RENEWABLE ENERGY AND TRANSMISSION ELEMENT
COUNTY OF IMPERIAL GENERAL PLAN

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IMPERIAL COUNTY GENERAL PLAN
RENEWABLE ENERGY AND TRANSMISSION ELEMENT

I. INTRODUCTION

A. Preface

Imperial County is a national leader in the development of its renewable energy resources. Also, the County supports and encourages the development of renewable energy resources in a manner compatible with the protection of existing communities, agriculture, military operations and sensitive environmental resources. The County implements this goal by providing leadership, staff liaison with other regulatory and permitting agencies, and an effective set of goals, objectives, programs and policies to facilitate a balanced development process.

This *Renewable Energy and Transmission Element* is designed to provide guidance and approaches with respect to the future siting of renewable energy projects and electrical transmission lines in the County. This is intended to take into account both the expansion of new types of renewable energy projects and the potential and probable growth of major transmission facilities anticipated to occur in Imperial County. New transmission lines will be needed to accommodate increased demand for power delivery due to both local and regional demand, system delivery requirements in southern California's service area, the need to improve overall system reliability and to support the development of expanded renewable energy power production and exportation.

B. Purpose of the Renewable Energy and Transmission Element

The *Renewable Energy and Transmission Element* is an optional element of the Imperial County General Plan as permitted by Section 65303 of the California Government Code.

The purpose of the *Renewable Energy and Transmission Element* is to provide a comprehensive document that contains the latest knowledge about the resources, feasible development technology, legal requirements, policies (Federal, State and County), and implementation measures. The Element provides a framework for the review and approval of renewable energy projects in the County. The development projections in this Element are based on forecasts obtained from the renewable energy industry, regional utilities, and the Desert Renewable Energy Conservation Plan (DRECP). It is not the intent of the *Renewable Energy and Transmission Element* to provide zoning, regulation, permitting or taxation.

C. Benefits of Renewable Energy and Transmission Development

The benefits of Renewable Energy development in Imperial County are:

1. Fiscal benefit of expanded property tax revenues;

2. Fiscal benefit of sales tax revenues from the purchase of equipment, goods and services;

3. Royalty and lease benefits to local landowners and County;

4. Social and fiscal benefits from increased economic activity and local employment opportunities that do not threaten the economic viability of other industries;

5. Improvements in technology to reduce costs of electrical generation;

6. Reduction in potential greenhouse gases by displacing fossil-fuel-generated electricity with renewable energy power which does not add to the greenhouse effect;

7. Contribution towards meeting the State of California's Renewables Portfolio Standard (RPS); and

8. Minimization of impacts to local communities, agriculture and sensitive environmental resources.

The benefits of Electrical Transmission and Joint Use Corridors in Imperial County are:

1. Provision of infrastructure for additional capacity to transmit renewable energy generation to meet both local and regional demand for electric power;

2. Increase in reliability of California's electrical system;

3. Reduction of potential land conflicts between and among renewable energy developers, agriculture, environmental resources and local landowners; and

4. Provision of increased certainty as to the future location and siting of electrical transmission facilities.

II. EXISTING CONDITIONS AND TRENDS

A. History of Renewable Energy Generation

Imperial County has a long history of generating energy from renewable sources. Direct heat application of geothermal energy resources in the form of hot springs was initially used by Native Americans and later by European settlers. The first attempts to utilize the underground geothermal resources in the County commenced with the drilling of three wells between 1927 and 1928 on Mullet Island. The wells were abandoned because the steam pressure and volume were insufficient for commercial use. Successful geothermal wells were drilled in the 1950s, but the production of electricity was impeded by mineral deposition and corrosion of equipment.

From 1965 to 1970, the University of California at Riverside conducted an intensive investigation of geothermal resources in the Imperial Valley. The research culminated in a 1971 report entitled *Cooperative Geological-Geophysical-Geochemical Investigations of Geothermal Resources in the Imperial Valley Area of California*. Numerous subsequent studies throughout the years have been performed to determine the nature of geothermal resources in the Salton Trough. This data has facilitated the development of economically efficient geothermal/alternative energy power plants.

In the mid 2000's, the State of California Legislature enacted renewable regulations and requirements for utility companies to generate a significant percentage of electrical energy from geothermal and other renewable resources known as the Renewable Portfolio Standards of California (RPS). The regulations, as of 2014, required that the electrical utilities needed to achieve 33% of their energy from renewable energy resources by 2020. From 2009 to 2014, Imperial County received 36 applications for renewable energy projects, with 24 permits approved for implementation. Providing that all 24 approved renewable energy projects are implemented, approximately 3,700 megawatts of additional electrical power would be generated from renewable resources.

A variety of environmental documents have analyzed the environmental effects and mitigation measures of renewable energy development in Imperial County. The major environmental issues addressed in these documents include air quality; agricultural, natural and cultural resources; public health; compatibility with urban land uses; and military operations. Approximately 22,000 acres of agriculturally designated land will be impacted by the implementation of the applications for renewable energy development (for more detailed history, please refer to Appendix A).

B. Geologic and Climate Conditions

<u>Geologic Conditions</u>

The Imperial Valley is part of a large, southeastern-trending basin known as the Salton Trough, which is a 3,100-square-mile structural depression that extends from the Transverse Range on the north to the Gulf of California on the south. The Peninsular Range forms the western border of the valley, and the Colorado River forms the eastern border. The formation of the Colorado River delta perpendicular to the Trough created a

subsiding basin to the north that contains the Salton Sea and Imperial Valley. The Salton Trough Basin is bound to the east by the Chocolate Mountains and associated ranges. Though the area east of those mountains and continuing over to the Colorado Riveris technically part of the basin and Range geomorphic province, it is not the subsiding Salton Trough. The Salton Trough is an active spreading rift valley where sedimentation and natural tectonic subsidence are nearly in equilibrium. A thick clay-dominated strata extends downward from 1,000 to about 3,000 feet throughout the Trough.

The California Division of Mines and Geology recognizes the Salton Trough as an area underlain at shallow depths by thermal water of sufficient temperature for direct heat application. Separate geothermal anomalies are distributed throughout the Trough that have hotter fluids suitable for generation. Hypersaline brines are present under the Salton Trough, but are not found everywhere. The hypersaline brines are only found in the northern central 1/3 of the basin where ancient salt and evaporate deposits were located. The southern 1/3 of the basin extending to Mexico and the northern 1/3 extending into the Coachella Valley are not underlain by hypersaline brines. Large-scale development of the geothermal resources has depended on the ability to engineer cost-effective technology which overcomes technical problems and makes geothermal development economically feasible.

The United States Geological Survey (USGS) has identified nine Known Geothermal Resource Areas (KGRAs) in Imperial County. A KGRA is defined as:

> An area in which the geology, nearby discoveries, competitive interests, or other indicia would, in the opinion of the Secretary of the Interior, engender a belief in those who are experienced in the subject matter that the prospects for extraction of geothermal steam or associated geothermal resources are good enough to warrant expenditures of money for that purpose (30 U.S.C. 1001).

The nine KGRAs are located throughout the County and vary in temperature, pressure, and chemical composition of brine solutions found in each area (ICPDS 2006), and constitute approximately 326,938 acres (11 percent) of total land area of the County of Imperial (Table 1: Geothermal Resource Area Acreages in Imperial County). Four of the nine KGRAs are located within Imperial County designated Geothermal Overlay Zones that have been identified in approved Environmental Impact Reports (EIRs). These areas would provide opportunities for geothermal energy generation.

Figure 1 shows the locations of the existing KGRAs, the Truckhaven Geothermal Leasing Area, and West Chocolate Mountains Renewable Energy Evaluation Area. Figure 1 also shows the locations of the four existing Geothermal Overlay Zones that were approved previously by the County that will be incorporated into the Renewable Energy Overlay Zone.

Figure 1: Known Geothermal Resource Areas in Imperial County

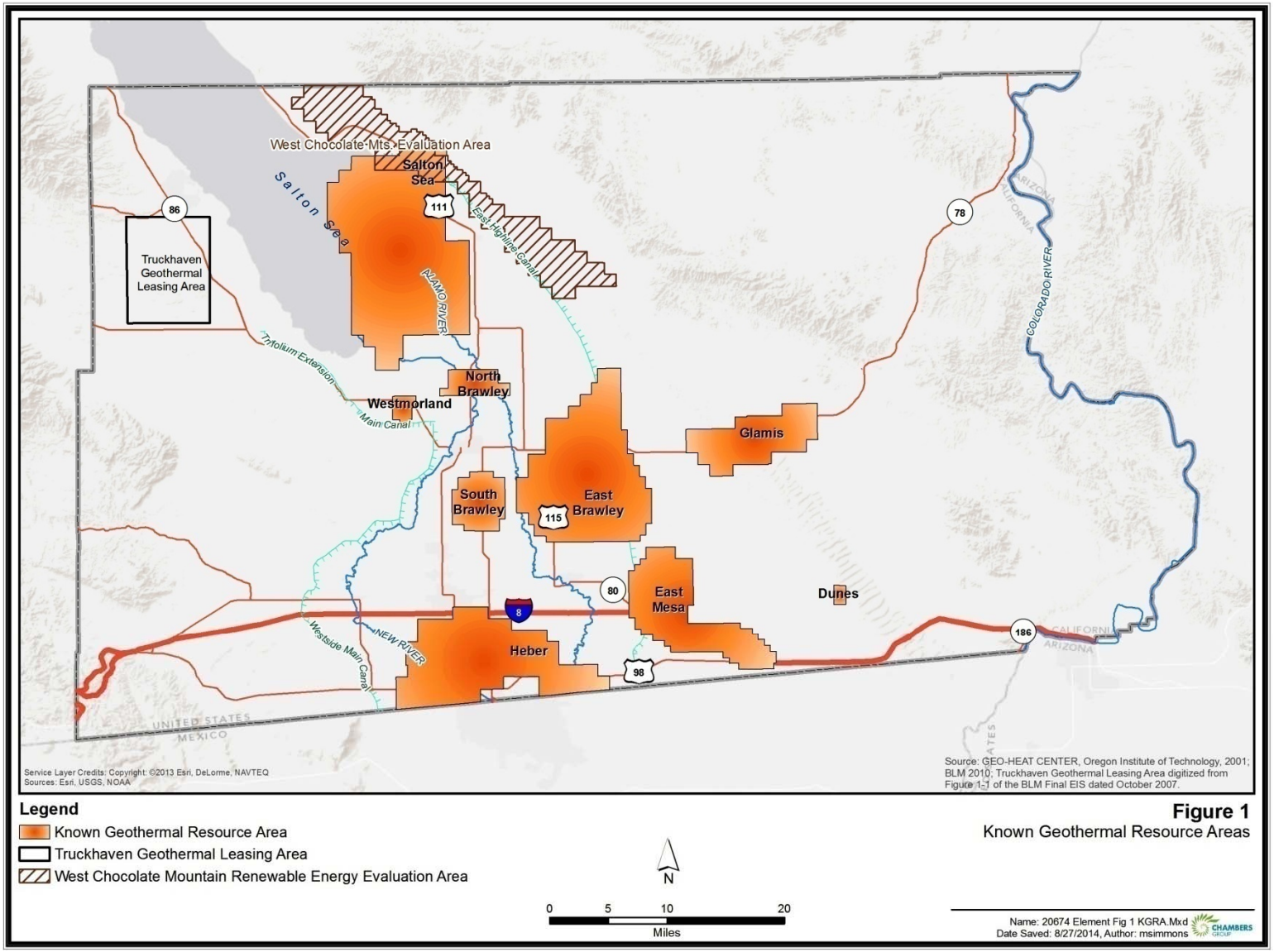


Table 1: Geothermal Resource Area Acreages in Imperial County

Known Geothermal Resource Area*	Area (acres)	Percentage of Imperial County
Salton Sea	103,221.51	3.51%
East Brawley	70,548.85	2.40%
Glamis	25,985.76	0.88%
East Mesa	37,802.91	1.28%
Dunes	7,723.11	0.26%
South Brawley	12,782.22	0.43%
Heber	59,319.26	2.02%
Westmorland	2,534.01	0.09%
North Brawley	7,020.26	0.24%
Total	**319,917.63**	**11.11%**

