tracks relevant policy issues on its website at http://awea.org/legislative/.

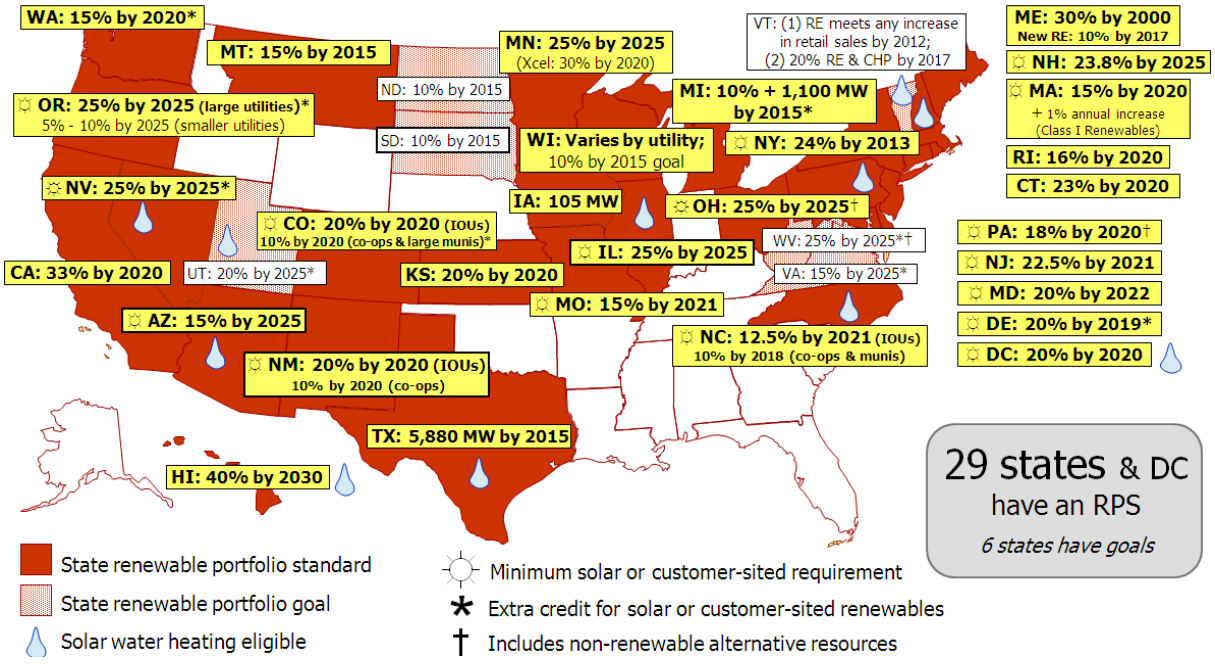
State Government Resources

State budgets can influence the profitability of tribal energy projects because all state governments (except Vermont) must balance their budgets. Budget shortfalls could lead to higher, or new, resource-related taxes. Conversely, budget surpluses can be applied to new energy subsidies. The National Association of State Budget Officers (NASBO) publishes its *Fiscal Survey of States, a* semi-annual assessment of State fiscal health, on its website at http://www.nasbo.org/publications.php#fss2007.

State-level renewable energy subsidies play an important role in the economics of tribal energy projects. The Database of State Incentives for Renewable Energy (DSIRE) lists current subsidies at http://www.dsireusa.org/index.cfm?EE=0&RE=1.

State-level climate change mitigation policies can create incentives for greenhouse gas (GHG) abatement projects and could potentially impose unanticipated costs on conventional energy facilities. The Pew Center on Global Climate Change maintains a list of state and regional programs at http://pewclimate.org/states-regions. Further, the 29 states with Renewable Energy Portfolio Standards have requirements either by legislation or regulation on energy suppliers to produce or purchase a set amount of renewable energy each year.

Figure 11 – State Renewable Electricity Portfolio Standards, as of January 2010



Source: Interstate Renewable Electricity Council, DSIRE

NOTE: A simple comparison of percentages is not effective because each state defines "renewable" in a different manner.

Associations of U.S. State governments also maintain policy resources and statistics. Several of these offer compendia of laws and policies that may be useful in defining market opportunities and limitations governing tribal projects, including:

- The Interstate Oil and Gas Compact Commission (IOGCC) is an association of state oil and gas regulators. The IOGCC sells a summary of state statutes and regulations on its website at http://iogcc.myshopify.com/collections/frontpage/products/summary-of-state-statutes-and-regulations-for-oil-and-gas-production-cd-rom-2007.

- The National Association of Regulatory Utility Commissioners (NARUC) represents state regulators of energy and transportation resources (as well as telecommunications and water). The NARUC website provides links to state regulatory bodies at http://www.naruc.org/commissions.cfm.

- The National Governors Association (NGA) website compiles reports of state-level energy and environmental policy initiatives and associated incentives and regulation at http://www.nga.org/portal/site/nga/menuitem.8274ad9c70a7bd616adcbeeb501010a0/.

- The National Conference of State Legislatures (NCSL) website prepares period reports of state-level energy and environmental policy initiatives and associated incentives and regulation at http://www.ncsl.org/Default.aspx?TabID=756&tabs=951,65,163#951.

Federal Government Resources

As discussed elsewhere in this Primer, **Federal regulatory agencies** administer existing national laws governing tribal energy projects. Key Federal regulators that could impact tribal projects include:

- The Environmental Protection Agency (EPA) enforces laws governing pollution, especially the Clean Air Act (CAA), Clean Water Act and Safe Drinking Water Act. Each of these, and others, may be relevant to tribal energy projects.

    i. Clean Air Act. EPA sets national ambient air quality standards (NAAQS) for "criteria pollutants" (http://epa.gov/air/criteria.html) and, most relevantly, imposes limitations on new projects in counties that have not attained those standards. "Non-attainment" areas are tabulated on the EPA website at http://www.epa.gov/air/oaqps/greenbk/.

    ii. Clean Water Act. EPA tracks regional compliance and water quality on its Enforcement & Compliance History Online (ECHO) system website at http://www.epa-echo.gov/echo/.

iii. Safe Drinking Water Act. The EPA's *Safe Drinking Water Information System* (SDWIS) maintains state-level enforcement and compliance data on its website at http://www.epa.gov/enviro/html/sdwis/sdwis_query.html.

Other Federal regulators with potential environmental and/or safety oversight of energy projects on tribal lands include:

- The independent Nuclear Regulatory Commission (NRC), http://nrc.gov, which regulates nuclear power facilities.
- The independent Federal Energy Regulatory Commission (FERC), http://ferc.gov, which regulates interstate pipelines, electric transmission and most hydropower licensing.
- The Army Corps of Engineers, http://www.usace.army.mil, which regulates some mining permits as well as certain projects affecting waters of the United States.
- The Department of Labor's Mining Safety and Health Administration (MSHA), http://www.msha.gov, which oversees mining safety.
- The Department of Interior's Bureau of Land Management (BLM), http://www.blm.gov, which oversees conventional and renewable energy production on public lands, among many other activities.
- The Department of Interior's Fish and Wildlife Service (FWS), http://www.fws.gov, which administers the Endangered Species Act and provides policy guidance related to coal, oil and gas, wind, and solar installations and other activities on public lands.
- The Department of Interior's Minerals Management Service (MMS), http://www.mms.gov, which among its responsibilities accounts for and disburses revenues associated with mineral leases on Indian and Federal lands.

- The Department of Interior's Office of Surface Mining (OSM), http://www.osm.gov, which regulates surface coal mining under the Surface Mining Control and Reclamation Act (SMCRA) and the surface effects of coal deep mining.

- The Department of Transportation's Pipeline Hazardous Materials Safety Administration (PHMSA), http://www.phmsa.dot.gov/, which regulates oil and gas pipelines.

Several Federal agencies also administer financial incentives programs for energy projects, including:

- The U.S. Department of Agriculture (USDA) administers several bioenergy and biofuels programs, including production subsidies and loan guarantees. These are summarized on the USDA website at http://energymatrix.usda.gov/.

- The U.S. Department of Energy (DOE) administers a loan guarantee program for innovative technologies (http://www.lgprogram.energy.gov/).

- DOE also oversees a broad range of incentives programs for energy efficiency and renewable energy under the American Recovery and Reinvestment Act of 2009 (ARRA), a list of which is presented at http://www.energy.gov/recovery/funding.htm.

The U.S. House and Senate is responsible for amending existing national laws and passing new laws that could impact tribal energy projects. Many legislative proposals are available on Congressional websites, for instance.

- The Senate Agriculture Committee oversees the U.S. Department of Agriculture, which provides financial incentives for biomass and biofuels projects. The Agriculture Committee also oversees the regulation of commodities markets. Legislation is available at http://ag.senate.gov/site/legislation.html. Legislation before the House Agriculture Committee, which has a similar portfolio of responsibilities, is available at http://ag.senate.gov/site/legislation.html.

- The Senate Commerce, Science and Transportation Committee oversees the U.S. Department of Transportation and shares in the oversight of highway and public infrastructure spending. Links to relevant legislation are available from the main Committee website at http://commerce.senate.gov.

- The Senate Energy and Natural Resources Committee oversees the Departments of Energy and Interior and the nation's independent energy regulators. This Committee plays a primary role in setting policies governing resource extraction. Relevant legislation is available at: http://energy.senate.gov/public/index.cfm?FuseAction=Legislation.Home.

- The Senate Environment and Public Works Committee (EPW) oversees the U.S. Environmental Protection Agency, the independent regulator of federal environmental laws. EPW also shares in the oversight of highway and public infrastructure spending. Legislation is available at: http://epw.senate.gov/public/index.cfm?FuseAction=Legislation.Home

- The Senate Indian Affairs Committee oversees most matters involving Indian Tribes, tribal lands, and energy and economic development on tribal lands. See http://indian.senate.gov

- The House Energy and Commerce Committee oversees energy and environmental policy, including the Department of Energy, the EPA and independent energy regulators, but does not oversee natural resources policy. Links to relevant legislation are available from the main Committee page at http://energycommerce.house.gov

- The House Natural Resources Committee oversees the Department of the Interior. There is no direct link to legislation from this Committee website, but bills referred to this Committee are available at the U.S. Library of Congress legislative search engine website, http://thomas.loc.gov

III. SPECIFIC SOURCES OF ENERGY

A. RENEWABLE FUELS AND POWER

- Biodiesel bio-refinery locations and market data are available from the National Biodiesel Board at http://www.biodiesel.org/buyingbiodiesel/plants/.
- Ethanol bio-refinery locations and market data are available from the RFA at http://www.ethanolrfa.org/industry/locations/.
- Biomass power plant locations are available from ORNL at http://cta.ornl.gov/bedb/biopower/Current_Biomass_Power_Plants.xls.
- Geothermal power market data are available from the GEA at http://www.geo-energy.org/publications/reports/US_Geothermal_Industry_Update_Sept_29_2009_Final.pdf.
- Solar power market data are available from the Interstate Renewable Energy Council (IREC) at http://www.irecusa.org/fileadmin/user_upload/NationalOutreachDocs/SolarTrendsReports/IREC_Solar_Market_Trends_Report_2008.pdf.
- Wind power market data are available from the AWEA at http://awea.org/projects/.

B. CRUDE OIL AND OIL PRODUCTS

Oil supplies about 95% of U.S. transportation energy, and gasoline demand accounts for approximately 50% of U.S. oil consumption.

High-level data regarding U.S. and international oil and oil products supply demand are available from many sources. Most of these resources are published monthly or annually.

- The International Energy Administration (IEA) publishes a free version of its monthly *Oil Market Report* on its website at http://omrpublic.iea.org/.

- The Organization of Petroleum Exporting Countries (OPEC) publishes monthly market reports and an annual *World Oil Outlook* on its website at http://www.opec.org.

- The American Petroleum Institute (API) publishes a monthly assessment of U.S. oil production on its website at http://www.api.org/statistics/.

- National Petroleum Refiners Association (NPRA) publishes annual assessments of U.S. refinery capacity and complexity on its website at http://www.npra.org/publications/statistics/.

- The Interstate Oil and Gas Compact Commission (IOGCC) publishes production data from U.S. marginal wells in its *Marginal Well Report,* available at http://iogcc.myshopify.com/collections/frontpage/products/2008-marginal-well-report.

- Drilling rig activity data are available on a weekly basis from the oilfield services company Baker Hughes on its website at http://investor.shareholder.com/bhi/rig_counts/rc_index.cfm.

- Monthly drilling data are also available from the Department of Energy's Energy Information Administration (EIA) at http://tonto.eia.doe.gov/dnav/ng/ng_enr_drill_s1_m.htm

Data concerning U.S. vehicles fleets and transportation infrastructure – critical enablers of end-user demand – are also available from multiple sources, including:

- The Department of Energy's Oak Ridge National Laboratory (ORNL) publishes its annual *Transportation Energy Book* at http://cta.ornl.gov/data/download28.shtml.

- The Department of Transportation's Federal Highway Administration (FHWA) publishes transportation infrastructure and vehicle use data on its website at http://www.fhwa.dot.gov/policyinformation/pubs/pl08021/index.cfm.

- The EPA publishes annual assessments of vehicle fuel economy on its website at http://epa.gov/otaq/fetrends.htm.