Source: Geo-Heat Center, Oregon Institute of Technology

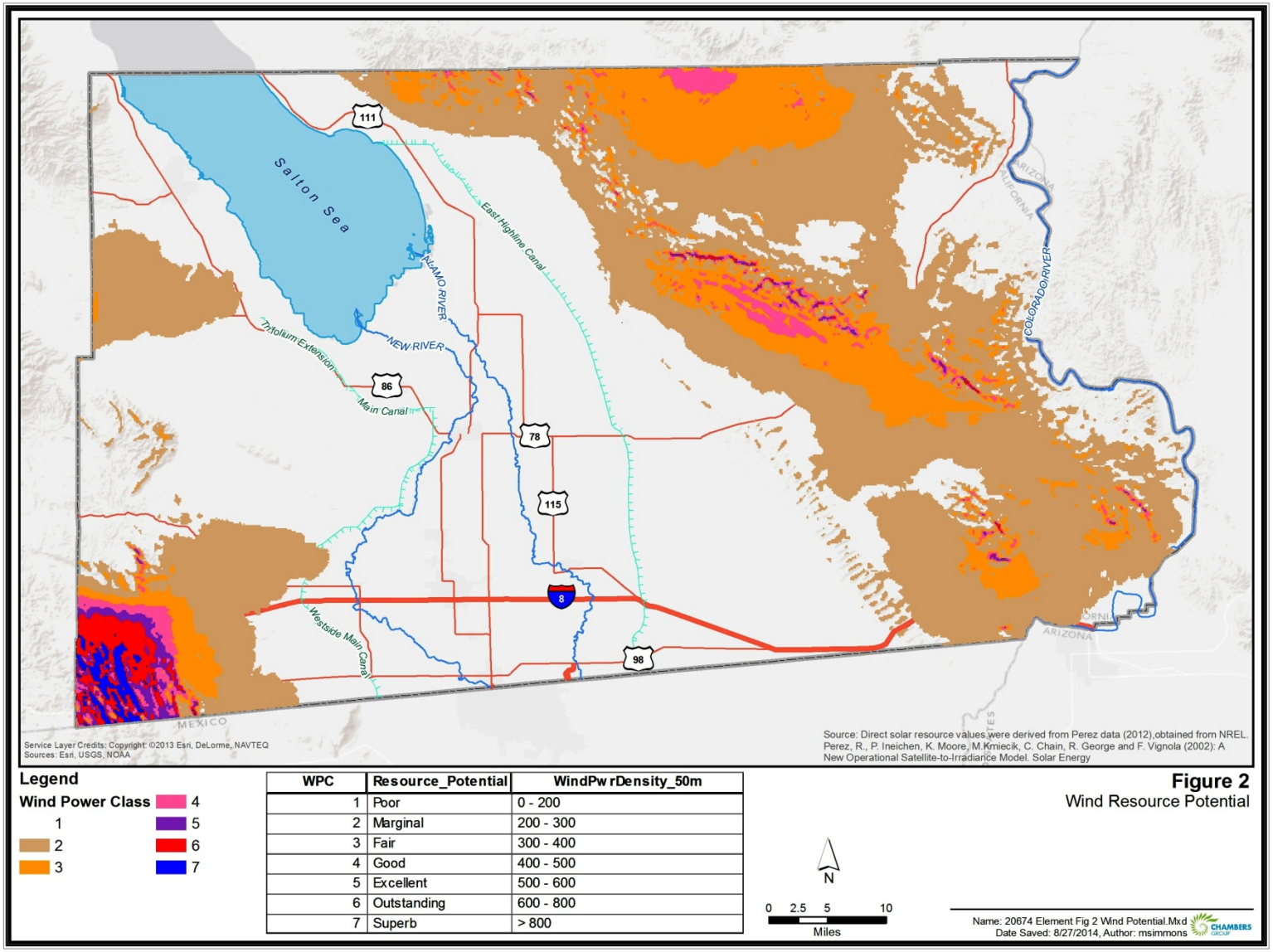
Climate Conditions

Imperial County is characterized as a semiarid desert with hot, dry summers and warm winters. Rainfall at the El Centro Station, which represents the area's climate in the SSAB, averages approximately 2.64 inches annually (Western Region Climatic Center (WRCC) 2014). The heaviest precipitation occurs in January through March. The mean annual air temperature ranges from 55 degrees Fahrenheit (°F) in January to 92 °F in July, with an annual average temperature of approximately 73 °F (WRCC 2014).

The combination of the flat terrain of the valley and the strong diurnal temperature differentials created by solar heating produce moderate winds and deep thermal convection, making the County an ideal location for a wide range of renewable energy projects. The high temperatures combined with low humidity produce hot, dry summers and warm winters that make the area attractive for future renewable energy development.

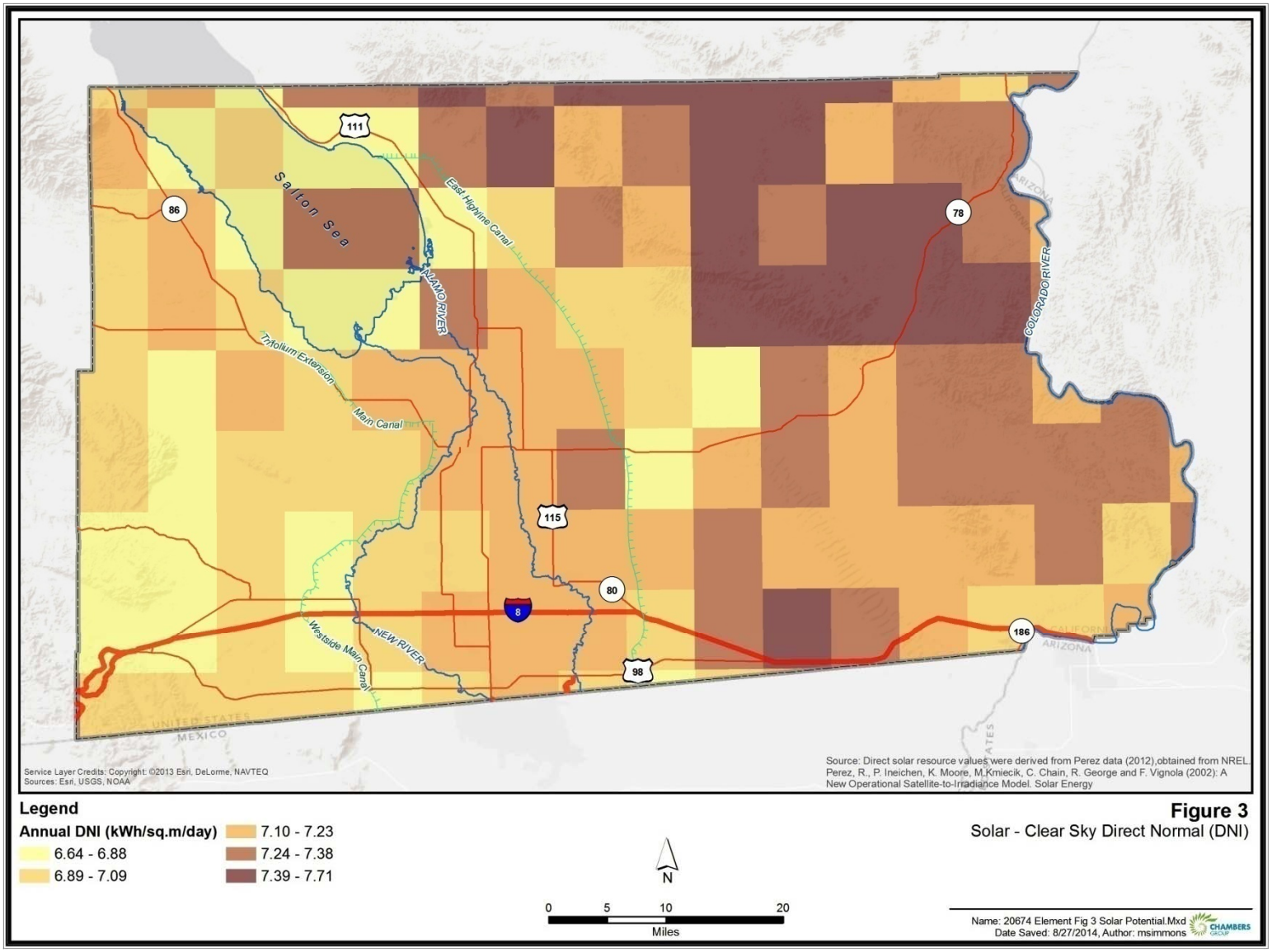
Based on U.S. Department of Energy's National Renewable Energy Laboratory which identifies areas with potential for wind and solar power resources, Imperial County has excellent solar resources and limited wind resources. The annual average daily total solar resources and the annual clear sky direct normal irradiance (DNI) data is beneficial in determining solar resources opportunity areas. These factors result in the excellent basis for solar resources for power generation in the County.

Figure 2: Potential Wind Power Resource Areas in Imperial County



WPC	Resource_Potential	WindPwrDensity_50m
1	Poor	0 - 200
2	Marginal	200 - 300
3	Fair	300 - 400
4	Good	400 - 500
5	Excellent	500 - 600
6	Outstanding	600 - 800
7	Superb	> 800

Figure 3: Potential Solar Power Resource Areas in Imperial County



C. Existing Renewable Energy Generation Facilities and Electrical Transmission Corridors

Renewable Electricity Generation

The 1977 Geothermal Element estimated that 4,500 megawatts (MW) of electricity could be generated by the year 2020 from geothermal resources. Geothermal development has been significantly lower than anticipated in 1977; however, an increase in the demand for geothermal electrical generation is anticipated due to the reliable and consistent energy generated over a 24-hour period. An increase in the requirement for energy to be generated from renewable resources could accelerate development of all types of renewable sources, including mineral recovery projects.

Geothermal power generation facilities are currently being operated in the East Mesa, Heber, North Brawley and Salton Sea KGRAs. In addition, the Bureau of Land Management will continue reviewing geothermal leasing areas on Federal lands located in the County. Approximately 19 solar power generation facilities, utilizing photovoltaic technology, have been developed and/or approved throughout much of Imperial County. Many of the facilities are concentrated in southern Imperial County south of Interstate 8 (I-8) between Calexico and the New River. A large wind energy facility has been constructed in southwest Imperial County on both sides of I-8 near Ocotillo. In addition, three bio-mass energy generation facilities producing ethanol and dimethyl-ether (DME) have been approved in the Brawley area.

Electrical Transmission

The Imperial Irrigation District (IID), as the Balancing Authority, is the primary electrical Transmission Service Provider (TSP) in Imperial County. IID is the responsible entity for maintaining load-interchange-generation balance within their Balancing Authority Area and supports interconnection frequency in real time. As the Balancing Authority, the IID maintains load-resource balance (generation, transmission and load) within its metered boundary. IID's Board of Directors has ratemaking authority. Retaining local ratemaking authority enables lower energy rates.

The IID is the primary owner of electrical transmission and the sole owner of the distribution network in Imperial County. IID provides electrical service for residential, commercial, and industrial customers in Imperial and portions of Riverside and San Diego Counties. Their transmission system consists of 500 kilovolt (kV), 230-kV, 161-kV and 92-kV transmission lines and lower voltage distribution lines. The two existing 230-kV transmission lines provide for import/export of renewable electrical within the County and regionally.

San Diego Gas and Electric (SDG&E) and IID have two 500-kV lines that traverse the southern part of Imperial County and interconnect with the transmission system in Arizona. These two 500-kV lines currently serve as the primary import lines for electrical power to be brought into SDG&E's system to supply power to San Diego County and the City of San Diego. These two 500-kV lines also provide import/export capacity to the

IID service area. The Sunrise Powerlink, completed in June 2012, provides additional transmission capacity between Imperial and San Diego counties.