The EIA publishes lower-level supply and demand data for U.S. oil and oil products demand on its website. Key sources include:

- Weekly U.S. petroleum supply estimates, a gauge of market conditions, are available at http://tonto.eia.doe.gov/dnav/pet/pet_sum_sndw_dcus_nus_4.htm.
- Weekly U.S. refinery inputs, utilization and production, a key gauge of demand, at http://tonto.eia.doe.gov/dnav/pet/pet_pnp_wiup_dcu_nus_w.htm.
- Monthly U.S. import data, a key source of potential competition, at http://tonto.eia.doe.gov/dnav/pet/pet_move_impcus_d_NUS_Z00_mbbl_m.htm.
- Import data are also available on a per-company basis at http://www.eia.doe.gov/pub/oil_gas/petroleum/data_publications/company_level_imports/current/data/import.xls.
- Monthly finished products sales data are available on a State-level at http://tonto.eia.doe.gov/dnav/pet/pet_cons_prim_a_EPM0_P00_Mgalpd_m.htm.
- State-level crude oil production data are available on a monthly basis at http://tonto.eia.doe.gov/dnav/pet/pet_crd_crpdn_adc_mbbl_m.htm.
- Intra-U.S. movements of oil by rail, tanker and barge, a measure of localized demand variations, are available at http://tonto.eia.doe.gov/dnav/pet/pet_move_ptb_dc_R20-R10_mbbl_m.htm.

C. NATURAL GAS

Residential and commercial buildings consume about 37.5% of U.S. natural gas. Industrial demand and electric utilities account for about 31% apiece, although manufacturing demand has dropped and electric power demand has increased during

the past five years. About 20% of U.S. electric generation is fueled by natural gas, and this share has increased 6.5% during the past 15 years.

High-level EIA data regarding U.S. natural gas supply and demand includes:

- Weekly data concerning working natural gas in underground storage, an important indicator of supply-demand balances, are available at http://tonto.eia.doe.gov/dnav/ng/ng_stor_wkly_s1_w.htm.
- A comparative analysis of underground storage vis-à-vis prior years is available, also on a weekly basis, at http://www.eia.doe.gov/oil_gas/natural_gas/ngs/ngs.html.
- Monthly production data are available at http://tonto.eia.doe.gov/dnav/ng/ng_prod_sum_dcu_NUS_m.htm.
- Monthly consumption data, by end-use, are available at http://tonto.eia.doe.gov/dnav/ng/ng_cons_sum_dcu_nus_m.htm.
- Monthly import data by national point of origin are available at http://tonto.eia.doe.gov/dnav/ng/ng_move_poe1_a_EPG0_IRP_Mmcf_a.htm.

EIA also provides annual State-level supply, demand and transportation data:

- Production data, by state, are available at http://tonto.eia.doe.gov/dnav/ng/ng_prod_sum_a_EPG0_FGW_mmcf_a.htm.
- Inter-State and international movements of natural gas are available at http://tonto.eia.doe.gov/dnav/ng/ng_move_ist_a2dcu_nus_a.htm.
- State-level delivery data are available at http://tonto.eia.doe.gov/dnav/ng/ng_cons_pns_a_EPG0_VRP_pct_a.htm.

D. COAL

Coal supplies about 49% of U.S. electric power, a share that has fallen by about 2.5% during the past 15 years. In the aggregate, coal deliveries account for between 25% and 30% of freight rail cargoes.

EIA data regarding coal production include:

- Weekly production data, at http://www.eia.doe.gov/cneaf/coal/weekly/weekly_html/wcppage.html.
- Production and mine type, by State, at http://www.eia.doe.gov/cneaf/coal/page/acr/table1.html.
- Consumption and end-use, by State, at http://www.eia.doe.gov/cneaf/coal/page/acr/table26.htm.
- Import data, on a quarterly basis, at http://www.eia.doe.gov/cneaf/coal/quarterly/html/t19p01p1.html.
- Export data, on a quarterly basis, at http://www.eia.doe.gov/cneaf/coal/quarterly/html/t8p01p1.html.
- Databases regarding coal transportation and distribution, at http://www.eia.doe.gov/cneaf/coal/page/coaldistrib/coal_distributions.html.

In addition, National Mining Association (NMA) statistical publications are available only to NMA members at http://www.nma.org/statistics/stat_pubs.asp.

Environmental groups have increasingly opposed some types of coal mining and coal-fired power plants in recent years. Several information sources that may provide useful quantitative and anecdotal data include:

- SourceWatch, which maintains a database of coal-fired power plant cancellations at http://www.sourcewatch.org/index.php?title=Coal_plant_cancellations.

- The Army Corps of Engineers website provides a comprehensive list of all permits issued, at http://www.nao.usace.army.mil/technical%20services/Regulatory%20branch/PN/Issued.asp.

E. ELECTRIC POWER

Public utility commissions in all 50 States and the District of Columbia oversee rates and project approvals for the regulated power utilities that generate about 85% of the nation's electricity. The remainder comes from merchant, municipal and cooperative providers.

EIA data regarding power generation, transmission and consumption include:

- Power sales by end-use, at http://www.eia.doe.gov/cneaf/electricity/epm/table5_1.html.
- Power generation, by state, by end-use segment, at http://www.eia.doe.gov/cneaf/electricity/epm/table1_6_a.html.
- Comprehensive databases regarding electric generation and fuel use, at http://www.eia.doe.gov/cneaf/electricity/page/eia906_920.html.
- Fuel use and generation by fuel type, a useful mechanism for considering fuel-use and fuel switching trends within one or several geographic markets, at http://www.eia.doe.gov/cneaf/electricity/epa/consumption_state.xls.
- Grid capacity by Electric Reliability Council region, an indicator of congestion and transmission availability, at http://www.eia.doe.gov/cneaf/electricity/epa/epat3p2.html.
- Wholesale market data, by hub at http://www.eia.doe.gov/cneaf/electricity/wholesale/wholesale.html.

The Federal Energy Regulatory Commission (FERC) provides high-level and detailed generation and transmission data, including:

- The *Power Market Overview,* at http://www.ferc.gov/market-oversight/mkt-electric/overview.asp.
- *Market Snapshots,* on a national and regional basis, at http://www.ferc.gov/market-oversight/mkt-snp-sht/mkt-snp-sht.asp.
- Periodic market assessments, at http://www.ferc.gov/market-oversight/reports-analyses/overview.asp.

The National Energy Reliability Council (NERC) also provides generation and transmission data, including:

- The *Generating Availability Data System,* at http://www.nerc.com/page.php?cid=4|43.
- The Transmission Availability Data System, at *http://www.nerc.com/page.php?cid=4|62*.

NERC sells its *Electricity Supply and Demand Forecast* on its website for $5,000 at http://www.nerc.com/page.php?cid=4|38.

Real-time grid status data are available from the ISO/RTO Council, collaboration among the ten North American Independent System Operators (ISO) and Regional Transmission Organizations (RTO) that serve about two-thirds of U.S. electric customers. Status data are available on the ISO/RTO Council homepage at http://www.isorto.org.

Links to individual ISO and RTO members are available from the Members page at http://www.isorto.org/site/c.jhKQIZPBImE/b.2604455/k.C323/Members.htm.

F. GREENHOUSE GASES

Though a number of greenhouse gases, (GHG), are regulated in the United States under a variety of other regulatory regimes, the Federal government has recently found that specific greenhouse gases, including carbon-dioxide, endanger human health.

The Environmental Protection Agency (EPA) has initiated a regulatory process governing GHG emissions from vehicle tailpipes, and EPA recently issued draft regulations on that issue as well. It seems clear that broader regulation of GHG emissions from stationary emissions sources, including some tribal energy projects, should be anticipated. In addition, the current Congress also has proposed laws that would require domestic emitters to conform to an annually-declining, national GHG emissions cap, but offer emitters two ways to meet their requirements: either by reducing their emissions, or by redeeming emissions permits purchased from the Federal government or via open trade on a carbon market.

GHG regulation has two implications. First, assessments of tribal projects that will release GHG should incorporate the possible cost of emissions permits that may be required under EPA regulation or a new law. Second, tribal projects that reduce or eliminate existing GHG emissions should consider incorporating the income that could be generated by selling “offset credits” from these emission reductions to other regulated emitters. In negotiating any joint development or power sales agreements with customers, Tribes should pay special attention any discussion of GHG credits or renewable energy credits (RECs) and strive to maintain control of these credits.

Price forecasts are highly subjective due to the considerable uncertainty regarding the inclusiveness and stringency of pending U.S. actions.

- Voluntary carbon trading in the U.S. occurs principally on the Chicago Climate Exchange (CCX), the nation’s first voluntary market. Price data for CCX contracts are available for free on the CCX website: http://www.chicagoclimatex.com/.

By the same token, data from U.S. “voluntary” markets may be poor proxies for realistic compliance costs. Buyers and sellers of credits within voluntary programs usually apply deep discounts to credit prices to compensate for the risk the credits may not be admissible for compliance. As a result, price data from mandatory programs overseas may offer better proxies U.S. costs.

- The European Union (E.U.) Emissions Trading Scheme (ETS), the most robust overseas carbon market, posts its transaction log online at http://ec.europa.eu/environment/ets/transaction.do?languageCode=en.

- The European Carbon Exchange posts futures prices for E.U. ETS allowances (EUA) and Kyoto Clean Development Mechanism offsets (CER) on its website at http://www.ecx.eu/.

Markets in countries governed by national cap-and-trade programs are growing fast but remain thinly-traded, immature and fragmented. Many transactions occur on an “over-the-counter” (OTC) basis between private parties instead of trading on an exchange like an electricity futures contract. Private consulting firms and market makers are often best-positioned to share price data gathered through transactions they initiate, facilitate or observe.

- Point Carbon, a private consulting firm, posts its proprietary OTC price index on its website at http://www.pointcarbon.com.

  ICF International, a private consulting firm, sells its 2008-2012 carbon price forecast on its website at http://www.icfi.com/markets/energy/marketing/carbon-forecast.asp.

ASSESSING THE TYPES OF BUSINESS STRUCTURES TO USE FOR A TRIBAL ENERGY PROJECT

I. INTRODUCTION and BACKGROUND

This chapter analyzes the various business structures that Indian Tribes and their energy industry partners may utilize to develop and operate a particular energy project. It also identifies certain advantages and disadvantages of each different business structure, including possible tax consequences and the impact on the Tribe's sovereign immunity. Finally, this chapter examines key contract issues that arise when Tribes enter into business arrangements with private entities, including waivers of sovereign immunity, dispute resolution and choice of law issues.[110]

The uniqueness of each project (including the specific type of energy project at issue), the needs and preferences of the Tribe, the needs of the Tribe relative to the project (for example, expertise in the industry or financing requirements) etc, all tend to play a role in the selection of the appropriate business structures. Also, the development of a tribal energy project typically involves evaluating and selecting appropriate business structures at two different stages or levels – first, at the tribal level (what tribal entity will be used to pursue the project?) and the joint venture level (what entity will the tribal entity and its non-tribal partner utilize to jointly develop and operate the project?). Although many of the same factors are present at each level, the latter involves unique sovereign immunity and tax considerations, especially when tax credits are available as in the area of renewable energy projects, which are more fully discussed in the chapter on Financing, elsewhere in this Primer.

[110] Nothing in this chapter is intended to be nor is it legal advice on the matters discussed. It is provided for the purpose of raising, in general terms, the types of considerations that may apply to any given scenario. It is important that Tribes obtain legal advice in connection with structuring appropriate business and related tax matters.

Although there are several resources available to assist a Tribe in evaluating and selecting business structures, an excellent resource is the Tribal Business Structure Handbook, Karen Atkinson and Kathleen Nilles (2008 Edition), available at http://apps2.irs.gov/pub/irs-tege/tribal_business_structure_handbook.pdf (lasted visited on Mar. 25, 2010).

Background on Sovereign Immunity and Federal Tax Status

Two important issues that are significant factors in determining the preferable structure to utilize to pursue an energy project are Federal tax consequences and the impact on a Tribe's or tribal entity's sovereign immunity. As discussed below, although a Tribe is both immune from suit because it possesses sovereign immunity and is not subject to federal income tax, not all business structures that Tribes may establish are similarly immune from suit or exempt from Federal income tax.

A. **Sovereign Immunity**

Indian Tribes possess immunity from suit and cannot be sued unless they or the United States Congress expressly and unequivocally waives their immunity.[111] The historic purpose of sovereign immunity is to protect the tribal treasury.[112] As such, many Tribes organize their businesses in a manner that ensures that the entity will share in the Tribe's immunity from suit. It is clear that Tribes and unincorporated divisions of Tribes possess sovereign immunity, even for commercial activities they engage in off-reservation. However, a business entity that is wholly owned by a Tribe and organized as a separate legal entity pursuant to tribal law may or may not possess sovereign immunity depending upon a number of factors discussed below.[113] Further, a business entity formed under state law will most likely not possess sovereign immunity from suit, as discussed below.