Several 92-kV transmission lines provide interties between the renewable power plants in the County and tie these electric generation sources into the IID transmission and distribution system, I.V. Substation and the California grid. If the renewable power generation facilities that are now in the planning stages are built, then new interties and substations may be constructed to link these generation facilities into transmission lines.

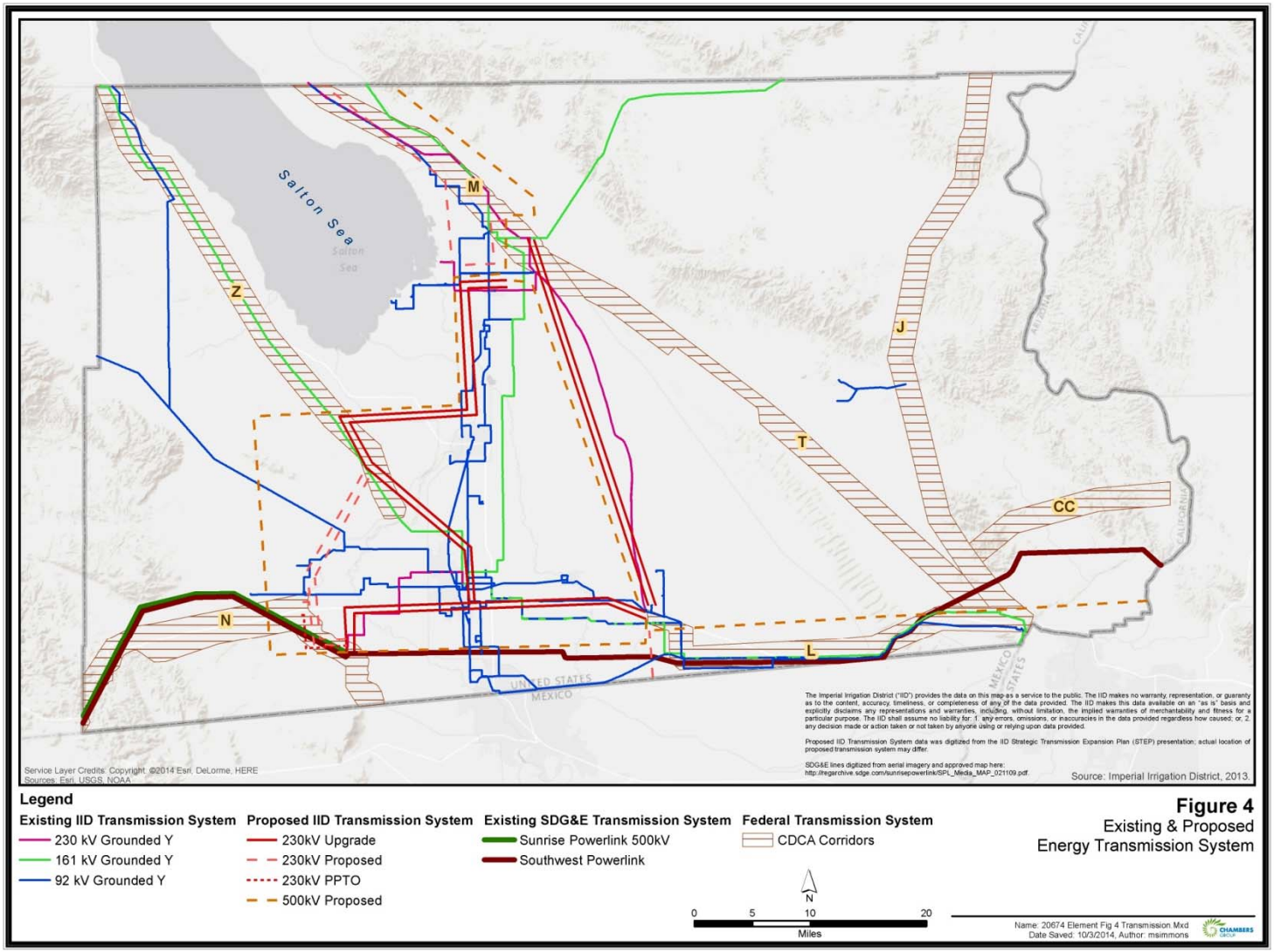
An upgrade to the 230kV IID line (Path 42) is currently under way located on the east side of the Salton Sea. This transmission upgrade would provide additional capacity to deliver energy generated in Imperial County from renewable resources to load centers in California. IID has also proposed a 500-kV Direct Current link between Imperial County and the San Onofre Nuclear Generation Station (SONGS) to facilitate the transmission of additional energy to compensate for the generation capacity lost when SONGS was shut down in 2013.

The remaining planned transmission lines are anticipated to be smaller and intended primarily to support power plant development. It is the intention of this *Renewable Energy and Transmission Element* to provide input and guidance to those developers and agencies that will plan and have regulatory siting authority over the proposed and potential transmission lines to be constructed in the County. Figure 4 shows the existing and proposed IID and SDG&E electrical transmission corridors described above.

D. Renewable Energy Generation and Electrical Transmission Line Siting Development Regulation

A wide variety of Federal, State, and County agencies regulate and monitor development of renewable energy and transmission line siting in Imperial County and their responsibilities often overlap. Government agencies use permits to exercise their discretionary power or require developers to conform to regulatory conditions. The permits require developers to conform with all agency regulations and regulatory conditions established by other agencies with jurisdictional authority. All discretionary decisions for permits must be preceded by appropriate environmental review pursuant to the National Environmental Policy Act (NEPA) and/or the California Environmental Quality Act (CEQA). Permits often stipulate conditions to mitigate potential environmental impacts and implement monitoring programs to assure conformance with permit conditions over the life of the project.

Figure 4 Existing and Proposed Energy Transmission System



Renewable Energy Generation

The County, through the Planning and Development Services Department, regulates the use of land for renewable energy purposes through zoning and Conditional Use Permits (CUPs). A Renewable Energy (RE) Overlay Zone was added to the County Land Use Ordinance, Division 17, which following a recommendation by the County Planning Commission, was approved by the Board of Supervisors. The County acts as "lead agency" in the preparation of environmental documents for renewable energy projects within its jurisdiction.

The following agencies, among others, are also involved in permitting or regulating renewable energy projects: Federal Energy Regulatory Commission; California Energy Commission; Army Corps of Engineers; California Public Utilities Commission; Department of the Navy; State Lands Commission; State Water Resources Control Board; State Department of Fish and Wildlife; Regional Water Quality Control Board; County Air Pollution Control District; and Imperial Irrigation District.

Electrical Transmission

If a transmission line is intrastate and does not cross federal lands, then the proposed line must undergo environmental review pursuant to CEQA. Once the project is completely defined an appropriate "Lead Agency" will be identified to implement CEQA.

If the transmission line is wholly within federal lands, or has a federal nexus, then the federal Lead Agency must prepare an environmental review document for the project as outlined by the National Environmental Policy Act (NEPA). If a project crosses a combination of local, state and federal lands in California, then a joint CEQA/NEPA document is usually prepared. The agency which has the greatest impacts to its jurisdiction (most often the greater lineal distance on their lands or area of jurisdiction) would serve as lead agency for the CEQA portion and the primary Federal Agency will be responsible for the NEPA element for preparation of the environmental document.

If a State agency, such as the California Public Utilities Commission (CPUC), takes the lead in a CEQA equivalency process over the local agency, such as the County of Imperial, then the NEPA review will still lie with Federal Agency with land use control. This scenario would likely occur when an investor-owned utility (over which the CPUC has exclusive regulatory authority in California to permit and site electrical utility lines) is the project proponent and the State of California has greater overall regulatory interest.

Agencies with Permit Authority over Renewable Energy Generation and Electrical Transmission Line Siting

The agencies with regulatory and environmental oversight are outlined below:

- Federal Energy Commission (FEC) – Interstate electrical transmission lines where the primary intent of the line is to service interstate power interest, where no formal State environmental guidelines apply, and where federal lands may also be involved.

- Other Federal Agencies (Bureau of Land Management [BLM], U.S. Forest Service [USFS], U.S. Fish and Wildlife Service [USFWS], U.S. Army Corps of Engineers [USACE], Bureau of Indian Affairs [BIA], Department of Defense [DOD], etc.) – Lines that are within federal lands and are not being developed primarily for interstate transmission of electrical power.

- California Energy Commission (CEC) – Electrical transmission lines that are appurtenant to a thermal power generation facility of equal to or greater than 50 MW in size from the facility to the first point of interconnection. It is important to note that the environmental review process implemented by CEC is a Certified Regulatory Program under CEQA (§21080.5) and results in a document that is the functional equivalent of an EIR.

- California Public Utilities Commission (CPUC) – Transmission lines that are being sited and developed by an electrical corporation.

- California State Lands Commission – Lines that are primarily or exclusively within the boundaries of lands owned by the State of California.

- Municipal Utilities (includes irrigation districts and water authorities) – Agencies that act as their own regulatory entities for the siting and permitting of electrical transmission lines. Municipal Utilities must follow CEQA guidelines with respect to siting decision-making; however, they are not subject to other extra territorial review and oversight, assuming none of the conditions apply as outlined for the agencies listed above.

In Imperial County, all of the agencies and governmental entities listed above could potentially be involved in the siting and permitting of electrical transmission lines; however, the agencies with the greatest potential for transmission line regulatory oversight and siting would likely be federal land and resource management agencies (such as ACOE, USFWS, BLM, BIA, DOD, and Bureau of Reclamation[BOR]) CEC, CPUC, , the California State Lands Commission, or a local municipal utility (such as the Imperial Irrigation District).

While the County would have some land use and zoning regulatory authority concerning the siting and construction of electrical transmission lines, environmental review would predominately be the responsibility of one or a combination of agencies listed above. The following is a synopsis of the siting review and environmental oversight for each of the various agencies that could be called upon to provide siting regulatory oversight in Imperial County.

Federal Agencies

If a transmission project is to be sited on federal lands, then the specific agency whose lands would be impacted would be the lead agency for regulatory oversight. There have been instances where the federal government has served as lead agency for lines not on federal lands as well. That agency would be required to review the applicant's

project following the NEPA guidelines and in particular those administrative guidelines the agency has put in place to adhere to NEPA. Each agency has developed specific approaches to implementing project environmental review for the siting of projects such as electrical transmission lines. In Imperial County, the primary federal agencies that would review transmission projects are BLM, BOR (Salton Sea), and Department of Defense (Naval Air Facility, El Centro). While each agency has its own process to comply with environmental review, the agency would generally follow the NEPA process.

The Federal Aviation Agency (FAA) needs to be notified of any new construction or alteration to transmission structures that may impact the National Airspace System. FAA will perform or require the developer to perform an aeronautical study of the proposed transmission line development / modification. The results from this study may require a utility or developer of transmission assets to install obstruction lighting and/or markers.

The Federal Communications Commission (FCC) prohibits the operation of transmission lines and associated equipment that interferes with radio frequency communication. If a transmission line is found to interfere with radio communications, appropriate mitigation methods must be employed. CPUC's General Order 95 is the document that governs the construction and operation of power lines to prevent or mitigate radio frequency interference.

Western Area Power Administration

Western Area Power Administration (WAPA) is a Federal Power Marketing Administration within the Department of Energy (DOE). The agency primarily markets federal power for project use and marketing to "preference" customers, who are generally nonprofit public entities including federal and state governments, municipal utilities, electric cooperatives, Native American tribes, etc. WAPA owns and operates high voltage transmission facilities throughout 15 central and western states. WAPA assesses the potential environmental impacts of any proposed transmission interconnection project in accordance with NEPA and other relevant environmental regulations.

The interconnection procedures for connecting to WAPA's system are similar to those that are followed by public utilities. WAPA's interconnection procedures are essentially in accordance with the Open Access Transmission Tariff on file with FERC.

California Energy Commission

As noted above, the California legislature has provided regulatory authority and oversight to CEC for the siting of thermal energy generation facilities in the State that are 50 MW or larger. Transmission lines from the power plants to the first point of interconnection are also within the jurisdiction of CEC. CEC must provide environmental review and permit oversight in the siting of these transmission lines and their relationship to the power plants to which they are interconnected. CEC (as mentioned above) has established a specific CEQA "equivalent" review process that all energy

facilities and their related transmission facilities are required to undergo as part of an Application for Certification. CEC must complete their review of the application as well as an environmental review per CEQA-equivalent Certified Regulatory Program prior to issuing to the project proponent a Permit to Construct. CEC and the County of Imperial coordinate the permitting and siting of power plants and interconnection facilities.