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[111] *Santa Clara Pueblo v. Martinez*, 436 U.S. 49 (1978); *Okla. Tax Comm'n v. Citizen Band of Potawatomi Indian Tribe*, 498 U.S. 505, 511 (1991); *Kiowa Tribe v. Mfg. Technologies, Inc.*, 523 U.S. 751 (1998).
[112] *Allen v. Gold Country Casino*, 464 F.3d 1044 (9th Cir. 2006) (citing *Alden v. Maine*, 527 U.S. 706 (1999)).
[113] Although it is not independently controlling, if a Tribe intends for a wholly owned tribal law corporation to share in the Tribe's immunity, the entity's articles of incorporation or charter should affirmatively state that the entity shares in all of the privileges and immunities of the Tribe, including immunity from suit.

When Tribes partner or otherwise enter into business arrangements with companies on economic development projects, it is typical that the non-tribal entity will request, if not insist, that the Tribe (or tribal entity) waive its immunity from suit in order for the non-tribal entity to be able to enforce its contractual rights. Accordingly, most Tribes provide a limited waiver of their immunity in order to provide meaningful dispute resolution and to allow the joint venture arrangement to go forward.

B. **Federal Tax Status**

A Tribe is considered a non-taxable entity and therefore does not pay Federal tax on its income, regardless of whether that income is generated on or off reservation.[114] Similarly, an unincorporated instrumentality, division or agency of a Tribe that is not established as a separate legal entity is not subject to Federal income tax.[115] A corporation organized under Section 17 of the Indian Reorganization Act[116], or Section 3 of the Oklahoma Indian Welfare Act[117], similarly is not subject to Federal income tax.[118] Generally, a political subdivision of a Tribe, such as a gaming commission or energy development or utility authority that is organized as a governmental entity generally is not subject to Federal income tax and may be treated as a qualifying political subdivision of a Tribe for purposes of the Indian Tribal Government Tax Status Act[119] if that entity has been delegated substantial governmental authority, such as the power to tax, regulate or police, or is otherwise deemed to be a division of the Tribe.[120]

The Federal tax treatment of a tribal law corporation that is wholly owned by a Tribe is uncertain. As discussed below, in examining the issue in the past, the IRS generally has applied an "integral part" test and has concluded that if the entity is an integral part of the Tribe, it is not subject to federal income tax. The Federal income tax treatment of

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[114] Rev. Rul. 67-284, 1967-2 C.B. 55 (Indian Tribes are not taxable entities).
[115] *Id.*
[116] 25 U.S.C. § 477 (2006).
[117] 25 U.S.C. § 503 (2006).
[118] *Id.; see also* IRS Indian Tribal Governments FAQ #2, http://www.irs.gov/govt/tribes/article/0,,id=179712,00.html (last visited Mar. 25, 2010).
[119] 26 U.S.C. § 7871 (2006).
[120] Id.; see also H.R. conf. Rep. No 97-984, at 15 (1982), 1983-1 CB 522.

a State chartered tribal corporation is clear – it is subject to Federal income tax.[121] However, as discussed below, a state law tribal limited liability company or trial limited liability partnership, may receive favorable tax treatment.

II. TRIBAL BUSINESS STRUCTURE

When a Tribe decides to pursue the development of an energy project, it also must decide what type of business entity it will utilize to pursue the particular project or business operation. This decision will involve and be influenced by a number of factors, including: the Tribe's past experiences, preferences, successes or failures with previously utilized business structures; tax consequences; impacts on tribal sovereign immunity; and the level of involvement by the Tribe's governing body in the operation of the entity and the business. To some degree, these factors are intertwined and overlap.

This section examines the following different types of business structures available to the Tribe for an energy development project: (a) Tribal government directly or an instrumentality, division or agency of the Tribe that is not a separate legal entity; (b) Quasi-separate political subdivision of the Tribe; (c) Tribal law corporation that is a separate legal entity; (d) Section 17 corporation, and (f) State law corporation. Some of the advantages and disadvantages of each structure and tax consequences and sovereign immunity implications are also discussed.

When considering the preferred business structure, the Tribe should also keep in mind the overall needs of any joint venture partner. If the Tribe understands what an entity considering investing in Indian Country will be taking into account, the Tribe may attract better quality partners. Thus, potential partners or financier will consider three main risk factors, recited elsewhere in this Primer, when investing in Indian energy projects: (1) efficiency – can the project move forward with little wasted time or resources, (2) predictability – will the favorable conditions which attract the investor to the project in

[121] Rev. Rul. 94-16, 1994-1 C.B. 19.

the first place remain throughout the life of the project, and (3) enforceability- can the terms of the project agreements be reliably enforced in a mutually agreeable forum.[122]

A. Tribal Government Itself, Instrumentality, Agency or Other Unincorporated Entity of the Tribe

Many Tribes pursue and operate business activities without creating a separate legal entity (such as a corporation), or establishing a semi-autonomous political subdivision (such as an economic development authority). Rather, the Tribe simply engages in the business activity in the Tribe's name through the Tribe's governing body, such as the Tribal Council or Business Committee, or through an unincorporated arm or instrumentality of the Tribe. There are certain advantages and disadvantages to this approach.

One advantage of this approach is that the tribal council structure is already in place and no time is required to create a separate entity. Similarly, it takes very little or time to form the tribal instrumentality, which is typically formed by resolution of the Tribe's governing body, and no time if the entity has already been established.

Other advantages include the preservation of tribal sovereign immunity (to the extent not expressly and duly waived by the entity or the Tribe) and favorable Federal income tax treatment. As discussed above, Tribes generally are immune from suit, even in their commercial capacities and even for off-reservation projects. Since an instrumentality is not organized as a separate legal entity, it shares in the Tribe's privileges and immunities, including immunity from suit. Also, the Tribe and unincorporated instrumentalities or agencies of the Tribe that are not organized as separate legal entities should not be subject to Federal income tax.[123]

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[122] *See* Williams, *supra* note 104, wherein the author states that "to secure quality partners and investors, the ability to meet these basic external business requirements should be balanced with tribal preferences for internal structure."

[123] Rev. Rul. 67-24, 1967-1 C.B. 75; Rev. Rul. 94-16, 1994-1 C.B. 19. However, as noted in Atkinson & Nilles, there is no per se exemption from Federal income tax for a tribal instrumentality and in order to be considered a non-taxable entity, the instrumentality generally must be operating as an arm of the tribe and not organized as a separate legal entity, unless the instrumentality otherwise qualifies as and is

One of the most significant disadvantages with this approach is that there is no clear separation between politics and business. Research suggests that a key factor in the success of a tribal enterprise is its "freedom from political interference."[124] Absent this separation, economic decisions may be driven by political considerations and not sound business objectives. As such, the entity's business pursuits may prove to be unsuccessful. On a practical level, this approach may prove burdensome and may hinder the pace of the project, especially if day to day business decisions must be approved by the Tribe's governing body. Moreover, potential business partners may be reluctant to do business directly with a Tribe's governing body and may prefer dealing with an entity that is separated and shielded from political matters.

Another disadvantage of a Tribe engaging in energy development projects without creating a separate legal entity is that it may be very difficult, if not impossible, to separate the assets and liabilities of the instrumentality from those of the Tribe. Since there is no separate legal entity, creditors may have recourse to tribal assets unrelated to the particular business of the instrumentality.

B. **Separate Political Subdivision of Tribe**

Many Tribes opt to pursue economic development, including energy projects, through distinct, quasi-autonomous political subdivisions of the Tribe. Although these entities are typically closely connected to and ultimately controlled by the Tribe, they are distinct entities that generally enjoy a semi-autonomous existence. Tribal political subdivisions typically carry out various governmental purposes and provide governmental services, such as economic development and energy development and regulation.

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deemed an integral part of the tribe. *See* Karen J. Atkinson & Kathleen Nilles, DOI Office of Indian Energy & Econ. Dev., *Tribal Business Structure Handbook* II-5 III-6 (2008 edition) available at http://apps2.irs.gov/pub/irs-tege/tribal_business_structure_handbook.pdf (lasted visited on Mar. 25, 2010).

[124] *See* Miriam Jorgensen & Jonathan Taylor, The Harvard Project on Am. Indian Econ. Dev., *What Determines Indian Economic Success?*, available at http://www.hks.harvard.edu/hpaied/pubs/documents/WhatDeterminesIndianEconomicSuccess.pdf (last visited Mar. 25, 2010).

- Example: Diné Power Authority - Diné Power Authority was established in 1985 as an enterprise by the Navajo Nation Council to promote the Navajo Nation's development of energy resources. 21 Navajo Nation Code § 201. Currently, Diné Power Authority is working with Sithe Global Power, LLC to develop the coal-fired Desert Rock Energy Project in Northwestern New Mexico and have other solar projects as well.

- Example: Red Willow Gas Corp. of the Southern Ute – Red Willow is the oil and gas production business of the Southern Ute Indian Tribe. It has approximately 80 tribal and non-tribal employees working in offices located in Ignacio, Colorado and Houston, Texas and operates wells in New Mexico, Colorado and Texas, along with interests in non-operated properties in Colorado, New Mexico, Texas, the Gulf of Mexico and Alberta Canada. See http:www.rwpc.us

There are several advantages associated with conducting business through a tribal political subdivision. Under current IRS practice, income earned by a tribal political subdivision is not subject to Federal income tax, as long as the subdivision has been delegated substantial governmental powers.[125] In a 2006 Private Letter Ruling, the IRS ruled that a tribal economic development authority that was established as a political subdivision, authorized to exercise governmental power over certain new and existing tribal businesses, and delegated certain governmental powers by the tribal governing body, was not subject to Federal income tax.[126]

Tribal political subdivisions have generally been held to possess sovereign immunity.[127] The document creating the political subdivision, whether it is an ordinance or charter, typically affirmatively states that as a political division of the Tribe, the entity possesses all of the privileges and immunities of the Tribe. The document should also clarify the manner in which the subdivision may waive its immunity from suit and whether such a waiver requires the approval of the Tribe's governing body.

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[125] *See* Atkinson & Nilles, *supra* note 123, at II-16.
[126] I.R.S. P.L.R. 200635002 (Sept. 1, 2006).
[127] *Ninigret Dev. Corp. v. Narragansett Indian Wetuomuck Hous. Auth.*, 207 F.3d 21 (1st Cir. 2000); *Hagen v. Sisseton-Wahpeton Comy. Coll.*, 205 F.3d 1040, 1043 (8th Cir. 2000).

Another advantage of this approach is that the subdivision may be structured as a holding company for subordinate business entities that have a similar purpose. For example, several Tribes have organized all, or virtually all, of their economic enterprises under a single political subdivision – a structure that lends itself well to consistency and centralized management.

Also, a political subdivision that has been delegated one or more sovereign powers and recognized as a political subdivision by the Department of the Interior, will qualify as a political subdivision under the Tribal Government Tax Status Act.[128] Accordingly, this presents an advantage and allows the entity to be treated as State for certain tax purposes, including issuing tax exempt bonds for essential governmental purposes.

Although a political subdivision that has been delegated substantial governmental purposes will likely qualify as such under the Tribal Government Tax Status Act, the IRS has specified a particular qualification and Federal approval process that an entity must undergo before it is deemed to qualify as a political subdivision.[129] Unfortunately, this process may take up to six months.[130]

Another disadvantage of doing business through a political subdivision is that, depending upon its structure and the level of interaction between the tribal governing body and the entity's governing body, there may be insufficient separation between politics and business. However, this easily can be addressed by significantly limiting the Tribal Council's role in the operations of the subdivision and clarifying in the document creating the subdivision that the entity's governing body is responsible for the day to day operations of the entity.

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[128] *See* Rev. Proc. 84-37, 1984-1 C.B. 513 (identifies procedures for a tribe to obtain recognition of a tribal entity as a political subdivision); Atkinson & Nilles, *supra* note 123, at II-15.
[129] Rev. Proc. 84-37, 1984-1 C.B. 513.
[130] *See* Atkinson & Nilles, *supra* note 123, at II-18.

C. **Tribal Law Corporation**

Tribes may establish under tribal law, wholly owned corporations to pursue and operate economic development projects and businesses, including energy. Although recommended, Tribes are not required to enact a corporate code before creating a tribal law corporation. Generally, a tribal law corporation is established by a resolution of the Tribe's governing body that formally approves the corporation's articles of incorporation. Typical articles of incorporation of a tribally-owned tribal law corporation include the following: identification of the corporation's purposes, duration, identification of the Tribe as the sole shareholder, creation of a board of directors, statement of powers, identification of actions that require approval of the Tribe's governing body, statement that the corporation shares in the privileges and immunities of the Tribe, and clarification that the corporation's assets are separate from and do not include assets of the Tribe.

One advantage of utilizing a tribal law corporation is that the corporation typically is structured in a manner that ensures sufficient separation from the Tribe's governing body to allow the corporation to make sound business decisions that are not influenced by political considerations. Although the governing body of the Tribe will likely have some oversight role and typically has ultimate control over the entity by virtue of its ownership, the corporation can pursue economic activities and make business decisions on its own in a timely manner without having to continuously go back to the tribal council for approvals. Most non-tribal partners are familiar with a corporate structure and may prefer it over doing business directly with the Tribe's governing body.

Another advantage of a corporate structure is that the assets of the corporation are separate from the assets of the Tribe. This allows the Tribe to minimize its potential liabilities and financial risk because if properly structured, the assets of the Tribe will be protected and creditors will have recourse only to the assets of the corporation.