California Public Utilities Commission

CPUC has discretionary approval authority over the planning, design, economic, and environmental considerations for new facilities proposed by the three investor-owned utilities (IOU), Pacific Gas and Electric, San Diego Gas & Electric, and Southern California Edison, referred to in the Public Utilities Code as electrical corporations. Two key regulations which govern these activities are: (1) PUC General Order 131(d) (Rules Relating to the Planning and Construction of Electric Generation, Transmission/Power/Distribution Line Facilities, and Substations Located in California); and (2) Rules 17.1 and 17.3 (The Commission's Rules of Practice and Procedure), which require the PUC to conduct CEQA review for transmission line applications. These rules apply to any project initiated by an IOU in the State of California on public or private land. It is also likely that other private transmission developers would also need a CPCN from the CPUC to proceed with a project, and that would include environmental review.

As delineated in §131(d), a new transmission line proposal could fall under the jurisdiction of one of two permits: (1) the Certificate of Public Convenience and Necessity (CPCN) or (2) a Permit to Construct (PTC). In general, the CPCN process applies to construction of larger facilities (greater than 200 kV), whereas the PTC applies more to transmission line upgrades and substation modifications (50 kV to 200 kV). Regardless of which "track" is deemed appropriate for a given application, the first step in the process is to file an Application, along with a Proponent's Environmental Assessment (PEA), which describes the applicant's understanding of the potential environmental impacts associated with the proposed project. This filing initiates CPUC's formal review process. When an IOU is seeking CPCN approval through CPUC, the Balancing Authority will typically perform its own independent system assessment relating to proposed transmission line application to determine regulatory and economic need for the project. This does not substitute for the CPUC determination of need, but is highly influential for electrical corporations.

The CEQA compliance process provides several opportunities for public notice and involvement. By statute, the CPUC must consult with local government agencies and consider their land use policies; however, they are not formally bound to adhere to them. This consultation process, along with public and agency commenting opportunities, provides the primary means by which a local government agency can provide input to the process.

California State Lands Commission

The State Lands Commission has jurisdiction over the siting of electrical transmission lines if the project falls wholly within state lands and is not superseded by the jurisdiction

of either CPUC or CEC. If the State Lands Commission is the lead agency for siting review and approval, the standard CEQA process would apply.

California Division of Oil, Gas, and Geothermal Resources

State law designates the California Division of Oil, Gas, and Geothermal Resources (CDOGGR) as the lead agency for geothermal exploration projects on land under the jurisdiction of the State or the County. While CDOGGR exercises this authority in other counties, it has designated the Imperial County Planning and Development Services Department to act as lead agency for geothermal exploration projects.

The Planning and Development Services Department also serves as the lead agency for geothermal power plant projects that generate less than 50 MW (net capacity). CEC is the lead agency for power plants that generate more than 50 MW (net capacity) with the exception of solar plants.BLM is the lead agency for review under the National Environmental Policy Act for geothermal exploration and development projects on lands under their jurisdiction. The lead agency for the California Environmental Quality Act review is a function of the project's State and Local permit requirements.

Municipal Utility and Local Government

Based on the California Government Code Section 53091, publicly-owned utilities are exempt from other local and state regulatory oversight for the siting and approval of transmission lines and can act as their own lead agency; however, they must review the environmental effects of their actions pursuant to CEQA. While each agency (such as the Imperial Irrigation District) may have some administrative differences in how the CEQA process is applied, they must undertake CEQA review of siting new transmission projects. Publicly owned utilities also have the right of eminent domain to ensure that important projects cannot be delayed or blocked due to land ownership purchase or needed acquisition of rights-of-ways for projects which they wish to build and that have undergone CEQA review.

As noted above, the siting of electrical transmission lines is exempt from local government regulatory review; however, local Municipal and County governments do have land use and zoning authority within their boundaries which can be overridden only by a public utility invoking eminent domain. In addition, Municipal and County governments can establish a process for public review and process by developing such a process within their general plans. Several counties in California have done so and helped create and guide a more orderly and comprehensive process to ensure early public input to the siting process, creating the potential for more community participation and a reduction in potential environmental effects caused by the siting of the transmission corridor. In addition, a well-thought-out planning process at the County and Municipal levels can lead to the planning of joint use corridors and efficient implementation of important electrical transmission projects.

The revisions associated with the Imperial County *Renewable Energy and Transmission Element* to include transmission siting and planning is an attempt to provide a more comprehensive and orderly approach to the development of future transmission facilities

in the County. In this regard, the development of utility/road/canal joint use corridors and renewable energy are attempts by the County to provide a new roadmap to foster orderly and environmentally responsible energy and transmission development in Imperial County.

Airport Land Use Commission

The Imperial County Airport Land Use Commission (ALUC) is established pursuant to California Public Utilities Code, Section 21670 et seq. (Chapter 4, Article 3.5 of the State Aeronautics Act). The ALUC helps to ensure that development projects and transmission lines are consistent with the 1996 Airport Land Use Compatibility Plan (ALUCP). The ALUCP guides the reviews of local general and specific plans, zoning ordinances and updates thereto. The ALUC also reviews building heights, restrictions on land use and standards for building construction in the vicinity of the County's seven (7) airports.

E. Issues Relating to Renewable Energy Development and Transmission Corridors

The following issues serve as the basis for the Goals and Objectives contained in Chapter III of this Element.

Aesthetics

The visual character of Imperial County varies greatly, consisting of natural scenic visual resources such as deserts, sand dunes, mountains, recreation areas, and the Salton Sea. The visual character of Imperial County also includes agricultural areas, urban areas, and areas of solar development. Development of renewable energy facilities would have the potential to impact existing visual character and quality, including scenic vistas, natural environment and existing landscape, general built environment and historic buildings, and scenic highways. Renewable energy facilities may also create new sources of substantial light or glare which would adversely affect day or nighttime views in the area.

Future projects would need to evaluate whether their location in relation to key observation areas would impact the existing aesthetics of the surrounding area. Much of the County is visible from major roadways, and potential impacts to existing visual resources from proposed alternative energy projects would need to be considered during siting, planning, and design. Although no highways in Imperial County are designated as state scenic highways, the routes considered eligible for designation are still recognized and would need to be taken into consideration for planning renewable energy projects. Recreational areas with scenic qualities such as the Salton Sea and Picacho State Recreation Area would need to be considered when siting potential renewable energy projects. Furthermore, future projects would also need to be evaluated for compatibility with current visual resource ratings assigned to BLM-managed lands.

Agricultural Resources

According to data from the California Department of Conservation (CDC), approximately 540,942 acres, or 18 percent, of the total land within Imperial County is classified as farmland. Agricultural production constitutes a major portion of the County's overall economy and was estimated to have yielded a gross income of approximately $1,945,759,000 in 2012 (County 2012). It is estimated that approximately 1,668 acres of farmland within the County were converted to other uses between 2008 and 2010 (CDC 2010). The 2012 gross income from agricultural production described above represented a 0.93 percent decrease compared to the 2011 gross value (County 2012). Consequently, development of renewable energy in the County may be constrained due to the potential for projects to further affect revenue produced by agricultural land.

Development of renewable energy projects may also be constrained by federal statutes intended to preserve farmland. The Farmland Protection Policy Act (FPPA) is intended to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. Pursuant to the FPPA, federal agencies must use the criteria and guidelines established in 7 CFR Section 658.5 to identify and take into account the adverse effects of federal programs on the protection of farmland. Because the FPPA does not authorize the federal government in any way to regulate the use of private or nonfederal land or in any way affect the property rights of owners of such land, an opportunity still exists to develop renewable energy projects on these lands.

The California Land Conservation Act of 1965 (commonly referred to as the Williamson Act) enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. Although the Imperial County Board of Supervisors voted not to accept any new Williamson Act applications and not to renew any previous contracts under the program (2010), each existing contract lasts for 10 years. As such, several parcels still remain throughout Imperial County that are subject to the land use restrictions of the Williamson Act agreements.

Development of renewable energy resources will need to incorporate sensitivities with regard to the County's agricultural industry. Given the level of regional reliance on the industry, consideration of a potential site for such facilities should include thoughtful deliberation regarding impacts to farm operations and IID's canal and drain systems which support agriculture. To this end, general and specific standards include preservation of farm operations by minimizing surface land usage and by avoiding disruption to existing irrigation and drainage patterns.

Air Quality

The climate of Imperial County is characterized as a semiarid desert with hot, dry summers and warm winters. The combination of the flat terrain of the valley and the strong diurnal temperature differentials created by solar heating produce moderate winds and deep thermal convection. The high temperatures combined with low humidity

produce hot, dry summers and warm winters. These conditions are attractive for renewable energy development.

Development of renewable energy facilities could increase criteria pollutant emissions, and lead to increases in the frequency or severity of existing air quality violations. Imperial County is currently designated as a nonattainment area for the National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) for 8-hour ozone and particulate matter up to 10 micrometers in size (PM_{10}). A portion of Imperial County is also currently designated a nonattainment area for the NAAQS for particulate matter up to 2.5 micrometers in size ($PM_{2.5}$). Additional emissions generated from development of renewable energy projects within the air basin, particularly during construction, would have the potential to contribute to conditions that already exceed air quality standards. Furthermore, changes in land use (e.g., agricultural to industrial) due to development of renewable energy facilities could also lead to inconsistency in the assumptions used for development of regional transportation plans and State Implementation Plans (SIPs).

Consequently, renewable energy projects developed in Imperial County would need to meet the requirements of the Imperial County Air Pollution Control District (ICAPCD) CEQA Handbook. Any project with the potential to have a significant impact on regional and local air quality would be required to develop a Comprehensive Air Quality Analysis Report. Specifically, the CEQA Handbook requires analysis and mitigation of construction and operational air emissions. The ICAPCD recommends the implementation of effective and comprehensive mitigation measures to reduce air quality impacts.

Biological Resources

A review of the California Natural Diversity Database (CNDDB) managed by the California Department of Fish and Wildlife (CDFW) determined that six sensitive habitats are presumed extant within the County (CDFW 2013a). Similarly, numerous agency-designated sensitive habitats located within the County include, but are not limited to, USFWS Critical Habitat (USFWS 2013d), USFWS National Wildlife Refuges (CEC 2009), and California Desert Conservation Act (CDCA) areas. Additionally, several habitat conservation plan areas exist or are proposed within the County. These conservation areas are designed to conserve the ecosystems upon which listed species depend and ultimately serve to contribute to their recovery. Habitat conservation plans within the County include the Desert Renewable Energy Conservation Plan (DRECP) California Desert Conservation Area (BLM 1999) and Imperial Sand Dunes, Northern and Eastern Colorado, and Western Colorado land use plans (BLM 2013a). Imperial County also possesses numerous sensitive wildlife and plant species that are protected under federal and State regulations. A review of CNDDB (CDFW 2013a) and the California Native Plant Society's Electronic Inventory (CNPSEI) of Rare and Endangered Vascular Plants of California (CNPSEI 2013) determined that 60 sensitive plant species and 69 sensitive wildlife species were known to occur in the County.

Development of renewable energy facilities in the County may be constrained by sensitive biological resources. Construction and operation of renewable energy facilities could impact biological resource areas of high importance, including sensitive habitats and agency-designated or protected areas. Similarly, water-associated habitats directly adjacent to the Salton Sea and Colorado, Alamo, and New rivers that provide habitat for sensitive and listed species may constrain development. Agricultural ditches and canals, which contain wetlands, riparian habitat, and wildlife corridors and attract insects which provide food for migratory birds, burrowing owls, and a number of bat species, may also constrain development. The biologically sensitive areas described above would not necessarily be excluded from development of renewable energy projects but would be subject to agency regulations and requirements for permitting and approval. Projects with a federal nexus would require preparation of a NEPA document and public involvement, preparation of restoration plans, and specific mitigation measures that would contribute to schedule and cost constraints.