The key disadvantages associated with structuring a tribal energy project or business as a tribal law corporation is the uncertainties with respect to the corporation's Federal tax status and its sovereign immunity. We examine each of these issues below.

1. **Sovereign Immunity**.

Several courts have examined whether sovereign immunity applied to wholly owned, separate tribal business entities and have reached differing conclusions. In examining whether a wholly-owned tribal entity possessed sovereign immunity from suits, courts have generally identified and applied the following factors:

- Whether the entity operates as an arm of the tribal government and serves a governmental purpose;
- Whether the Tribe and the tribal entity are closely allied and connected as evidenced by tribal control and governance over the entity (e.g., tribal control to dissolve entity, appoint and remove entity's governing body, and to direct entity's operations);
- Whether the Tribe will receive the entity's profits;
- Whether the entity's governing body is comprised mainly of tribal officials;
- Whether Federal Indian law policies intended to promote tribal self-determination would be furthered by extending immunity to the entity;
- Whether the entity holds title to property in its own name;
- Whether the entity is legally separate and distinct from the Tribe;
- Whether a judgment against the tribal entity will reach the Tribe's assets;
- Whether the entity is organized under the Tribe's laws rather than Federal or State law; and
- Whether the tribal entity has the power to bind the Tribe's assets or to obligate tribal funds.

Of these factors, perhaps the three most important are the related factors of (1) whether the entity in effect operates as an arm of the Tribe serving a governmental purpose, (2) whether the entity is closely controlled by the governing body of the Tribe, and (3) whether the Tribe receives the entity's profits. The closer the relationship between the Tribe and the entity, as evidenced by tribal control of the entity's board of directors (including power to appoint and remove board members), finances, and operations, including the power to dissolve the entity, the more likely a court will conclude that the entity shares in the Tribe's immunity. Conversely, the farther removed and less connected the entity is from the Tribe's control and governance, the more likely a court will conclude that the entity does not share in the Tribe's immunity.

2. Federal Income Tax Status.

As mentioned above, the Federal income tax status of a tribal law corporation that is wholly owned by a Tribe is uncertain. According to the IRS:

> "The tax status of corporations chartered under tribal law and owned 100% by the Tribe is not clear. A revenue ruling is anticipated to address this issue. The revenue ruling will limit its consideration to those entities that are 100% owned by the Tribe under whose law they are formed. In the meantime, it is recommended that tribal governments adopt one of the incorporation methods whose tax consequences are clear. See Rev. Rul. 94-65."[131]

Despite its assurances to do so, the IRS has yet to issue formal guidance on this issue. In private letter rulings on the subject issued in the past,[132] the IRS has applied an "integral part" analysis to determine whether a tribal law corporation wholly owned by a Tribe is subject to Federal income tax. If the IRS determined that the corporation was an integral part of the Tribe, it concluded that the corporation was not subject to Federal income tax.

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[131] I.R.S I.R.M § 4.88.1.4(6)(B) (June 1, 2006; *See also* IRS website on Indian Tribal Governments FAQ: "This issue is currently under review by IRS Counsel and guidance will be issued in the near future," http://www.irs.ustreas.gov/govt/tribes/article/0,,id=179712,00.html (last visited Mar. 25, 2010)
[132] The IRS is no longer issuing private letter rulings on the subject.

The IRS has cited to the following factors when applying the "integral part" analysis:

- Whether the government has the authority to terminate the existence of the entity;
- Whether the government or a governmental body elects members to the entity's board;
- Whether the government has the power to recall or remove the members of the entity's board;
- Whether the government has made a significant financial commitment (or transferred significant property) to the entity;
- Whether the government has a substantial right to the profits earned by the entity;
- Whether the government is liable for acts of the entity; and
- Whether the entity is essentially an operating unit or agency of the government.[133]

In past private letter rulings that directly address the issue of the tax status of wholly owned tribal law corporations, the IRS has focused on two key factors that must be shown in order for the corporation to be considered an integral part of the Tribe, and therefore, non-taxable: (a) control by the tribal government over the corporation, and (b) the financial commitment the Tribe has made to the corporation.[134]

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[133] *See* Atkinson and Nilles, *supra* note 123, citing *Florida Residential Property and Casualty Joint Underwriting Association v. United States*, 207 F. Supp.2d 1344, 1349 (N.D. Fla. 2002); Rev. Rul. 87-2, 1987-2 C.B. 18; Rev. Rul. 71-131, 1971-2 C.B. 28; Rev. Rul. 71-132, 1971-1 C.B. 29.

[134] For example, in a Private Letter Ruling issued March 23, 2001, the IRS examined whether a tribally-chartered authority established for the purpose of developing, constructing and operating a gaming enterprise, was an integral part of the tribe and therefore, not subject to federal income tax. The financial commitment of the tribe to the authority and the tribe's control over the authority, were key factors in the determination that the authority was an integral part of the tribe: "Accordingly, after considering the financial commitment that Tribe has made to Authority and the degree of control exercised over Authority by Tribe, we conclude that Authority is an integral part of Tribe." I.R.S. P.L.R. 200112013 (Mar. 23, 2001). Similarly, in a Private Letter Ruling issued February 27, 2004, the IRS examined whether a wholly owned corporation chartered under laws of a tribe by resolution of the tribe's governing body, constituted an integral part of the tribe. In determining that it did, the ruling emphasized the tribe's control over, and financial commitment to, the corporation: "Because Tribe, a federally recognized tribe, has demonstrated its financial commitment and control over Corporation, we conclude that Corporation is an integral part of

D. Section 17 Corporation

A Tribe may also pursue its energy project development and operations utilizing a Section 17 corporation formed pursuant to Section 17 of the Indian Reorganization Act.[135] The Indian Reorganization Act authorizes Tribes to organize their governments pursuant to Section 16 and their economic business under a Federal corporate charter issued pursuant to Section 17.[136] A Section 17 corporate charter must be approved and issued by the Bureau of Indian Affairs and ratified by the governing body of the Tribe. Certain Oklahoma Tribes were exempt from the Indian Reorganization Act, but received the same opportunities through Section 3 of the Oklahoma Indian Welfare Act. For purposes of this discussion, references to a "Section 17 corporation" include tribal corporations formed under either statutory provision.

A key and fundamental characteristic of a Section 17 corporation is that although it is a separate legal entity, it operates as an integral part or alter ego of the Tribe (the business ego versus the government ego). Accordingly, a Section 17 corporation shares the same privileges and immunities of the tribal government. Section 17 corporations are Federal corporations that are wholly owned by the Tribe. Generally, they are governed by a Board of Directors. Typically, Section 17 corporate charters delineate the powers of the corporation *vis-a-vis* the powers of the Tribe, identify the authorized purposes of the corporation, identify qualifications of, and the manner of selection and removal of Board members, and contain other routine corporate provisions.

Tribe. Because Corporation is an integral part of the Tribe . . . Corporation's income is also not subject to federal income tax." I.R.S. P.L.R. 200409033 (Feb. 27, 2004).

[135] 25 U.S.C. § 477 (2006). Tribes located in Oklahoma may organize their businesses under Section 3 of the Oklahoma Indian Welfare Act, 25 U.S.C. § 503 (2006).

[136] To be clear, Tribes can organize their governments in any manner and need not organize under Section 16 of the IRA. Regardless of whether a Tribe has organized its government under the IRA, a Tribe may petition for a Section 17 federal corporate charter. The authorized purposes of the corporation identify the qualifications of and the manner of selection and removal of, Board members, and certain other standard corporate provisions.

There are several advantages to conducting business through a Section 17 corporation. First, it is clear that under existing IRS policy, a Section 17 corporation is not subject to Federal income tax.[137] Second, if properly structured, a Section 17 corporation will be immune from suit unless it expressly waives such immunity. It should be noted that many Section 17 Federal charters, especially those issued shortly after passage of the IRA, contain "sue and be sued" clauses and there are differing judicial opinions as to whether such clauses constitute waivers of immunity.[138] However, a Section 17 corporate charter does not have to contain, and should not contain, a blanket waiver of the corporation's immunity. Rather, it can, and should, expressly include as a corporate power, the right of the corporation to waive its immunity and the specific procedures to effectuate a valid waiver.[139]

Third, as a separate legal entity, the assets of a Section 17 corporation are separate from the assets of the Tribe. As such, the assets of the Tribe will be protected and creditors of the corporation will have recourse only to the assets of the corporation.

Fourth, although the Section 17 corporation is a parallel entity of the Tribe's governmental body, it is typically structured as an entity that operates with little involvement by the Tribe's governing body. Rather, the corporate board of directors typically makes all day to day and other business decisions; a structure that many potential non-tribal business partners may find attractive.

Finally, another advantage of pursuing an energy project through a Section 17 corporation is that the corporation can lease tribal property for a period of twenty-five years without approval by the BIA.

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[137] Rev. Rul. 94-16, 1994-1 C.B. 19.
[138] *See Cohen's Handbook of Federal Indian Law* §7.05[1][C], at 643 (Nell Jessup Newton et al. eds., 2005 Edition).
[139] Similarly, the charter should clearly state that the corporation lacks the authority to waiver the Tribe's sovereign immunity and any waiver of the corporation's immunity shall not be construed as a waiver of the Tribe's sovereign immunity.

One disadvantage of utilizing a Section 17 corporation is that the process of obtaining a corporate charter is cumbersome and time consuming. The Tribe must pass a resolution, draft a corporate charter, obtain tribal approval of that charter, submit the resolution and charter to the BIA for approval of the charter, and finally, ratify the BIA-approved corporate charter.[140] This process may take several months. However, once obtained, the Section 17 corporation affords the Tribe the opportunity of making a strategic decision as to how to use this mechanism. For instance, a Tribe may make a strategic decision to use their Section 17 corporation as a holding company for other tribal or state law chartered entities. A Tribe should also understand that a Section 17 corporate is a federal entity whose charter can only be terminated by an Act of Congress.[141] Tribes should carefully consider the business implications (e.g., stability, separation from tribal politics) and the Federal government involvement (perceived loss of tribal control) when considering this approach.

E. **State Law Entities**

Tribes may also organize their business entities under applicable state law as state law entities, such as state law corporations, limited liability companies and limited liability partnerships. In choosing a state law entity, a Tribe should carefully consider two key strategic elements: (1) the tax treatment of the entity, and (2) whether the entity will most likely possess sovereign immunity from suit. From a Federal income tax perspective, a state law tribal corporation will be subject to Federal income tax.[142] As such, Tribes rarely use a state law tribal corporation. Although there are some advantages to organizing as a state law corporation,[143] Tribes often believe that the disadvantages outweigh the advantages and accordingly, rarely organize their business structures as state law corporations. However, a state limited liability company (LLC) or

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[140] *See Cohen's Handbook of Federal Indian Law* §21.02 [1][6], at 1284 (Nell Jessup Newton et al. eds., 2005 Edition).
[141] 25 U.S.C. § 477 (2006).
[142] Rev. Rul. 94-16, 1994-1 C.B. 19. Also, it is uncertain whether a state law corporation may be deemed a political subdivision of a tribe for purposes of the Tribal Government Tax Status Act.
[143] Advantages of organizing and pursuing energy projects via a state law corporation include separation of assets, generally, separation from tribal politics, limited liability of the owners of the corporation, and familiarity of potential business partners with this structure.

limited liability partnership (LLP may result in favorable tax treatment (see the discussion in Section III Joint Venture Structures). A Tribe may find the use of a single member LLC useful for both business and tax purposes.

From a sovereign immunity perspective, any of the state law entity options most likely do not possess sovereign immunity and therefore are subject to suit.[144] Tribes using ether a state law LLC or LLP need to make a strategic decision that the entity formed will not possess sovereign immunity. In certain circumstances, the Tribe may decide there are compelling business reasons to decide against sovereign immunity for the entity. Further, the corporate structure of the entity creates a bright line that sovereign immunity has been waived only as far as the corporate entity (not beyond it to the parent – the tribal government). Use of this approach can provide a Tribe access to the liability shields created by corporate law and used by the business counterparties, and as such, are familiar (and thus comfortable) to their potential investors and business partners.

III. JOINT VENTURE STRUCTURES

Tribes often partner with private entities to pursue energy development projects. Tribes and their business partners have several different options with respect to structuring their joint venture business, including whether to establish a separate joint venture entity and if so, its form. Several factors typically drive this decision, including the needs of the Tribe relative to the project (for example, the need for expertise in the area or financing requirements) and the non-tribal partner's desire to take advantage of certain tax advantages and other tax implications.

A number of the business structures discussed above are not available to a Tribe and its energy business partner because only the Tribe can have an ownership interest in these structures. Specifically, a Tribe and its business partner cannot organize as a tribal instrumentality, arm of the tribal government or political subdivision of the Tribe

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[144] Atkinson & Nilles, *supra* note 123; *See Airvator, Inc. v. Turtle Mountain Manufacturing Company*, 329 N.W. 2d 596 (N.D. 1983); s*ee generally Cohen's Handbook of Federal Indian Law* (Nell Jessup Newton et al. eds., 2005 Edition).

because only the Tribe can have an interest in such governmental entities. Similarly, a Section 17 corporation must be wholly owned by a Tribe.

However, Tribes and their energy development partners may organize their joint ventures as corporations, partnerships (including limited liability partnerships), and limited liability companies. Any of these potential structures allow both the Tribe and its business partner to have an ownership interest. Not every structure may be appropriate for each type of energy project. This is especially true in the case of renewable energy projects because certain tax credits are available for these projects, as explained elsewhere in this Primer. Also, with the establishment of each structure, whether it is a corporation, partnership or limited liability company, careful consideration must be made to financing and tax issues. It is highly recommended that the Tribe and its business partner seek legal advice from appropriate counsel. Similarly, as in any joint venture, the entity's governing documents should clearly set forth the roles, duties and obligations of each party as well as the manner in which revenues will be shared and distributed.

1. **Corporation**.

Although a corporate structure provides for limited liability and other advantages discussed above, from a Tribe's perspective, a key disadvantage in forming a corporation that is owned in part by a non-tribal partner is that such corporations are generally subject to a Federal corporate tax on their income. In addition, the owners of the corporation, other than the Tribe, will be subject to Federal income tax on their dividend income. Accordingly, many joint ventures between Tribes and their non-tribal parties do not utilize a corporate structure.

2. **Partnerships and LLC's**.

Tribes and their business partners may also form partnerships (including both general and limited liability partnerships) and limited liability companies (LLC's) to jointly pursue energy projects. One key advantage to such structures is favorable Federal income tax treatment.[145] Partnerships, and LLC's that are taxed as a partnership, are not subject to Federal income tax on the entity's income. However, each taxable partner, or member in the case of an LLC, is subject to income tax on its respective allocated share of the partnership's or LLC's income. In other words, the entity is a "pass-through" entity and a Federal income tax (for taxable entities)[146] is imposed only at the partner or member level.

Another characteristic, and advantage, of limited liability partnerships and limited liability companies is, as the names suggest, is the limited liability of the limited partners and members. However, the scope of the limitation varies according to the laws of the jurisdiction in which the entity is formed.

An uncertain issue is whether a partnership or LLC consisting of a Tribe and a non-tribal entity possess sovereign immunity. It is not clear that any case has ever held that such an entity possesses sovereign immunity. And, applying the factors analyzed by courts to determine whether *wholly owned* tribal companies possessed sovereign immunity, it is unlikely that a court would conclude that a partnership or LLC that was not wholly owned by a Tribe was immune from suit based on tribal sovereign immunity.

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[145] For a comprehensive discussion of the Federal income tax treatment of partnerships and LLC's, and the advantages and disadvantages of each structure, see Atkinson & Nilles, *supra* note 123, at V-1 to V-9.

[146] Under current IRS policy, a Tribe that is a partner in a partnership is not subject to Federal income tax.

IV. CONTRACT ISSUES

Doing business and entering into contracts with Indian Tribes is uniquely different than entering into such arrangements with non-tribal entities. Unfortunately, a general unfamiliarity with Federal Indian law or Tribes and lack of full understanding of key issues may cause some potential partners to forego business opportunities with Tribes. Without doubt, there are unique issues that must be considered and carefully addressed in any contract with a Tribe. However, if they are discussed up front and openly, they can most certainly be resolved to the satisfaction of both parties.

A Tribe's potential business partner must understand the entity with which it is contracting or forming a business entity. As part of its due diligence, it will want to verify that all requisite tribal approvals have been obtained and confirm that the proposed business structure complies with all applicable tribal law.

A fundamental issue that should be addressed in any business relationship with a Tribe is tribal sovereign immunity. As mentioned above, Tribes and certain tribal entities possess sovereign immunity and cannot be sued absent their consent or congressional waiver. Waivers of sovereign immunity must be express and unequivocal.[147] Most Tribes grant waivers of immunity in their business dealings but such waivers are typically limited so that the Tribe waives its immunity only as to actions brought by the other parties to the contract, only as to arbitration and suits in the judicial fora specified in the contract and only for certain actions and damages.

Another pertinent contract issue involves the question where disputes should be heard (choice of forum) and what law should govern the business relationship and any potential disputes (choice of law). Tribes and their energy partners may agree to have disputes heard before an arbitrator or in a particular judicial forum, including tribal, State or Federal courts. However, Federal courts are courts of limited jurisdiction and absent a Federal question, a Federal court will lack jurisdiction over a contract dispute because

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[147] For a detailed decision on waivers of tribal sovereign immunity, see *Cohen's Handbook of Federal Indian Law* (Nell Jessup Newton et al. eds., 2005 Edition).

unincorporated Tribes are not citizens for purposes of creating diversity jurisdiction.[148] Also, the doctrine of exhaustion of tribal remedies may require that notwithstanding the selection of a non-tribal forum, the respective tribal court may be required to opine as to its jurisdiction in the first instance.

Finally, it is important to note that certain contracts that encumber Indian lands for seven or more years must be approved by the BIA. In addition, leases of Indian lands must also be approved by the BIA (unless the land is leased by a Section 17 corporation or in connection with an approved TERA).

[148] *Am. Vantage Companies, Inc. v. Table Mountain Rancheria*, 292 F.3d 1091 (9th Cir. 2002); Ninigret Dev. Corp. v. Narragansett Indian Wetuomuck Hous. Auth., 207 F.3d 21 (1st Cir. 2000); *Gaines v. Ski Apache*, 8 F.3d 726 (8th Cir. 1993); Romanella v. Hayward, 114 F.3d 15 (2nd Cir. 1997).

ASSESSING FINANCING OPTIONS FOR TRIBAL ENERGY PROJECTS

I. INTRODUCTION

The following summary describes certain methods of energy project financing that may be available to Tribes, including government programs, loans and guarantees for which Tribes may be eligible, as well as private and other financing options. As with nearly every area summarized in this Primer, Tribes are advised to seek legal assistance in pursuing any of the financing options described below, as energy projects are subject to a variety of complex regulatory issues and a thorough legal review of the project and its structure is necessary to ensure compliance. In addition, as explained elsewhere in this Primer, certain contracts are required to be reviewed and approved by the Bureau of Indian Affairs. Tribes should also consider how to appropriately structure energy projects so as to maximize any tax incentives available (as further discussed below). Tribes should also be aware that most lenders may be concerned with the enforceability of agreements related to any financing, and as well as to receiving appropriate security from the Tribes.

II. GOVERNMENT ASSISTANCE.

The Federal government may be able to provide financing assistance in connection with a Tribe's renewable energy project, including assistance in the form of grants, loans or guarantees. The following descriptions explain some of the opportunities for financing assistance that may be available to Tribes by particular governmental agencies.

A. U.S. Department of Agriculture (USDA)

The 2008 Farm Bill (Pub.L.110-234) contains several important opportunities for Tribes to receive financial assistance in connection with renewable energy programs. A brief description of some of the opportunities under the Farm Bill that Tribes may wish to pursue is below.

- Biorefinery Assistance Program. Tribes are eligible to receive assistance under this program which assists in the development of new and emerging technologies for the development of advanced biofuels. The program contemplates guarantees for loans to fund the development, construction and retrofitting of commercial-scale biorefineries using eligible technology, and provides grants to help pay costs of the development and construction of demonstration-scale biorefineries. Eligible technologies include technologies that are being adopted in a viable commercial-scale operation of a biorefinery that produces an advanced biofuel, or has been demonstrated to have potential to do so. This program includes $75 million in funding for fiscal year 2009 and $245 million in fiscal year 2010, and authorizes further funding of $150 million annually for fiscal years 2009 through 2012.

- Repowering Assistance. The Farm Bill provides for payments to existing biorefineries to replace fossil fuels used to produce heat or power to operate the biorefineries with renewable biomass. To be eligible, a biorefinery must demonstrate that the renewable biomass system of the biorefinery is feasible based on an independent feasibility study that takes into account the economic, technical and environmental aspects of the system. The program provides mandatory funding of $35 million for fiscal year 2009 that will remain available until expended, and authorizes appropriations of $15 million per year for fiscal years 2009 through 2012.

- Bioenergy Program for Advanced Biofuels. This program provides for payments to be made to eligible producers of advanced biofuels to support and ensure an expanding production of advanced biofuels. Payments are made pursuant to a contract entered into with the Secretary of Agriculture and are based on the quantity and duration of production by the producer, the net renewable energy content of the advanced biofuel, and other appropriate factors. This section of the Farm Bill mandates a total of $300 million in funding for fiscal years 2009 through 2012 and authorizes appropriations of $25 million per year for such years.

- Biodiesel Fuel Education Program. This program provides grants to eligible entities in connection with education of government and private entities that operate vehicle fleets and education of the public about benefits of biodiesel fuel use. Eligible entities include those with a demonstrated knowledge of biodiesel fuel production, use or distribution. The bill provides for funding of $1 million per year from fiscal years 2009 through 2012.

- Rural Energy for America Program. This provision of the Farm Bill provides for grants and loan guarantees to promote energy efficiency and renewable energy development for agricultural producers and rural small businesses through grants for energy audits and renewable energy development assistance, and loans or other financial assistance for energy efficiency improvements and renewable energy systems. Eligible participants include units of tribal government. Total funding of $255 million is mandatory for fiscal years 2009 through 2012 and additional funding is authorized in the amount of $25 million per year for such years.

- Rural Energy Self-Sufficiency Initiative. This initiative provides financial assistance for the purpose of enabling eligible rural communities to substantially increase the energy self-sufficiency of such communities. Grants may be used to conduct energy assessments, formulate and analyze ideas for reducing energy usage of the rural community from conventional sources, and to develop and install an integrated renewable energy system. $5 million annually for each of fiscal years 2009 through 2012 has been appropriated for this initiative.

- Feedstock Flexibility Program for Bioenergy Producers. This program subsidizes the use of sugar for ethanol production through Federal purchases of surplus sugar for sale to ethanol producers. Eligible producers are entities located in the U.S. that market a form of raw or refined sugar or in-process sugar that is eligible to be marketed in the U.S. for human consumption or to be used in extraction of sugar for human consumption. Funds will be provided in sufficient amounts to carry out the program.

- Biomass Crop Assistance Program. This program provides support to establish and produce crops for conversion to bioenergy in project areas approved by the Secretary of Agriculture and to assist with collection, harvest, storage and transportation of eligible materials for use in a biomass conversion facility. The Secretary of Agriculture will use such funds as are necessary to carry out the program through 2012.

- Forest Biomass for Energy. The Forest Service is authorized to conduct a competitive research and development program to encourage use of forest biomass for energy. Tribes are eligible to compete for program funds. The program will give priority to projects that develop technology and techniques to use low-value forest biomass (such as byproducts of forest health treatments and hazardous fuels reduction) for the production of energy, develop processes that integrate production of energy from forest biomass into biorefineries or other existing manufacturing streams, develop new transportation fuels from forest biomass, and improve the growth and yield of trees intended for renewable energy production. $15 million annually for each of fiscal years 2009 through 2012 has been appropriated for this program.

The USDA provides numerous other opportunities for financing assistance. For example, the Business and Industry Guaranteed Loan Program aims to improve, develop, or finance business, industry, and employment and improve the economic and environmental climate in rural communities. Tribes may be eligible borrowers under such program and certain commercially available energy projects that produce biomass fuel or biogas may be eligible projects. For more information, see www.rurdev.usda.gov/rbs/busp/b&I_gar.htm. In addition, Tribes may qualify for assistance under a number of other USDA programs, including those relating to rural electrification, drinking water, sanitary water, solid waste and storm drainage facilities in rural areas, cities and towns.

B. U.S. Department of the Interior—Office of Indian Energy and Economic Development

The Office of Indian Energy and Economic Development within DOI promotes economic opportunities for Tribes. The Division of Capital Investment manages the Indian Loan Guaranty, Insurance and Interest Subsidy Program. To qualify, the borrower cannot be delinquent on any Federal debt obligation and must be projected to have at least 20% equity in the business being financed immediately after loan funding. The percentage of loan that is guaranteed is the minimum necessary to obtain financing (up to 90% of unpaid principal and interest). Loans may be for operating capital, equipment purchases, business refinance, building construction and lines of credit. The lender must pay a one-time 2% premium payment of the guaranteed portion of the loan (which may then be charged to the borrower). Visit the Bureau of Indian Affairs website at www.bia.gov for more information about eligibility requirements and application process.

C. U.S. Department of Energy—Tribal Energy Program

Tribes may wish to seek funding from the Department of Energy's Tribal Energy Program, which is part of the Department's Office of Energy Efficiency and Renewable Energy. The program generally provides financial assistance to Tribes in connection with evaluation and development of renewable energy resources. Funding for projects is competitive and submissions must meet criteria applicable to currently available funding opportunities. The Golden Field Office in Colorado manages project solicitations. See www.eere.energy.gov/golden/Default.aspx for open solicitations at any given time.