Cultural Resources

A review of existing technical studies previously completed by the County, IVC museum, local tribes, and IID identified numerous archaeological sites including villages, rock shelters, habitation sites, lithic scatters, milling stations, and isolated artifacts. Similarly, ethnographic studies previously completed in the County suggest the concept of sacred geography has always been important to the desert cultures of this region. A review of existing technical studies, and consultation of the National Register of Historic Places (NRHP), California Historical Landmarks, California Points of Historic Interest, and local historical registers also identified numerous previously identified and listed archaeological and historical resources in Imperial County. These previously identified resources include 10 archaeological sites and districts listed as eligible to the NRHP, 14 resources identified to be of statewide significance and are listed as California Historic Landmarks by the State Office of Historic Preservation (OHP), and 4 cultural sites listed as points of historical interest as defined by the OHP.

Development of renewable energy facilities in the County would have the potential to impact archaeological and historical resources described above unless properly sited. Similarly, sensitive prehistoric and historical cultural resource sites that have not been systematically surveyed, including built environment resources, are likely to exist in areas within Imperial County. Previously identified and newly identified archaeological and historical sites would require further study and avoidance to ensure that the cultural and scientific value present at these sites is not adversely affected by future renewable energy facilities. Future renewable energy projects would be required to prepare appropriate CEQA and/or NEPA documentation, consult with Native American tribes, and develop mitigation measures to minimize impacts. Future renewable energy projects would also need to analyze the potential to impact paleontological resources and develop mitigation measures to minimize impacts.

Environmental Justice

The development of renewable energy projects involving a federal action (funding, permit, or land) would need to comply with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, signed by President Clinton on February 11, 1994. Executive Order 12898 requires federal agencies to take the appropriate and necessary steps to identify and address disproportionate impacts on minority and low-income populations to the greatest extent practicable and permitted by law. Development of renewable energy facilities in the County could disproportionately affect minority and low-income populations through environmental impacts or displacement of jobs. Consequently, all future renewable energy projects involving a federal action would need to analyze potential disproportionate impacts on minority and low-income populations and develop mitigation, minimization, and avoidance measures to address these impacts to the greatest extent practicable and permitted by law.

Land Use

Imperial County covers an area of approximately 2,942,080 acres and consists of a variety of land uses, including urban areas, active farmlands, recreation areas, and undeveloped land. Existing land uses throughout Imperial County are governed by land use and zoning regulations that may constrain development of renewable energy facilities. For instance, the existing County of Imperial Land Use Ordinance provides comprehensive land use regulations for all unincorporated areas. These regulations are adopted to promote and protect the public health, safety, and general welfare through the orderly regulation of land uses throughout the unincorporated areas of the County. Future renewable energy facilities would need to demonstrate consistency with the Land Use Ordinance in order to receive project approval. Similarly, projects on State lands would require authorization from the California State Lands Commission (CSLC) for development of renewable energy facilities. Land use classes identified in the California Desert Conservation Area Plan limit the type of electrical generation facilities allowed for development. Future renewable energy facilities in the incorporated cities of Brawley, El Centro, Westmorland, Holtville, Imperial, Calipatria, and Calexico would need to demonstrate consistency with city standards, as determined by each city, prior to project approval. Additionally, any proposed alternative energy activities should be located outside a 0.5-mile buffer of all urban area boundaries. Physical characteristics, such as endangered species and habitat, flood hazards, steep slopes, unstable slopes, liquefaction, and active faults could also constrain future renewable energy facilities. Agricultural land uses also possess land use constraints which are described above.

Military Operations

Several military installations are located within Imperial County. Future renewable energy projects would need to evaluate whether their location in relation to existing military bases would impact operations. Development within the Chocolate Mountains Aerial Gunnery Range and Naval Air Facility (NAF) El Centro target ranges would be prohibited due to the dangers associated with military activities at these bases. Development of renewable energy facilities could be constrained due to their potential

to interfere with military aircraft operations. Large wind turbines, concentrated solar-thermal power (CSP) towers, and drilling or cooling tower plumes associated with geothermal facilities could obstruct airspace, limit pilot visibility, or interfere with radar. Similarly, glare from solar energy and CSP facilities could limit pilot visibility. Large wind turbines and CSP towers could conflict with restrictions within 5-mile Bird/Wildlife Air Strike Hazard (BASH) subzones due to the potential for birds to strike these facilities. If potential impacts are identified for any of the scenarios described above, future renewable energy projects would need to incorporate modifications and/or mitigation before receiving approval.

Water Resources

The County of Imperial is entirely within the Colorado River Hydrologic Region (HR). The major surface water features within the County of Imperial are the Colorado River and Salton Sea. Several small rivers and creeks occur within the County of Imperial; but only the New River and Alamo River are perennial. Average annual precipitation for the Colorado River HR ranges from less than 3 inches along the eastern boundary near Imperial Valley to 25 inches in the mountain divide between the Salton Sea and Pacific Ocean drainages. Runoff occurs from winter precipitation, especially in the higher elevations, and from summer thunderstorms. The surface water that intermittently exists flows toward the Salton Sea and Colorado River.

The Colorado River HR is underlain by 64 groundwater basins/subbasins covering 8.68 million acres, or approximately 26 percent of the HR. Within the HR, 8 percent of domestic and agricultural supply is drawn from groundwater resources. In some larger basins, particularly near dry lakes, aquifers may be separated by aquitards that create confined groundwater resources. Groundwater in most of the smaller basins is found in unconfined alluvial aquifers (DWR 2003). The Colorado River HR contains water bodies that do not meet the water quality objectives and do not support the beneficial uses as defined in the Basin Plan. These water bodies are designated as impaired under CWA Section 303(d). Water bodies listed as impaired under the CWA Section 303(d) require the development of Total Maximum Daily Loads (TMDLs) to establish priority rankings and control plans. TMDLs provide the method to attain and maintain the established water quality objectives and beneficial uses. Other issues relating to water quality associated with renewable energy projects include point source discharge and the requirement for compliance with NPDES permits.

Development of renewable energy facilities in the County may be constrained by impaired water bodies, the increasing salinity and impairments of the Salton Sea, and the limited water supply of the Colorado River. Construction and operation of renewable energy facilities could generate untreated or inadequately treated stormwater runoff that may eventually flow to receiving waters. Similarly, development of renewable energy facilities may increase the amount of impervious surfaces in the County, thus reducing the amount of water that would normally infiltrate into the soil and be filtered naturally. Other issues relating to water quality associated with renewable energy projects include point source discharge and the requirement for compliance with NPDES permits.

Proposed projects would be required to include design features and mitigation measures consistent with applicable hydrology- and water-quality-related regulatory requirements that would minimize impacts to the maximum extent practicable.

III. GOALS AND OBJECTIVES

A. Preface

The *Renewable Energy and Transmission Element* serves as the primary policy statement by the Board of Supervisors for implementing development policies for geothermal and other renewable energy land uses in Imperial County. The Element also addresses Transmission as an interrelated activity that needs to be considered when reviewing renewable energy projects. This section (Chapter III) of the *Renewable Energy and Transmission Element* presents Imperial County's Goals and Objectives relative to renewable energy project development within the unincorporated areas of the County. They are based on community input, extensive collaboration with key regional stakeholders, identification of environmental issues and balancing economic interests.

The Goals and Objectives, together with the Implementation Programs and Policies in Chapter IV, are the statements that shall provide direction for renewable energy development as well as government actions and programs. Imperial County's Goals and Objectives are intended to serve as long-term principles and policy statements representing ideals which have been determined by the Board of Supervisors as being desirable and deserving of community time and resources to achieve. These Goals and Objectives are important guidelines for renewable energy projects and related land use decision-making. It is recognized that other social, economic, environmental, and legal considerations are involved in land use decisions and that these Goals and Objectives, and those of the other General Plan Elements, should be used as guidelines for reviewing individual projects overall conformance.

B. Goals and Objectives

Goal 1 – Support the safe and orderly development of renewable energy while providing for the protection of environmental resources.

Objective 1.1: The County of Imperial supports the overall goals of the Desert Renewable Energy Conservation Plan to provide a balance between the development of renewable energy resources while preserving sensitive environmental resources within its jurisdiction.

Objective 1.2: Lessen impacts of site and design production facilities on agricultural, natural, and cultural resources.

Objective 1.3: Require the use of directional geothermal drilling and “islands” when technically advisable in irrigated agricultural soils and sensitive or unique biological areas.

Objective 1.4: Analyze potential impacts on agricultural, natural, and cultural resources, as appropriate.

Objective 1.5: Require appropriate mitigation and monitoring for environmental issues associated with developing renewable energy facilities.

Objective 1.6: Encourage the efficient use of water resources required in the operation of renewable energy generation facilities.

Objective 1.7: Assure that development of renewable energy facilities and transmission lines comply with Imperial County Air Pollution Control District's regulations and mitigation measures.

Goal 2 – Encourage development of electrical transmission lines along routes which minimize potential environmental effects.

Objective 2.1: To the extent practicable, maximize utilization of IID's transmission capacity in existing easements or rights-of-way. Encourage the location of all major transmission lines within designated corridors, easements, and rights-of-way.

Objective 2.2: Where practicable and cost-effective, design transmission lines to minimize impacts on agricultural, natural, and cultural resources, urban areas, military operation areas, and recreational activities.

Goal 3 – Support development of renewable energy resources that will contribute to and enhance the economic vitality of Imperial County.

Objective 3.1: Preserve IID's Balancing Authority and local rate-making authority which allows IID to continue to provide low-cost service. Lower energy rates enhance the economic vitality in Imperial County.

Objective 3.2: Encourage the continued development of the mineral extraction/production industry for job development using geothermal brines from the existing and future geothermal flash power plants.

Objective 3.3: Encourage the development of services and industries associated with renewable energy facilities.

Objective 3.4: Assure that revenues projected from proposed renewable energy facility developments are sufficient to offset operational costs to the County from that particular development.

Objective 3.5: Encourage employment of County residents by the renewable energy industries wherever and whenever possible.

Objective 3.6: Encourage the establishment of necessary and applicable renewable energy training programs in local school systems in association with the renewable energy industry.

Objective 3.7: Evaluate environmental justice issues associated with job creation and displacement when considering the approval of renewable energy projects.

Goal 4 – Support development of renewable energy resources that will contribute to the restoration efforts of the Salton Sea.

Objective 4.1: Prioritize the Salton Sea exposed seabed (playa) for renewable energy development.

Objective 4.2: Encourage the development of renewable energy facilities that will contribute to the reduction or elimination of airborne pollutants created by exposure of the seabed of the Salton Sea as it recedes.

Objective 4.3: Develop mitigation measures and monitoring programs to minimize impacts to avian species and other species that may be affected by renewable energy facilities constructed near the Salton Sea.

Goal 5 – Encourage development of innovative renewable energy technologies that will diversify Imperial County's energy portfolio.

Objective 5.1: Support the implementation of pilot projects intended to test or demonstrate new and innovative renewable energy production technologies.

Objective 5.2: Encourage development of utility-scale distributed generation projects in the County.

Goal 6 – Support development of renewable energy while providing for the protection of military aviation and operations.

Objective 6.1: Assure that renewable energy facilities proposed in areas adjacent to military installations and training areas will be compatible with these uses.

Objective 6.2: Facilitate the early exchange of project-related information with the military for proposed renewable energy facilities located within a military operations area (MOA) or within 1,000 feet of a military installation.

Objective 6.3: Assure that renewable energy facilities proposed within MOAs will not jeopardize the safety of existing residents or impact military operations.

Goal 7 – Actively minimize the potential for land subsidence to occur as a result of renewable energy operations.

Objective 7.1: Require that all renewable energy facilities, where deemed appropriate, include design features that will prevent subsidence and other surface conditions from impacting existing land uses.

Objective 7.2: For geothermal energy development facilities, establish injection standards consistent with the requirements of the California Division of

Oil, Gas, and Geothermal Resources (CDOGGR). Request a CDOGGR subsidence review, if necessary, for consideration prior to setting injection standards.