D. U.S. Department of Commerce—Economic Development Administration (EDA)

Tribes should consider if their energy projects may qualify for Comprehensive Economic Development Strategy (CEDS) Investment Assistance grants through the EDA. Assistance may be awarded to planning organizations (including Tribes) to develop, revise or replace a CEDS. To apply for assistance, a planning organization should submit for consideration a CEDS plan that contemplates broad-based public and private

sector participation and provide required information, including background of the economic development situation of the applicable region (including economy, population, geography, workforce development and use, transportation access, resources and environment), analysis of economic and community development problems and opportunities and goals and objectives to solve such problems, a discussion of community and private sector participation in the CEDS endeavor, and number of jobs to be created pursuant to suggested projects. EDA will review the Tribe's plan of action to consider the goals and objectives of the CEDS, including promoting economic development and opportunity, promoting effective transportation access, enhancing and protecting the environment, maximizing use of workforce, promoting use of technology, balancing resources, and obtaining and utilizing adequate funds and other resources. Submissions should specify how the CEDS will be integrated with a state's economic development priorities. For more information on CEDS assistance, see EDA's Programs, Investment Policies and Funding Opportunities site at www.eda.gov/InvestmentsGrants/Investments.xml.

E. U.S. Environmental Protection Agency (EPA)

The EPA has a number of funding opportunities, depending on the specific nature of the energy project. See the EPA's American Indian Tribal Portal at www.epa.gov/tribalportal/grantsandfunding/index.htm for more information on grants currently available for particular types of projects at any given time.

F. U.S. Department of Housing and Urban Development (HUD)—Office of Native American Programs

Through the Indian Community Development Block Grant (ICDBG) program, HUD offers grants to Tribes (and certain Indian organizations applying on behalf of Tribes) in connection with developing viable Indian communities, including decent housing, a suitable living environment and economic opportunities, primarily for low and moderate income persons. In addition, through the ICDBG program, grants are made to provide a range of affordable housing activities including housing development, assistance to housing developed under the Indian Housing Program, housing services to eligible

families and individuals, crime prevention and safety, and model activities that provide creative approaches to solving affordable housing problems. See www.hud.gov/offices/pih/ih/cd/ for more information on community development grants available to Tribes under HUD.

G. U.S. Department of Health and Human Services

The U.S. Department of Health and Human Services offers financial assistance to low-income households in meeting their home heating and cooling needs for certain Tribes that are Low-Income Home Energy Assistance Program tribal grantees. See www.acf.hhs.gov/programs/ocs/liheap/grantees/tribes.html for more information.

III. PROJECT FINANCING, BONDS AND OTHER OPPORTUNITIES.

Depending on the size and scope of a project, other financing options may be better or required either to replace or supplement the governmental programs above. For larger projects, the governmental programs may provide development funds, but construction large commercial projects will most likely outstrip the availability of governmental funding. Successful projects will most likely blend several of the available financing techniques described below, such as stand-alone project finance, bond financing options, tax credits, and renewable energy certificates.

A. Stand-Alone Project Finance.

Tribes may incur debt to banks or other sources such as venture capital funds in order to finance energy and other projects. One of the main benefits of this option is that Tribes do not have to obtain allocation and may not have to obtain government approvals. Lenders may be concerned with the enforceability of agreements related to such financings, and obtaining appropriate security for the obligations of Tribes. Tribes may wish to seek assistance via the Renewable Energy Finance Information Network, a listing of organizations that self-nominate as players in financial issues related to, and financing of, renewable energy. The directory was created by the American Council on Renewable Energy and may be used to seek financing and professional expertise related to energy projects. See www.refindirectory.com for more information.

B. <u>Bond Finance Options</u>.

Tribal Economic Development Bonds (TED Bonds) are a new type of tax-exempt borrowing available to Tribes and authorized by the American Recovery and Reinvestment Act of 2009 (Recovery Act). The Recovery Act authorized an aggregate amount of $2 billion of TED Bonds to be issued by Tribes. Before the Recovery Act, tax-exempt bonds were only permitted to be issued by Tribes for certain essential government functions (as further described below). The Recovery Act authorizes tax-exempt bonds to be issued for much broader tribal purposes, including energy development and transmission facilities, and certain commercial enterprises owned and operated by the Tribe (although they are not permitted to be issued for gaming purposes). The IRS accepted applications for the first round of bond authority allocation as of August 15, 2009; TED Bonds authorized in such round must be issued by December 31, 2010. Applications for the second and final round of bond allocation must have been filed by January 1, 2010 and TED Bonds authorized in such round must be issued by December 31, 2011.

Tax-exempt bonds may be issued by Tribes to finance economic development projects. Tax exemption lowers the cost of borrowing and may make projects more competitive on a cost basis. Tribes may only issue tax-exempt bonds for limited purposes (except as described above with respect to TED Bonds), including projects owned or operated by the Tribe that provide services or serve functions that are normally provided by governmental entities (for example, renewable energy projects where the electricity is provided to the Tribe). Generally, private uses are not permissible, which may include projects where private parties own, lease, manage, use or pay for the project. The amount of such bonds is not subject to a volume cap limitation like the TED Bonds described above. The Recovery Act raised the limit of bank qualified obligations from $10 million to $30 million to stimulate the tax-exempt market.

Build America Bonds are another new type of bond authorized under the Recovery Act. Though not tax-exempt like TED Bonds, issuers of Build America Bonds are subject to a 35% Federal rebate on interest costs. The issuer may choose to receive a payment from the U.S. Department of Treasury of 35% of the interest paid on the Build America

Bonds or to allow bondholders to receive a credit against Federal income tax of 35% of the interest paid on such bonds. Build America Bonds are not subject to any volume cap limitation but may only be issued in 2009 and 2010. Such bonds are subject to the private use restrictions applicable to tax-exempt bonds and may only be used to finance new money projects (not refinancings).

Clean Renewable Energy Bonds (CREBs) are authorized to be issued by Tribes to finance eligible renewable generation facilities (which may include wind energy, biomass facilities, geothermal energy and solar energy). Such project may be leased to, or operated by, a private entity. CREBs are tax credit bonds for which that the government provides a subsidy equal to 70% of interest directly to the bondholder. The private use restrictions applicable to tax-exempt bonds do not apply to CREBs. CREBs are subject to a volume cap limitation of $2.4 billion and interested parties must apply for allocation.

Qualified Energy Conservation Bonds (QECBs) are another type of tax credit bond designed to provide the issuer with a 70% interest subsidy. Eligible projects may include certain projects related to renewable energy generation facilities (as described in the description of CREBs above), funding of research facilities and research grants in certain areas such as development of cellulosic ethanol or non-fossil fuels and technologies for the capture and sequestration of carbon dioxide, demonstration projects designed to promote green building technology and other projects, mass commuting facilities that reduce the consumption of energy, including expenditures to reduce pollution from vehicles used for mass commuting, and green community programs. QECBs are subject to a national $3.2 billion volume cap, with allocation based on state population. Each state must use at least 70% of its volume cap for governmental purpose bonds (subject to the private use restrictions) and no more than 30% for private activity bond purposes which must be applied to finance capital expenditures.

C. Other Tax Credits.

In general, Tribes are exempt from income taxes so tax credits do not offer a direct benefit to them, but Tribes may be able to structure a project so a non-tribal investor may take advantage of the tax benefits created. For example, production tax credit (PTC) may be available for certain renewable energy technologies at the current rate of 2.1 cents per kilowatt-hour; the Recovery Act provided for an extension of the PTC through 2012. Investment Tax Credit (ITC) may be available for certain renewable power technologies at the rate of 30% of the initial investment in the project; the Recovery Act provided for an extension of ITC authority through 2016. Both PTC and ITC may be used for wind, solar and geothermal energy projects, as well as other projects. There may be other tax credits or incentives available to Tribes in connection with energy projects depending on the particular nature of the project and a particular Tribe's circumstances.

D. Renewable Energy Certificates.

Renewable energy certificates (also called green certificates, green tags or tradable renewable certificates) symbolize the environmental qualities of the power produced from certain energy projects and may be sold or traded separately as a commodity. Tribes may wish to consider using revenue generated from selling green tags to help finance a particular project. See the EPA's Green Power Network at http://apps3.eere.energy.gov/greenpower/ for more information on renewable energy certificates.

ASSESSING OTHER ENERGY PROJECT DEVELOPMENT ISSUES

Introduction:

This chapter of the Primer is designed to identify additional factors and considerations that will impact the development decision, such as project planning, an understanding of the strategic positioning for a plant in the industry and in the marketplace, the need to identify direct and indirect personnel needs, support costs, organizational requirements, availability of utilities, water, access to markets and investor priorities.

Development Project Planning[149]:

(1) Strategic Energy Planning - The first step in understanding your energy journey is to envision your destination. Where is it you want to go? What does that place look like? At the same time, take stock of where you are now, to better understand the resources you will need to get to your destination. The difference between these two points, where you are, and where you want to be, defines the work that needs to be done. Energy planning[150] can be a relatively straightforward process, and is a subset of infrastructure planning discussed elsewhere in the Primer. However, the work needed to complete an energy plan may be considerable.

(2) Evaluating Energy Options[151] - The Tribe may have identified a number of priority needs and energy supply options. Next it should evaluate the Tribe's energy options — deciding more narrowly what makes the most sense, how much it will cost, who needs to be involved, how it will be implemented and whether the energy is intended for self use or export for profit. At this stage, the analysis becomes more rigorous and the challenges better defined. In other words, the road ahead can be seen more clearly.

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[149] See Strategic Energy Planning, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/tribalenergy/guide/energy_planning.html. Retrieved 12/07/09.
[150] See Energy Planning: A Guide for Northwest Indian Tribes, Northwest Sustainable Energy for Economic Development. http://www.nwseed.org/documents/NWSEED_Tribal%20GB_Final.pdf. Retrieved 12/07/09.
[151] See Evaluating Options, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/tribalenergy/guide/evaluating_options.html. Retrieved 12/07/09.

Take time with this step — the more thoroughly the Tribe analyzes its options, the smoother the implementation stages will be.

(3) Organizational Development[152] - As discussed more thoroughly elsewhere in this Primer, new organizations or institutions may be necessary to implement effectively tribal energy plans and projects. In some cases, it may be possible to expand the responsibilities of an existing tribal entity to include energy implementation, but sometimes a whole new entity, such as a tribal utility, is needed. Sometimes, joint ventures with outside partners may make the most sense.

The foundation of organizational development is human capacity. Effective strategic energy planning requires addressing a host of issues including legal, environmental, finance, energy end-use, technology, and market elements. Ideally a Tribe would have all this expertise in-house, but seldom does, relying instead on consultants and other outside experts. While this reliance on outside consultants is often necessary in the early stages, Tribes should work to build internal capacity with such expertise. Going through the strategic planning process will help identify the Tribe's capacity; the more a Tribe can build internal capacity, the more it can exercise its sovereignty and the faster it can make effective decisions to promote economic development opportunities, in energy and elsewhere. Tribes should also recognize that even Fortune 500 companies do not necessarily find it cost effective to have experts in every detail of a project on staff, and often rely on outside consultants. The Tribe should discuss and prioritize the expertise that it wants to develop.

There are many organizational options. The "organization," in this context, refers to the legal business structure established to implement energy projects. Energy projects are usually long-term (10-, 20-, or even 50-year) commitments and require a stable professional business-like structure to sustain the project performance (operations and maintenance, revenue collection, and debt payment) after construction. Energy

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[152] See Organizational Development, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy.
http://www1.eere.energy.gov/tribalenergy/guide/organizational_development.html. Retrieved 12/07/09.

efficiency projects can be accomplished without a formal organization, but they are more effective, more comprehensive, and can reach more tribal homes and commercial operations if they are well organized.

(4) Feasibility Assessment - Before actually committing to construction, most energy projects benefit from a more detailed feasibility assessment[153]. The initial screening that takes place during strategic plan development should identify a number of interesting options while generating lots of unanswered questions. For the preferred options, conducting a good feasibility assessment will reduce the list of interesting options down to the possible options, which can be further ranked by criteria important to the Tribe. The winners can then move into the project development process.

As part of the feasibility assessment, the Tribe should begin discussions with the local utility about an interconnection agreement[154]. The interconnection process should proceed in parallel with the project development process.

(5) Project Development - Deciding how to manage the detailed project development and construction phase is an important tribal management decision. There are basically two paths[155] to take: The project can be contracted[156] out to an engineering firm or developer, or the project can be carried out through multiple smaller contracts, having the Tribe act as the developer [157]or general contractor. There can be a mixing of these two approaches as well. In either event, it is important that the Tribe maintain control. The second option obviously requires more internal tribal management capacity and

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[153] See Feasibility Assessment, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/tribalenergy/guide/feasibility_assessment.html. Retrieved 12/07/09.
[154] See Interconnection Process, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. http:www1.eere.energy.gov/tribalenergy/guide/interconnection_process.html. Retrieved 12/07/09.
[155] See The Management Decision, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/tribalenergy/guide/management_decision.html. Retrieved 12/07/09.
[156] See Contracting Out, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/tribalenergy/guide/contracting_out.html. Retrieved 12/07/09.
[157] See Tribal Development, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/tribalenergy/guide/tribal_development.html. Retrieved 12/07/09.

expertise than the contract-out option. However, even under the contract-out option, the Tribe should use every opportunity to use the actual engineering and construction of a project for tribal capacity building. The DOE Tribal Energy Program also provides detailed information about the subsequent steps associated with project development[158] including engineering design, power agreements, permitting and licensing, project financing, hardware development, construction and training, commissioning, and operations and maintenance.

Energy Project Integration:

In assessing the potential development of tribal energy resources, opportunities for project integration may be available. Energy resources can be developed solely for use on the reservation, exported for sale off of the reservation, or both. Energy resources can be produced, and then further processed, on the reservation or Indian lands (e.g., petroleum refinery, coal fired power plant, etc.) where value enhanced products become available for use or sale.

In another example, solar energy depends upon sunshine and wind energy depends upon the wind blowing. If other energy resources are available (for example natural gas or coal), the Tribe could consider an integrated processing plant that combines solar or wind with conventional fuels, so that it can be a supplier of a reliable source of energy.

Cost/Benefit Considerations:

A cost benefit analysis finds, quantifies, and adds all the positive factors. These are the benefits. Then it identifies, quantifies, and subtracts all the negatives, the costs. The difference between the two indicates whether the planned action is advisable. It is important when conducting a cost benefit analysis that all the costs and all the benefits are carefully included and properly quantified.

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[158] See Project Development, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy. http://www1.eere.energy.gov/tribalenergy/guide/project_development.html. Retrieved 12/07/09.

Indian Land Ownership:

The development of energy resources on Indian lands may be complicated by land ownership issues. Indian reservations often include tribal trust land, land owned by the Tribe, the heirs of individual Indian allottees, and third party (non-Indian) public or private interests. These separate interest types can be blocked up into large parcels or may be inter-mixed in smaller parcels. The most challenging land ownership hurdle involves individual Indian allotments.

The General Allotment Act's restrictions on inheritance created a legacy that greatly increases the difficulties in developing energy projects on individual Indian allotment land. Basically, the operation of inheritance laws has resulted in the subdivision of land ownership into smaller and smaller undivided interests instead of by physical partition. As discussed below, fractionated interests create an administrative and legal burden on energy (as well as other land tenure) projects.

Imagine a mathematically simple example where an Indian allottee with an 80 acre parcel dies and leaves the land to five children. Each of the second generation owners (5 interest owners) would inherit a 20% undivided interest in the land. Then, each child matures, marries, has five children and then dies. The third generation children (25 interest owners) would then have a 20% undivided interest in the inherited 20% interest of the deceased parent or a 4% undivided interest in the parcel. With the same assumptions, the fourth generation (125 interest owners) would have a 0.8% inherited interest (20%X20%X20%) and the fifth generation (625 interest owners) would have a 0.16% undivided interest in the parcel, and so on. While this simple example is illustrative, the reality is much more complicated by marriages, divorces, adoptions, variations in family sizes, land sales and subdivisions and application of individual state probate laws.

This "fractionation[159]" of land ownership complicates energy resource development because multiple owners must agree on proposed land uses. In some cases, allotted parcels are currently owned by one individual, while many are owned by dozens or hundreds of owner interests. A few have over one thousand interest owners. Gaining consent of some undivided interest owners is difficult due to the number of interest owners.

Furthermore, the overwhelming volume of record keeping associated with allotments contributes to the slowness with which the Bureau of Indian Affairs processes the heir - ship rights in land when an allottee dies. Without prompt processing of probates, ownership of allotments remains uncertain, thereby creating great difficulty for heirs who wish to use the land for energy development purposes. There are many examples where the probate of an Indian allotment has taken more than 20 years.

The complications of land ownership will determine the degree of effort (and cost) that will be required to utilize an energy resource. Land ownership patterns will affect the development of both renewable and non-renewable energy resources. Land owner consent will be required for developmental activities such as mining, drilling, and facility siting and to obtain rights-of-way for roads, rail, pipelines, and electrical transmission.

The Role of Government:

Developing energy resources will involve at least the tribal government and the federal government. Most Indian land is held in trust by the Federal government, with the Bureau of Indian Affairs (BIA), U.S. Department of the Interior having the lead responsibility for day-to-day administration of the trust. This fiduciary trust relationship requires the BIA to consider what is in the best interest of the Tribe or individual Indian allottee when authorizing the development of energy resources, granting rights-of-way, approving contracts or environmental studies, etc.

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[159] See Fractionation, Indian Land Tenure Foundation.
http://www.indianlandtenure.org/ILTFallotment/introduction/fractionation.htm. Retrieved 12/07/09

Generally, Tribes and individual Indian allottees consent to the development of their land and provide considerable oversight along the way. With over 560 Federally-recognized Tribes, the spectrum of relative roles and responsibilities is wide, ranging from Tribes which have little involvement in managing trust resources (sometimes referred to as "direct service" Tribes) to Tribes that are active and aggressive in directing the use of their resources through Tribal laws, regulations, guidelines and administrative oversight. Currently, Tribes are eligible to take even more control and responsibility for managing their energy resources through Tribal Energy Resource Agreements (TERA – as discussed elsewhere in this primer).

Generally, state governments and local municipalities exercise little authority over Indian trust land and resources. However, energy development activities that cross the reservation border may create additional regulation indirectly. For example, if a tribal energy project requires a utility connection to the power grid, the utility may require the Tribe to comply with state requirements that impact the utility.

Proposed energy project participants should understand the roles and responsibilities of the various government entities and other associated parties that will be involved to ensure all statutory, regulatory and other legal requirements are met.

Tribal Sovereignty:

Federally-recognized Tribes are domestic, dependent sovereign entities. Like the U.S. Federal government, Indian Tribes have sovereign immunity. Hence, the Tribes enjoy a level of legal autonomy.

Generally, for energy projects on Indian land, disputes over actions and decisions made by the Federal government and the individual state governments, are addressed in the Federal court system and disputes over tribal actions and decisions are addressed in tribal court, if not otherwise barred by the Tribes' sovereign immunity.

As energy development projects may involve private sector contractors, supplies, or customers, provisions for dispute resolution should be carefully considered.

Investor Concerns:

Generally, potential non-Indian investors and partners in a tribal energy project will consider as critical a number of issues, a few of which are included below:

Tribal Project Structure – this issue is discussed at length elsewhere in the Primer, but it should be understood that the investor will analyze the risks associated with the internal politics and business aspects of the structure chosen to implement a tribal energy project.

Reliable Budgets and Detailed Use of Proceeds – the investor will want assurance that the project can be built and operational within the budget proposed. They will want to see details on how the invested funds will be used.

Anchor Power Sales Agreements – the investor will want to know that there is a Power Purchase Agreement (PPA) in place which will be the anchor of energy sales contemplated by the energy project. This is akin to a shopping mall where investors typically will not build without at least one large department store committed to open. These PPAs will include reliability and availability requirements and, in the post-Enron environment, stringent credit requirements. The Tribe will need to include these credit requirements in the capital requirements of the project.

Transmission Agreements – for power projects, investors will not consider financing until the Tribe can prove the project can move out of the area to a market. For a natural gas project, for instance, the Tribe will need to show that a reliable gas pipeline is within a distance that can be economically reached.

Permitting – final project financing will be contingent on obtaining all required tribal, Federal, state and local permits. Projects with facilities that extend beyond trust land may need to coordinate with the permitting requirements of neighboring sovereigns, as discussed elsewhere in this Primer.

ASSESSING TRIBAL CAPACITY AND USE OF TRIBAL ENERGY RESOURCE AGREEMENTS

I. INTRODUCTION

In 2005, Congress passed the Indian Tribal Energy Development and Self-Determination Act (ITEDSDA).[160] The Act authorizes Tribes, in their discretion, to negotiate Tribal Energy Resource Agreements (TERA) with the Secretary of the Interior (Secretary), governing energy development and related environmental management on the Tribe's trust lands.[161]

The main benefit of a TERA, is that once it is approved by the Secretary, a Tribe may, without further approval by the Secretary, enter into leases and business agreements for the purpose of energy resource development on tribal land for exploration for, extraction of, or other development of the energy mineral resources of the Tribe located on tribal land. Eligible activities under an approved TERA include but are not limited to marketing or distribution, for the construction or operation of an electric generation, transmission, or distribution facility located on tribal land, and facilities to process or refine energy resources developed on tribal land.

Under an approved TERA, the Tribe may also grant rights-of-way for the purpose of energy resource development on tribal land for construction or operation of a pipeline or electric transmission or distribution line serving an electric generation, transmission, or distribution facility located on tribal land, or a facility located on tribal land that processes or refines energy resources developed on tribal land.[162]

In reviewing a TERA application submitted by an interested Tribe, the Secretary's main focus will be to determine whether the Tribe has the requisite "capacity" to develop,

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[160] Pub. L. 109-58, 119 Stat. 763, 25 U.S.C. 3501-3504, and 25 U.S.C. 2 and 9.
[161] See generally "About Tribal Energy Resource Agreements" at http://teeic.anl.gov/abouttera/index.cfm. Retrieved 11/02/09.
[162] See Final Rule, Tribal Energy Resource Agreements Under the Indian Tribal Energy Development and Self-Determination Act, 73 FR 12808, March 10, 2008. All further references to this rule will be by noted by its Code of Federal Regulations reference.

regulate and manage its energy project(s). Interested Tribes, therefore, in deciding whether to pursue an energy project using the provisions of the ITEDSA and a TERA agreement, should begin by engaging in a rigorous and thorough self-evaluation, to determine whether it believes it has the "capacity" (as determined ultimately by the Secretary) and will be able to demonstrate that it has such capacity to enter into such an agreement. The question of "capacity" is not ultimately a question whether the Tribe believes it has the "capacity" for such an agreement, but rather, whether the Tribe will be able to demonstrate to the Secretary's satisfaction that it has the requisite capacity.

Does The Tribe Desire To Enter Into A Tribal Energy Resource Agreement With The Secretary Of The Interior?

The ITEDSDA and its implementing regulations include an inventory of factors that the Secretary must use in evaluating TERA agreements submitted for is approval. In addition to these specific factors, the Secretary considers the best interest of the Tribe and the Federal policy of promoting tribal self-determination.[163] In other words, while any given Tribe may believe it has the authority as well as capacity to undertake projects, the Secretary will require the Tribe to demonstrate (to the Secretary's satisfaction) that it meets certain objective standards necessary for approval of a TERA agreement. The Tribe must have the TERA agreement in place before the Tribe can proceed with its energy project without needing further Secretarial approval for the elements of the project that are governed by the TERA.

The following is a detailed description of the elements necessary for a Tribe to evaluate with regard to tribal capacity when considering entering into a TERA agreement with the Secretary. In the pre-submission phase, the Tribe should evaluate its regulatory apparatus and legal infrastructure as well as its history of energy and environmental activities. The specific elements that the Secretary will view as constituting "capacity"

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[163] See 25 CFR 224.71. (When deciding to approve a final proposed TERA, "the Secretary will consider the best interests of the tribe and the Federal policy of promoting tribal self-determination"... and "must approve a final proposed TERA if it contains the provisions required by the Act and this part [the regulations in part 224] and the Secretary determines that the tribe has demonstrated sufficient capacity to manage the development of energy resources it proposes to develop." Bracket added for clarity.)

are derived from the implementing regulation adopted by the Department of the Interior in applying the TEDSDA. This regulation should be consulted when considering whether to proceed with a TERA application and agreement.[164]

II. GENERAL AREAS OF INQUIRY TO DETERMINE CAPACITY

What General Areas of Inquiry Will Be Made Regarding Tribal Capacity To Enter Into A TERA Agreement?

There is no definition of "capacity" in the regulations that apply to the determination whether the Secretary will approve an application by a Tribe to enter into a TERA agreement. Rather, the Secretary initiates a comprehensive review of the following areas of inquiry and makes his determination regarding:

- The specific energy resource development the Tribe proposes to regulate.

- The scope of the administrative or regulatory activities the Tribe seeks to assume.

- The materials and information submitted with its application for a TERA.

- The history of the Tribe's role in energy resource development, including negotiating and approval or disapproval of pre-existing energy related leases, business agreements, and rights-of-way.

- The financial capacity of the Tribe to maintain or procure the technical expertise needed to evaluate proposals and to monitor anticipated activities in a prudent manner.

[164] 25 CFR part 224.

- The Tribe's past performance administering contracts and grants associated with self-determination programs, cooperative agreements with Federal and State agencies, and environmental programs administered by the United States Environmental Protection Agency.

- The Tribe's past performance monitoring activities undertaken by third parties under approved leases, business agreements, or rights-of-way.

- Any other factors the Secretary finds to be relevant in light of the scope of the proposed TERA.[165]

Additional areas of inquiry the Tribe might consider include the following: Does the Tribe have such management level experience on existing energy projects? Does the Tribe have dedicated staff or consultants which will be encouraged to and will sustain focus on an energy project over the course of years? Does the Tribe have, or is it able to attract, sufficient capital needed to ensure the success of the energy project? Does the Tribe's governmental structure lend itself to political and economic stability and appropriately separate government functions from business functions? Does the Tribe have available to it a qualified and capable work-force able to perform the work needed (either because of its internal expertise for all purposes, or experience in working with and managing outside contractors and service-providers)? Does the Tribe have capable legal counsel and, if necessary, other in-house or experts, consultants, and advisors, available to it?

III. ELEMENTS OF A TERA APPLICATION AND AGREEMENT

What questions should a Tribe ask itself when deciding to make application for a TERA?