Objective 7.3: Require renewable energy facility permittees to establish and monitor subsidence detection networks in areas affected by permitted project activities.

Objective 7.4: Require monitoring programs for determining the possibility or extent of induced subsidence.

Objective 7.5: Require corrective measures, in proportion to each developer's activities, if evidence indicates that operation of geothermal energy facilities have caused, or will cause, surface impacts. In determining monitoring or mitigation requirements, the County shall consult with informed parties such as CDOGGR, County Department of Public Works, the IID, the permittee, other developers, and other experts as appropriate.

Objective 7.6: Where geothermal fields have been divided into units or developers have established a cooperative agreement for reservoir management, specific production and injection requirements of individually permitted projects may be modified in accordance with both Federal and State requirements.

Objective 7.7: Require seismic monitoring be performed in conjunction with major geothermal projects.

Objective 7.8: Require operators of geothermal facilities analyze seismic data to determine the effects of geothermal production and injection on seismic activities within the development area.

Objective 7.9: Consult with experts, such as CDOGGR, U.S. Geological Survey, geothermal industry representatives, permittees, and other developers to determine appropriate monitoring and mitigation requirements.

Objective 7.10: Require operators of geothermal facilities to establish a notification system to warn or notify surrounding residents of the accidental release of potentially harmful emissions as part of an emergency response plan.

Objective 7.11: Require all geothermal energy facilities to include operating procedures that would prevent detrimental impacts to geothermal reservoirs.

Goal 8 – Develop overlay zones that will facilitate the development of renewable energy resources while preserving and protecting agricultural, natural, and cultural resources. Development of overlay zones shall include coordination with

Federal, State, County, Tribal governments, educational entities, the public and local industries.

Objective 8.1: Allow for County review with appropriate development and performance standards for development of local resources within the overlay zones.

Objective 8.2: Promote the exchange of information concerning renewable energy development to be circulated between industry, County staff, and the public.

Objective 8.3: Provide the public adequate opportunity to obtain information on the current status of renewable energy development and to provide input on matters related to the development of renewable energy resources.

C. Relationship to Other General Plan Elements

State law mandates seven "elements" for local government general plans. Although the *Renewable Energy and Transmission Element* is not mandatory, it must comply with requirements that are requisite to all parts within a general plan. Legislative intent must be fulfilled as set forth in Government Code, Section 65300.5: "...the General Plan and the parts thereof comprise an integrated, internally consistent and compatible statement of policies for the adopting agency…"

The *Renewable Energy and Transmission Element* Policy Matrix (Table 2) identifies the relationship between the *Renewable Energy and Transmission Element* Goals and Objectives to other Elements of the Imperial County General Plan. The Issue Area identifies the broader goals of the Element and the "Xs" identify that related objectives are contained in the corresponding Elements.

Table 2: Renewable Energy and Transmission Element Policy Matrix

Issue Area	Land Use	Housing	Circulation	Noise	Seismic/ Public Safety	Agricultural	Open Space Conservation	Water
Land Use Planning	X		X				X	
Agriculture/ Biology	X					X	X	
Water Use							X	X
Land Subsidence					X		X	
Transmission Line	X		X				X	
Use of Renewable Energy	X		X	X	X	X	X	X
Zoning	X							
Natural Seismicity					X			

IV. IMPLEMENTATION PROGRAMS AND POLICIES

A. Preface

The demand for energy produced from renewable resources has increased dramatically since the previous update of the *Renewable Energy and Transmission Element* (formerly the Geothermal/Alternative Energy and Transmission Element) in 2006. This increase in demand has resulted in increased production of energy from geothermal resources as well as production of energy from other renewable resources such as solar, biofuels and biomass. Also, additional renewable energy facilities and transmission corridors are planned due to:

- Increased requirements for utility companies to procure higher percentages of power from renewable energy sources, either as part of a renewable portfolio standard or to meet climate change-driven emission reductions; and

- Increased electrical service demand due to larger population growth in southern California and the need to enhance system reliability.

In 2014, approximately 1,800 MW of renewable energy was being produced in Imperial County. Additional renewable energy projects that could increase the total amount of renewable energy generation have been processed and approved by the County. Approval of these and future renewable energy projects could increase the total renewable energy capacity located in Imperial County. The Desert Renewable Energy Conservation Plan (DRECP) has a renewable energy goal of up to 7,000 MW for Imperial County.

While the environmental effects of existing and approved renewable energy projects have been well documented, additional impacts to agriculture, natural and cultural resources, as well as other environmental issues, could be created by the projects needed to meet the DRECP goal of up to 7,000 MW. This updated *Renewable Energy and Transmission Element* creates a Renewable Energy Overlay Zone that directs the location of new renewable energy facilities to areas in Imperial County that minimize overall environmental impacts. The associated Program Environmental Impact Report describes the environmental effects of new renewable energy facilities and proposes mitigation measures and monitoring programs that will further reduce impacts to the environment.

In addition, increased capacity of existing transmission corridors and new transmission corridors needed to transmit the increased renewable energy production will create additional environmental effects.

This Section of the *Renewable Energy and Transmission Element* builds upon the Goals and Objectives of Chapter III, which establishes County policies on:

- Supporting development of energy from renewable resources;

- Supporting the location of transmission corridors which minimize environmental effects;

- Supporting the development of renewable energy resources that will enhance economic vitality;

- Contributing to the restoration efforts of the Salton Sea;

- Protecting military aviation and operations;

- Minimizing the potential for land subsidence; and

- Developing overlay zones in coordination with federal, State, and local agencies; tribal governments; the public; and the renewable energy industry that protect communities, agriculture, natural, and cultural resources, and reduce impacts to the environment.

Described in this Chapter are implementation programs for County agencies to utilize the Renewable Energy (RE) Overlay Zone pursuant to provisions of the County's Land Use Ordinance, Division 17, as amended.

B. Assumptions

Based on current data and updated growth scenarios, certain assumptions have been made concerning the future development of energy from renewable resources. The following assumptions were utilized in the preparation of this Element:

- Electrical demand will increase significantly in the future (2 to 3 percent per year, as the market dictates) in Imperial County, California, and the region.

- Electricity developed from renewable energy resources will become competitive in cost with electricity developed from other sources as technology advances, costs decrease, and cost of other energy sources increases.

- An adequate and satisfactory source of water will be available for renewable energy development.

- The DRECP goal of up to 7,000 MW of electrical generation from renewable resources will be developed in Imperial County.

- If the Renewable Portfolio Standard for California increases, then electrical development from renewable sources will significantly increase.

- As the land use agency, the County of Imperial will retain a leading role in guiding and regulating development of renewable energy resources in Imperial County.

- Renewable energy development will continue to be environmentally acceptable with adequate protection of agricultural, natural, and cultural resources. Adequate protection of biological resources will be encouraged with the implementation of the Desert Renewable Energy Conservation Plan (DRECP) by the California Energy Commission, California Department of Fish and Wildlife, Bureau of Land Management, and the U.S. Fish and Wildlife Service.

- New electrical transmission projects will either occur in Imperial County or transect the County. These transmission lines will be developed to export renewable power from Imperial County to other parts of California or will cross County jurisdiction to transport power to other statewide or interstate locations and end users.

- Due to Imperial County's unique location and future growth, Joint Use Corridors will need to be identified in order to create greater certainty and reduce impacts associated with locating new transmission facilities.

C. Programs and Policies

In order to implement the policies set forth in this Element, the County shall:

1. Maintain an updated Land Use Ordinance, including regulations for renewable energy projects, a Renewable Energy Overlay Zone, and definitions of renewable energy resources, facilities, and projects;

2. Require discretionary review for all Conditional Use Permit (CUP) applications for renewable energy projects to the extent allowed by law and implement County mitigation measures for such CUP's;

3. Add new projects into the existing subsidence, seismicity, and air quality monitoring networks;

4. Establish independent agency procedures to evaluate the findings of each environmental monitoring program to determine if:

    a. mitigation measures are necessary;

    b. the monitoring program should be modified;

    c. results demonstrate that the monitoring program is unnecessary; and

    d. results demonstrate that there needs to be compliance with the monitoring program.

5. Periodically review insurance and bond requirements to establish appropriate levels of protection;

6. Coordinate County planning and regulation of renewable energy development with the regulatory requirements of other governmental agencies as necessary;

7. Establish procedures to assure County input on projects for which other governmental agencies are “lead agency” or the approving authority, and to ensure continuity of enforcement in the event of such agency's failure or inability to exercise their authority;

8. Periodically update the Program Environmental Impact Report (PEIR) prepared for this Element as necessary to describe the environmental effects and mitigation measures needed to reduce any adverse effects for areas with substantial anticipated renewable energy development;

9. Periodically review utility transmission corridor plans with the Imperial Irrigation District, other utilities, and representatives of the renewable energy industry to determine if such plans are consistent with the Element and the PEIR;

10. Develop, in conjunction with IID, other utilities, merchant power companies, government agencies, and the County, prospective joint use transmission corridors. Such joint use corridors would be intended to accommodate future growth needs; provide certainty to the renewable energy industry, developers, and local citizens of where such transmission projects will occur; and describe how the impacts of such facilities will be reduced;

11. Determine the costs of processing applications and performing inspections and monitoring (including major monitoring projects) so that costs can be passed onto renewable energy developers through appropriate fees;

12. Assure that safe and adequate waste disposal facilities are available for waste materials resulting from renewable energy operations such as defective solar panels and liquids not injected or recovered for useful purposes;

13. Facilitate the development of direct heat utilization of geothermal energy;

14. Provide information to the public on necessary occupational skill levels required for employment in the renewable energy industry, and encourage educational institutions, unions, and industrial companies to offer appropriate courses and training programs;

15. Keep the public informed on renewable energy development in Imperial County with periodic informational program updates; and

16. Cooperate and participate in studies, as appropriate, of:

    a. the effect of renewable energy development on the demand for public services and facilities,

b. technical improvements and changes in renewable energy facility development and operations which might require changes in County policy or regulations,

c. water resources for renewable energy facility use with Imperial Irrigation District,

d. means and incentives to develop direct heat industries in Imperial County for economic development,

e. possible legislative incentives to accelerate renewable energy resource development in Imperial County,

f. options available for the utilization of renewable energy revenues to augment County staffing to assure adequate monitoring of renewable energy operations,

g. the effectiveness of mitigation measures required to mitigate or reduce adverse environmental effects to agricultural, natural, and cultural resources created by the production and transmission of energy from renewable resources,

h. the effect of renewable energy development to the economic vitality of Imperial County, with special attention to continued 1) agricultural viability, 2) job quality, 3) skilled career training, and 4) local hire practices, and

i. the effect of renewable energy development to protect the public's health, safety, and welfare.

D. Land Use Designations

The County Land Use Ordinance, Division 17, includes the Renewable Energy (RE) Overlay Zone, which authorizes the development and operation of renewable energy projects, with an approved Conditional Use Permit (CUP). The RE Overlay Zone is concentrated in areas determined to be the most suitable for the development of renewable energy facilities while minimizing the impact to other established uses. Conditional Use Permit applications proposed for specific renewable energy projects not located in the RE Overlay Zone would not be allowed without an amendment to the RE Overlay Zone. An amendment to the overlay zone would only be approved by the County Board of Supervisors if a future renewable energy project met one of the following two conditions:

- Adjacent to the Existing RE Overlay Zone: An amendment may be made to allow for development of a future renewable energy project located adjacent to the existing RE Overlay Zone if the project:

    - Is not located in a sensitive area

- Would not result in any significant environmental impacts

- "Island" Overlay: An amendment may be made to allow for development of a future renewable energy project that is not located adjacent to the existing RE Overlay Zone if the project:

  - Is located adjacent (sharing a common boundary) to an existing transmission source

  - Consists of the expansion of an existing renewable energy operation

  - Would not result in any significant environmental impacts.

E. Implementation Standards

The "Development Standards for Conditional Use Permits in Imperial County" applicable to the various types of proposed renewable energy projects located in the RE Overlay Zone have been included in the updated Land Use Ordinance, Division 17.