The TERA application and review process is intended to afford the Secretary the opportunity to assess the Tribe's capabilities and determine whether the Tribe has internal management-level experience on economic development projects in general,

[165] 25 CFR 224.72

whether it has adopted or utilized decision making structures, developed experience with tribal and non-tribal financing arrangements, whether it has contracting experience with tribal members and non-tribal entities, experience internally or externally with consultants services on such aspects of a project as engineering, legal, and environmental permitting and compliance, and whether it has experience managing construction projects and operating them.

As such, in the pre-submission stage, the Tribe should look at the information that it will be required to submit to the Secretary to evaluate whether it is likely to be able to demonstrate current ability to assume authority for approving leases, business agreements, and rights of way for development of energy resources. In this regard, the Tribe's needs to:[166]

- Identify itself as a Federally-recognized Indian Tribe with tribal trust or restricted land upon which it intends to develop an energy project (where tribal land is defined as any land or interests in land owned by a Tribe or Tribes, title to which is held in trust by the United States, or is subject to a restriction against alienation under the laws of the United States, or such lands that have those qualifications subsequent to the effective date of the TERA agreement);

- Describe its form of government;

- Provide certain tribal documents, such as a constitution, code, ordinance, or resolution that designates the tribal governing body or tribal officials that have the authority to enter into leases, business agreements, or rights-of-way on behalf of the Tribe;

- Describe by map, legal and general description the tribal land that the Tribe intends to include in the TERA;

[166] See 25 CFR 224.53

- State whether:
    - the Tribe retains the option of entering into energy-related leases or agreements under laws other than the ITEDSDA (e.g., the Indian Mineral Development Act of 1982) for any tribal land that the TERA includes,
    - that either (a) it intends the TERA to include all tribal land, energy resources, and categories of energy-related leases, business agreements, and rights-of-way, or (b) it intends the TERA to include only certain tribal land, energy resources, or categories of energy-related leases, business agreements or rights-of-way in the TERA (and, if this is the case, going on to specify and describe the tribal land, energy resources, or categories of energy-related leases , business agreements, or rights-of-way that the Tribe intends to include in the TERA), and
    - it intends to amend or modify leases, business agreements , or rights-of-way that exist when a TERA is approved if those activities are directly related to the activities authorized by the TERA (and whether the Tribe's ability to make such amendments or modifications requires the agreement of the other parties to those leases, business agreements or rights-of-way);
- Describe the Tribe's experience in negotiating and administering energy-related leases, business agreements, and rights-of-way issued under other Federal laws that includes descriptions of significant leases, business agreements and rights of way the Tribe has entered into with third parties or to which it has consented;

- Describe the expertise that the Tribe will use to administer the TERA and explain how that expertise meets the requirements of the regulations (particularly with regard to expertise the Tribe has to:
    - negotiate or review leases, business agreements, or rights-of-way under the TERA,
    - evaluate the environmental effects, including those related to cultural resources, of leases, business agreements or rights-of-way entered into under a TERA,
    - review proposals for leases, business agreements and rights-of-way under the TERA, and
    - monitor the compliance of a third party with the terms and conditions of any leases agreements and rights-of-way covered by the TERA, and other statutory requirements. In doing so, the Tribe must describe (a) its own existing energy resource development related departments or administrative divisions, (b) its proposed energy resource development related departments or administrative divisions within the Tribe, (c) existing energy resource development related expertise possessed by the Tribe, including a description of the relevant expertise of designated tribal employees, consultants and/or advisors, and (d) proposed energy resource development related expertise that the Tribe may acquire, including a description of the relevant expertise of designated tribal employees, consultants and/or advisors that that the Tribe intends to hire or retain;

- Describe the scope and amount of administrative activities related to the permitting, approval, and monitoring of under any lease, business agreement, or right-of-way that the Tribe intends to enter into under an approved TERA and explain:
    - its scope and plan for such administration and management in sufficient detail for the Secretary to determine the Tribe's capacity to administer and manage the regulatory activities,
    - that its intended scope of administrative responsibilities will not include the responsibilities of the Federal government under the Endangered Species Act or other "inherently Federal functions," and
    - the regulatory activities that it intends to assume in the geographical area it has identified as within the TERA.
- Describe how the Tribe is capable of assuming all of the activities the Tribe has identified in its TERA application, including but not limited to:
    - a description of the amount of administrative activities related to the permitting approval, monitoring of activities as applicable that the Tribe proposes to undertake under any lease, business agreement, or right-of-way the Tribe executes under an approved TERA;
    - its intent and description of the scope of the Tribe's plan for such administration and management in sufficient detail to determine the Tribe's capacity, as well as the Tribe's estimated annual costs to assume those activities that the Tribe identifies and the proposed source of tribal funds to carry out those activities, and the annual amount needed to conduct those activities the Tribe has identified;

- the application and any Federal program that may provide those funds, and a description of all compacts and contracts between the Tribe and the Secretary under the Indian Self-Determination and Education Assistance Act, all environmental programs that the Tribe has assumed under the Clean Water Act or the Clean Air Act, and all cooperative agreements, if any under the Federal Oil and Gas Royalty Management Act;

- Provide resolutions or formal actions of the Tribe's governing body or bodies that approves submission of an application for a TERA;

- Designate a contact and pertinent contact information of the Designated Tribal Official who will receive notifications from the Secretary or the Director regarding the status of the TERA application.

IV. REQUIRED PROVISIONS OF A TERA

Federal regulations require certain provisions to be in the TERA agreement itself[167]. Those provisions establish requirements the Tribe must satisfy in the event it enters into a TERA. Therefore, a Tribe considering whether to submit a TERA application should determine that:

A. The Tribe has the capacity to establish and ensure compliance with an environmental review process for leases, business agreements and rights-of-way which:

   i. Identifies and evaluates all significant environmental effects, including effects on cultural resources;

   ii. Identifies and incorporates appropriate mitigation measures;

   iii. Informs the public and provides opportunity for public comment on the environmental impacts;

[167] See 25 CFR 224.63

iv. Provides sufficient tribal administrative support and technical capability to carry out the environmental review process;

v. Develops adequate tribal oversight of the energy resource development activities that a third party conducts, to determine whether that entity or person complies the TERA and applicable Federal and tribal environmental laws;

B. The Tribe has the capacity to adopt and require with regard to leases, business agreements and rights-of-way:

i. Mechanisms for obtaining corporate, technical and financial qualifications of any third parties;

ii. Compliance with limitations on duration of agreements that meet the restrictions of the implementing regulations;[168]

iii. Mechanisms for amendment, transfer and renewal;

iv. Mechanisms for obtaining reporting and evaluation of the economic return to the Tribe;

v. Mechanisms for securing technical information about activities and ensuring that technical activities are performed in compliance with terms and conditions;

vi. Mechanisms to ensure compliance with all applicable environmental laws;

vii. Mechanisms to ensure that third parties comply with all applicable environmental laws;

viii. Mechanisms to identify tribal representatives with the authority to approve the lease, business agreement or right of way;

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[168] 25 CFR 224.86

ix. Mechanisms to give public notification that the lease, business agreement or right-of-way has received final tribal approval;

x. Processes for consultation with the affected states regarding off-reservation impacts, if any;

xi. Descriptions for remedies for breach of the lease, business agreement or right-of-way;

xii. Assurance that any lease, business agreement or right of way will state that any provision that violates the terms or requirements of the TERA is null and void;

xiii. Assurance that any lease, business agreement or right of way will contain a statement that if the Secretary determines that any provision that violates an express term or requirement of the TERA is material, the Secretary may suspend or rescind the lease, business agreement, or right-of-way or take any action the Secretary determines to be in the best interest of the Tribe;

xiv. Assurance that any lease, business agreement, or right of way subject to a TERA will go into effect when the Tribe delivers executed copes of the lease business agreement, or right of way to the Director of the Office of Indian Energy and Economic Development by first class mail return receipt requested or express delivery;

C. The Tribe has the capacity to ensure with regard to any TERA that the Tribe will:

i. Include in the TERA citations to any applicable tribal laws, regulations or procedures that provide opportunity for the public to comment on tan to participate in public hearings, and provide remedies that petitioning parties must exhaust before filing a petition with the Secretary under the regulations;

ii. Include a statement in the TERA that the Tribe will provide the Secretary with citations to any tribal laws, regulations, or procedures that Tribe adopts after the effective date of a TERA that establish, amend or supplement tribal remedies that petitioning parties must exhaust before filing a petition with the Secretary under the regulations;

iii. Designate a person or entity, together with contact information, authorized by the Tribe to maintain and disseminate to requesting members of the public current copies of tribal laws, regulations, or procedures that establish or describe tribal remedies that petitioning parties must exhaust before instituting appeals under the regulations;

iv. Identify financial assistance, if any that the Secretary has agreed to provide to the Tribe to assist in implementation of the TERA, including the Tribes environmental review of individual energy development activities;

v. Notify the Secretary and the Director in writing, as soon as practicable after the Tribe receives notice, of a violation or breach of the TERA agreement;

vi. Agree and ensure that the Tribe and the Tribe's financial experts will adhere to Federal auditing standards and applicable professional education requirements;

vii. Submit to the Director information and documentation of payments made directly to the Tribe, if any, including documents evidencing proof of payment such as cancelled checks, cash receipt vouchers, copies of money orders or cashiers' checks, or verification of electronic payments;

viii. Create, maintain and preserve records related to the leases, business agreements, or rights of way and performance activities of a Tribe assumed under a TERA sufficient to facilitate the Secretary's periodic review of the TERA.

V. THE TERA PROCESS

What is The Process for Negotiating A TERA Agreement?

Assuming that after a Tribe has done its self-evaluation and believes that it will be able to demonstrate its capacity to enter into a TERA agreement in pursuit of its energy project development, it will be required to follow the administrative process established by the Secretary for approval of a TERA. That process is detailed in the Code of Federal Regulations at 25 CFR part 224. The regulations provide for the following: (1) pre-application consultation between the Tribe and the Director, Office of Indian Energy and Economic Development, (2) the application for a TERA, (3) an Application Consultation Meeting, (4) issuance by the Director of a Report on the Application Consultation Meeting, (5) a final TERA application, (6) Public Notification and Comment, (7) conduct by the Secretary of an analysis of the TERA under the National Environmental Policy Act, (8) Secretarial Decision to Approve or Disapprove the TERA and notification to the Tribe, and (9) an appeal process if the Tribe disagrees with the Secretarial decision.[169]

VI. ENERGY PROJECT DEVELOPMENT WITHOUT A TERA

What if the Tribe Decides Not to Enter into a TERA Agreement with the Secretary?

If the Tribe decides not to enter into a TERA agreement with the Secretary, it may still pursue energy resource development under either the Indian Mineral Leasing Act of 1938 ("IMLA," 25 U.S.C. §§396a-396g) or the Indian Mineral Development Act of 1982 ("IMDA," 25 U.S.C. §§2101-2108).

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[169] A flow chart of this process may be found at http://teeic.anl.gov/documents/docs/TERA_flowchartTEEIC.pdf. Retrieved 11/2/09.

- **The Indian Mineral Leasing Act of 1938**. Under the IMLA, unallotted tribal lands may be leased for purposes of mineral development but only with the approval of the Secretary of the Interior. Such leases may be for a period not to exceed 10 years and thereafter as minerals are produced in paying quantities. The IMLA gives the Secretary, and not the Tribe, the decision-making authority when it comes to deciding the terms and conditions of a land lease for mineral development.

  The leases are offered to the highest bidder at public auction or through the submission of sealed bids after public notice and advertisement. The terms and conditions of the leases are prescribed by the Secretary, and the Secretary retains the right to reject any bid "whenever in his judgment the interest of the Indians will be served by doing so and if no satisfactory bid is received..." Under the IMLA, the Secretary may reject the highest bid if, in his judgment, it is "unwise in the interest of the Indians" to accept the bid.

- **The Indian Mineral Development Act of 1982**. Under the IMDA, any Tribe may negotiate and enter into minerals agreements, including leases, with private partners providing for exploration, production, and development, of the Tribe's mineral resources. These tribally-negotiated agreements must be approved by the Secretary to be valid. At the request of a Tribe, the Secretary is obliged to provide, either directly by dedicating Federal officials and resources or indirectly by providing funds to the Tribe to secure by contract, assistance that might be of value to the Tribe that is negotiating a minerals agreement with a partner.

  The mechanics of the IMDA are such that after submission of a minerals agreement by a Tribe, the Secretary has 180 days to approve or disapprove the agreement. The Secretary, not the Tribe, is required to make a determination that (1) the minerals agreement is "in the best interest of the tribe" and (2) in making the decision the Secretary must consider the potential economic return to the Tribe, any environmental, social, or cultural impacts that might occur as a

result of the mineral development, and provisions for resolving disputes that may arise between the parties.

Under the IMDA, once a mineral agreement has been approved by the Secretary, the U.S. is not liable “for losses sustained” but the U.S. continues to have a “trust obligation” to protect rights of tribe if another party to the agreement violates the terms of the agreement. Under the ITEDSDA, once a TERA has been approved and energy development proceeds, the United States shall not be liable to any party (including any Indian tribe) for “any negotiated term of, or any loss resulting from the negotiated terms” of, a lease or other business agreement.

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