1. Land Use

Land use standards include requirements for application and review of renewable energy projects in order to assure that renewable energy development is conducted in a manner that assures that the location, size, design, and operating characteristics will be compatible with and not materially detrimental to:

- adjacent uses by maintaining adequate setbacks from property lines; streets, and, in particular, noise sensitive land uses such as residences, schools, and hospitals;

- residents, by avoiding the creation of nuisances and unsightly conditions; requiring appropriate limits on hours of operations, light control, adequate fencing and landscaping; and establishing proper procedures and bonding for system shutdown and site abandonment;

- farm operations, by minimizing surface land usage for renewable energy facilities, and by avoiding disruption to existing irrigation and drainage patterns; or

- agricultural, natural, and cultural resources, by locating renewable energy projects in the RE Overlay Zone.

2. Health and Safety

A number of health and safety considerations are involved in renewable energy development such as:

- compliance with air quality and dust control standards;
- avoidance of geologic, soil, and hydrology hazards through seismic and subsidence studies and monitoring;
- protection of surface and groundwater quality and proper disposal of wastes; proper operating procedures, including appropriate routing of pipelines and electrical transmission lines; noise control management; and safe use of public roads for equipment transport;
- ensuring the health and safety of workers constructing, operating and maintaining renewable energy facilities; and
- maintaining an Emergency Response Plan covering incidents such as blow-outs, major fluid spills, earthquakes, fires, and other emergencies.

3. Environmental

The design, siting, and operation of renewable energy facilities shall give adequate consideration to potential direct and indirect environmental impacts pursuant to the California Environmental Quality Act:

- Aesthetics
- Agricultural Resources/Forestry
- Air Quality
- Biological Resources
- Cultural Resources
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing

- Public Services
- Recreation
- Transportation/Traffic
- Utilities and Service Systems

4. Monitoring and Management

In order that good planning and design are not negated by ineffective implementation, the Land Use Ordinance includes, but is not limited to, the following:

- standard requirements for compliance with all applicable laws and regulations, with bonds, fees, and insurance requirements to ensure proper performance by operators of renewable energy facilities;
- monitoring inspections and access/ entry provisions;
- identification of a responsible agent for all renewable energy project activities; and
- provision for permit revocation or limitation due to noncompliance.

APPENDIX A

HISTORY OF GEOTHERMAL USE AND DEVELOPMENT

(This document has been modified and updated to better reflect current standards and agency responsibilities.)

The usage of California geothermal resources started at many of the hot springs found throughout the state. At these springs, Indians and then later settlers gathered to use and enjoy the warm waters. By the late 1800's, some hot springs were commercialized.

Surface geothermal phenomena has been noted in Imperial County for many years. The famous "mud pots" of the Salton Sea, steam fumaroles, and boiling springs were observed near Mullet Island which is a volcano that erupted about 16,000 years ago.

In 1905, the Colorado River broke through earth closure works in a newly constructed intake channel and waters from the river flowed into Imperial and Coachella Valleys for more than a year. The uncontrolled water formed the Salton Sea. Many of the "mud pots" and other natural phenomena were covered, but their manifestations are visible on the sea's surface in a number of locations.

The initial attempts at utilizing the underground resources of the County commenced when three wells were drilled on Mullet Island in 1927-1928 by the Pioneer Development Company exploring for the Southern Sierra Power Company. The deepest well was drilled to 1,473 feet and reached a maximum temperature of 245° F. All three wells produced steam, hot water, and non-condensable gases; however, steam pressures and volumes were not considered sufficient for commercial use, and the wells were abandoned.

While these were being sunk, large quantities of carbon dioxide gas was produced. This led to the formation of the Salton Sea Products Corporation which began exploring for carbon dioxide gas. In 1932 the discovery well for the Imperial Carbon Dioxide field was drilled about a mile northeast of Mullet Island. The field produced commercial carbon dioxide gas from 1933 to 1954, and the gas was recovered from shallow sands 200 feet to 700 feet deep. Two plants were built in the field to convert the carbon dioxide to dry ice. The field was abandoned in 1954 because of depletion of the producing sands, the rising level of the Salton Sea, and the development of modern refrigerated transport systems.

In 1957, Kent Imperial Corporation drilled "Sinclair 1" which is considered to be the discovery well for the Salton Sea Geothermal field. This well produced substantial amounts of geothermal fluids. It was drilled as an oil well to 4,725 feet. When it was tested, it produced hot water and steam.

A small pilot electrical generation plant was installed at the wellhead in 1959. However, this test facility was shortly abandoned due to the deposition of minerals on the equipment forcing a shutdown.

The first geothermal exploratory well intended to locate a resource was "Sportsman 1", by Joseph I. O'Neil, Jr. It was drilled in 1961 to 4,729 feet, about 4 miles northeast of "Sinclair 1". From 1961 to 1964, 10 more geothermal wells were drilled in the vicinity and 8 produced geothermal fluids. The mineral content of these wells was very high, occasionally reaching concentration of over 300,000 ppm total dissolved solids. The brine was slightly caustic and production was hampered by severe corrosion and scaling.

The Morton Salt Company (Imperial Thermal Products, Inc.) and Union Oil Company erected small pilot plants in an effort to extract minerals from the brine. After a few years of experimentation with brine and electrical production, these ventures were terminated as uneconomical.

From 1965 to 1970, the University of California at Riverside conducted an intensive investigation of the Imperial Valley. The research culminated in a report entitled *Cooperative Geological-Geophysical-Geochemical Investigations of Geothermal Resources in the Imperial Valley Area of California*, dated July 1, 1971. This program was supported by many organizations, including the U.S. Bureau of Reclamation, the National Science Foundation, Standard Oil Company of California, the Chevron Oil Field Research Company, the Imperial Irrigation District and the United States Department of Energy.

Since 1912, when G. Hoyt drilled a 6-inch well approximately 475 feet deep, Imperial County has had numerous entrepreneurs, oil companies, and private landowners drill wells throughout Imperial Valley searching for viable economic resources such as oil, gas, geothermal resources, and minerals. This search continues today with exploratory applications being made in various areas in Imperial County.

Numerous studies through the years have been made of the resource and the resource characteristics in the Salton Trough including: temperatures and temperature gradients, ground levels and slopes, seismicity, isotopic studies of groundwater and hydrology of underlying waters, gravity anomalies, magnetic anomalies and stratigraphic geology.

APPENDIX B

GEOTHERMAL RESOURCE DEVELOPMENT REGULATION

(This document has been modified and updated to better reflect current standards and agency responsibilities.)

There are numerous governmental entities, which monitor and control all aspects of geothermal exploration and development in Imperial County. These entities include federal, state, and local agencies, and they often have similar responsibilities. The agency identification and brief descriptions presented here and in the following sections are intended to clarify the interrelationship of the various governmental levels and entities.

Each of the public agencies having discretionary approval power and exercise their discretionary power through the use of permits. For the purpose of implementing their environmental responsibility, the permits issued by such agencies may include:

Any condition or stipulations deemed necessary by that agency, including appropriate mitigation measures within the statutory jurisdiction of the agency; and

A monitoring program capable of assuring the permittee's conformance with all such conditions or stipulations.

A. County of Imperial

Imperial County is the local governmental entity which exercises jurisdiction over geothermal development on private and state lands outside of incorporated cities. The County is lead agency for all exploratory and test projects, and for power plant production projects generating less than 50 MW (net capacity). The California Energy Commission (CEC) regulates all power plants over 50 MW (net).

1. County Environmental Review

The County acts as the "lead" agency in the preparation of environmental documentation. All projects, including geothermal, must meet the requirements of the California Environmental Quality Act (CEQA). State law designates the Division of Oil, Gas, and Geothermal Resources (CDOGGR) as "lead" agency for CEQA purposes for geothermal exploration projects. Although CDOGGR exercises this authority in other counties, they have designated Imperial County Planning and Development Services Department to perform that function for them here.

According to CEQA Guidelines, a lead agency is one which has the "principal responsibility for carrying out or approving a project. . ." The lead agency prepares the environmental document for the project either directly or by contract. A responsible agency is a public agency, which also has discretionary approval power over the project, but uses the environmental documentation prepared by the lead agency.

There are three basic types of environmental documentation: Notices of Exemption, Negative Declarations, and Environmental Impact Reports (EIRs). EIRs can be comprehensive Master or Program EIRs or narrowly-focused site specific EIRs.

Imperial County has adopted several Master EIRs (MEIRs) for the major geothermal anomalies. These are useful base documents and reduce documentation for subsequent projects within that geothermal area. For example, the Salton Sea Anomaly Final EIR (1981) environmentally reviewed a “worst case scenario” of 4,000 MW’s (81 geothermal power plants).

The County must adopt "certification" that a MEIR and mitigation measures are adequate for each project. Site specific analysis is also prepared for any new project.

2. County Land Use Review

The County regulates the use of land for geothermal purposes through zoning and conditional use permits (CUPs). The Geothermal Overlay Zone is adopted by ordinance. Exploratory, test, and production projects are approved by conditional use permit (also referred to as a geothermal permit), which is a land use permit. The permit does not authorize a person or corporation to drill a well or build a plant, but it does authorize a specific parcel of land to have wells drilled or to have plants built upon it. The permit runs with the land, and the project cannot be moved to another location without a separate application and environmental analysis prepared and approved.

The County exercises authority over all phases of geothermal development on private and state lands and the various permits may be issued on a "project-by-project" basis. All permits require developers to conform with all County regulations as well as regulatory conditions established by other permitting entities. The normal processing time for County permits is:

1. Notice of Exemption — 10 days (after approval of project)
2. Exploration CUP — 1 to 6 Months (depends on project)
3. Production CUP — 6 months (depends on project)
4. Rezoning — 6 to 12 months (depends on project)
5. Building Permits — 20 days (depends on other departments)

Numerous permits are required to bring a project from the first exploratory well to the full field development and power plant phase. A project may not be required to have more than one discretionary permit from the County, but an applicant may sometimes develop a "project" in phases and submit each phase as a separate permit application. All permits have conditions outlining construction, operation, and monitoring requirements specific to that permit. County permits are not for an unlimited period of time and may expire if not used, or if a specific time limit is included as a condition.

Ministerial permits are those granted without exercise of personal judgment or discretion. These are issued after staff evaluation ensures that a project meets the standards and conditions outlined in the statutes. There are approximately twenty-one ministerial permits from the following: Building Inspection, Fire Department, Road Department, State Department of Industrial Relations, State Department of Transportation, and Federal Communications Commission.

B. State Agencies

1. California State Lands Commission (CSLC)

The CSLC has jurisdiction over the development of mineral resources beneath state lands including those lands owned by other state agencies. There are approximately 40,000 acres of state-owned lands in the County of Imperial, which is about 1.3 percent of all lands in the County. It is estimated that at least 5,000 acres may have commercially valuable amounts of geothermal resources. The type of ownership ranges from lands where the state owns both the surface and mineral rights, to lands where the states has sold the surface rights but retained the mineral rights.

The California State Lands Commission does not preempt the County in permitting geothermal activities on state lands. A proposed developer on state lands must obtain permits from and comply with all regulations of the County of Imperial.

Application for and issuance of geothermal permits, leases, and on-going lease management activities are handled from the SLC's Long Beach office. There are four methods of using state land for geothermal activities:

a. Nonexclusive Geothermal Exploration Permit. This permit is issued for preliminary geotechnical information gathering. Activities may include geophysical, geological and geochemical exploration including the drilling of temperature gradient holes. The permit is for a period of two (2) years and does not give the permittee any preferential right to a geothermal lease. This permit may not require the preparation of an environmental document if it is for information gathering only and does not have the potential to result in a serious or major disturbance to an environmental resource.

b. Geothermal Prospecting Permit. This permit gives the developer the exclusive right to explore the permit area for a period of two years with a possible two year extension. If a geothermal resource is discovered in commercial quantities the permittee may have a preferential right to a lease under terms agreed to before issuance of the permit. The permit allows drilling of deep exploratory wells and requires environmental impact documentation. This may range from a negative declaration to an EIR depending on the nature, scope and severity of the impacts of the project. The permit requires the drilling of at least one well during the term of the permit and provides for an escalating annual rental per acre until a well

has been drilled. This permit is generally issued in areas where the existence and nature of the geothermal resource is less well known.

c. Leasing by Competitive Bidding. Generally, these leases are issued in areas where the existence and nature of the geothermal resource is well established. The lease requires that a well be drilled within a specified drilling term.

d. Negotiated Leasing. The Commission may issue negotiated leases if the resource is to be utilized entirely for purposes other than electrical generation; or, if the Commission finds:

Wells drilled upon private or public lands are draining or may drain geothermal resources from State-owned lands;

The lands are determined to be unsuitable for competitive bidding because of such factors as their small size, irregular configuration, or inaccessibility from surface drill sites;

The state owns a fractional interest in the lands; or

The lease is determined by the Commission to be in the best interests of the state.

2. California Energy Commission (CEC)

The CEC has the following role:

Policy: To maximize the use of geothermal energy to generate electricity, to promote the use of direct heat, and to monitor compliance with the Renewables Portfolio Standard.

Permits: The CEC reviews and approves the construction of power plants with a capacity to produce more than 50 megawatts (net) or greater.

Environmental: The CEC is lead agency for preparation of the Site Assessment for projects they approve. They comment on EIR'S prepared by other agencies as appropriate.

3. The California Division of Oil, Gas, and Geothermal Resources (CDOGGR)

The CDOGGR is within the State Department of Conservation, and is charged with the responsibility to "exercise its power and jurisdiction to require that wells for the discovery and production of geothermal resources be drilled, operated, maintained and abandoned in such manner as to safeguard life, health, property and the public welfare, and to encourage maximum recovery." (Public Resources Code, Section 3700).

CDOGGR preempts local agency surface regulations which might interfere with state subsurface regulations.

The CDOGGR has the following role:

Permits: CDOGGR issues permits for a variety of operations pertaining to wells or well sites, including drilling, redrilling, reworking, abandonment, injection well programming, and drill site construction.

Regulatory: Supervises all wells on non-federal land during all phases of drilling, operation, maintenance and abandonment.

Environmental: CDOGGR has delegated its environmental review authority to the County of Imperial for exploratory projects. CDOGGR also comments on CEQA documents and EIR's prepared by the County.

4. State Water Resources Control Board (WRCB)

The WRCB has no specific policy on geothermal energy, but plays the following role:

Regulatory: At various stages, the State Water Resources Control Board, through the Regional Water Quality Control Board, is responsible for any discharge or action that could adversely affect the surface or ground water of the State. The WRCB grants water right permits for the use of surface waters or subterranean streams.

Environmental: The Board will act as either a Lead Agency or Responsible Agency pursuant to CEQA for all projects which involve the granting of appropriative water right permits and petitions.

5. Regional Water Quality Control Board (RWQCB)

The RWQCB, Region 7, has the following role in the permitting and regulatory process:

Permits: RWQCB issues permits regulating discharges that could affect water quality. The quality and quantity of any surface discharge of fluid, including the quality and disposal methods of fluids from drilling operations and waste from outside sanitary facilities.

Regulatory: Administers and regulates all water quality matters within its specific geographic area. The RWQCB enforces the standards set by the State WRCB.

Environmental: The RWQCB normally acts as a responsible agency on geothermal projects and reviews and comments on environmental documents.

The Regional Water Quality Control Board can also act as the CEQA lead agency for projects involving significant water quality implications.

6. The State Department of Fish and Wildlife (DFW)

The DFW has an interest in geothermal development as follows:

Regulatory: Has authority over watercourse alteration and activities which may affect fish and wildlife and their habitats.

Environmental: Is designated as a trustee agency and therefore comments on environmental documents prepared by the lead agency.

C. Other Local Agencies

1. Imperial County Air Pollution Control District (APCD)

APCD has discretionary authority as follows:

Permits: The Air Pollution Control District issues two kinds of permits: 1) an "Authority to Construct" based on submission of construction plans showing how emissions are to be controlled; and, 2) a "Permit to Operate" issued following an inspection of the installed facilities.

Regulatory: The APCD sets and enforces regulations for achieving and/or maintaining the air quality standards set by the State Air Resources Board and the U.S. Environmental Protection Agency.

Environmental: Designated as a responsible agency, the APCD must review and approve environmental documents according to its own standards. They are often the CEQA lead agency for projects on federal land.

2. Imperial Irrigation District (IID)

IID plays an important part in the development of renewable energy in Imperial County as follows:

Coordination: IID has a positive and cooperative working relationship with the developing geothermal industry providing water, electricity for initial operation, purchasing power, and the "wheeling" of power generated to points outside and within the County.

Permits: The use of IID irrigation water or disposal of water into its drainage system can only be allowed by permit or contract issued by IID under specified conditions.

Regulatory: Open Access Transmission Tariff (OATT) Process: If a generation facility locating within IID's Balancing Authority is required to apply for interconnection and/or transmission services as part of the plant permitting process, IID has adopted regulations governing interconnection and transmission service requests under their Open Access Transmission Tariff (OATT). IID's OATT is based on the Federal Energy Regulatory Commission (FERC) pro-forma OATT, which requires balancing authorities to evaluate the electrical impacts and interconnection costs of all electric generators that take service under the OATT.

On May 8, 2012, the IID Board of Directors adopted the *Temporary Land Conversion Fallowing Policy*, a policy that requires participation from certain project developers and/or landowners as a condition of water service for new non-agricultural projects. In particular, this policy targets lower water demand projects, such as photovoltaic facilities, that require a temporary land use conversion and are permitted by conditional use permits on agriculturally-zoned lands.

Environmental: IID would like to have a more active role in conjunction with the California Division of Oil, Gas and Geothermal Resources (CDOGGR) and the County in the permitting review, particularly in the monitoring and mitigation of potential subsidence impacts from renewable energy development.

All water delivered by the IID is raw, untreated Colorado River water this is subject to reasonable and beneficial use provisions as required by existing laws, regulations, ordinances and contracts. IID requires new water users to implement Best Management Practices (BMPs), conservation measures, meters and new water saving technologies to minimize a project's water demands from IID to the extent practicable.

All new industrial water users within the IID water service area are required to enter into a Water Supply Agreement in order to receive water deliveries. All water users are subject to IID's Rules and Regulations Governing the Use and Distribution of Water and the Equitable Distribution Plan adopted by the IID Board of Directors in their present form or as they may be amended hereafter. New non-agricultural water uses may be required to import water, provide replacement water, or participate in IID water conservation, supply augmentation, or demand management projects intended to offset or mitigate new project water uses Certain projects may also be required to adhere to Water Supply Assessment or Water Supply Verification requirements as outlined in California Public Resources Code, Section 21151.9 and California Water Code, Sections 10631, 10656, 10910, 10911, 10912, and 10915. These assessments or verifications must be prepared in consultation with IID, and while not a guarantee of service should provide the environmental assessment necessary to execute a Water Supply Agreement with IID.

3. Environmental Health Services Division, County Health Department/Local Enforcement Agency (LEA)

The Environmental Health Services Division of the County Health Department (EHS/Health) plays an important role as the Local Enforcement Agency through the permitting/regulation of designated waste facilities (Class II landfills) that require local and state approval through the issuance of a "Solid Waste Facilities Permit" for any handling, processing, and disposal of wastes generated by geothermal power plants.

Authorization: The California Integrated Waste Management Board has designated EHS/Health as the authorized LEA for issuing a solid waste facilities permit.

Regulatory: The LEA determines whether the project conforms to local and state standards, and is responsible to protect public health, safety, and welfare by regulating solid waste facilities.

Environmental: The LEA evaluates the environmental impacts of a proposed solid waste facility and any environmental documentation prepared for the process of issuing a solid waste facilities permit.

D. Federal Agencies

1. U.S. Department of Interior, Bureau of Land Management (BLM)

The BLM office in El Centro has jurisdiction over 1.4 million acres of federal land including portions of San DiegoCounty. Federal law preempts any County regulation over geothermal activity on federal lands. Federal lands comprise approximately 50 percent of all lands in ImperialCounty. Geothermal operations on federal lands are governed by the Geothermal Steam Act of December 24, 1970 (Public Law 91-5810). Surface management of all geothermal activities is provided by the Act and the regulations codified under 43 CFR 3200, and seven Geothermal Resource Operations Orders which were issued by the U.S. Geological Survey.

Policy: To provide management of public lands in a ". . . manner which recognizes the nation's needs for domestic source of minerals (e.g. steam)...protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archaeological values." (Federal Land Policy and Management Act of 1976).

The local BLM office has leased thousands of acres of federal land in Imperial County. In the East Mesa KGRA there have been numerous leases granted and there is an operating project. Prior to geothermal development on certain federal lands, the BLM prepared an Environmental Impact Statement (1973 EIS) on the use of these lands for geothermal activities under its *California Desert Conservation Area Plan (CDCA)*

(1980). This master plan covers approximately 25 million acres of land under federal jurisdiction in the California desert area.

Before lease tracts are released for bid and development, an EIS or Environmental Assessment Report (EA or EAR) is prepared. This report more specifically describes potential site-specific environmental concerns and mitigation considerations for the lease tract. The regulations implementing the Geothermal Steam Act also require that an environmental baseline study be conducted and a regular environmental monitoring program must be maintained when operating.

A NEPA leasing analysis was completed for the Truckhaven area with preparation of an EIS and a subsequent Record of Decision allowing for leasing, BLM/CA/ES-2008-004+3200. Also, a NEPA leasing analysis was initiated for the Superstition Mountain area located in the western portion of the County and within the boundaries of the CDCA. It was not completed and there has been no further activities in the Superstition Mountain area by either the Navy or the BLM. The NEPA proposals/actions were to allow for the issuance of federal geothermal leases for development on an approximate total of 46,400 acres, 40,000 and 6,400 acres for the Truckhaven and Superstition Mountain areas respectively. The BLM prepared an EIS for the West Chocolate Mountains Renewable Energy Evaluation Area (REEA) with a Record of Decision, BLM/CA/ES-2013-001+1793.

The geothermal developer prepares a proposed Plan of Operations, which must be approved by the district office of the BLM for each phase of geothermal resource investigation and development. There are often multiple "Plans" that require multiple reviews, e.g. "Plan of Utilization", and "Plan of Development". The plan details the work that will be followed in preparing the well pads, drilling the wells, exploring for a viable resource, and utilizing the resource. During the BLM review of the plan, the BLM may consider any state or local ordinances, which may be pertinent and require that the geothermal developer's plan comply with them.

Within the County's nine KGRA's, the federal government retains the mineral rights to some lands under the 1916 Stock Raising and Homestead Act. The court has opined that the acquisition of surface rights does not include ownership of the geothermal resource. The right to explore and develop the geothermal resource on these lands is thus subject to the same management and controls as that on other federal lands. The BLM has the same responsibilities with lease revenues and royalties subject to a 50:50 split between the federal and state governments. As the direct result of Assembly Bill 1905, passed and adopted in 1980, 45 percent of the state's share of the money collected from leases is returned to the county in which the federal lease is located.

The East Mesa KGRA is largely under federal jurisdiction and a number of power plants have been permitted and built since the 1980’s. As proposals for power plants are submitted, BLM will focus on the same factors as those considered for development on private and state lands such as:

- Consistency with the California Desert Conservation Plan, including designated and proposed planning corridors;
- Protection of air quality;
- Impact on adjacent wilderness and sensitive resources;
- Visual quality;
- Fuel sources and delivery systems;
- Cooling-water source(s);
- Waste disposal;
- Seismic hazards; and
- Regional equity.

2. Military Use of County Lands

The Department of the Navy operates the Naval Air Facility, which was established in the mid-1940's. Disposition and leasing of lands for geothermal development falls under the provisions of the Military Construction Act of 1979 which grants each military department the right to use and benefit from geothermal resources.

Range lands, used by the Navy for aerial weapons training activities, are controlled through a number of land use instruments, some of which allow for geothermal development and compatible use where practical as discussed for the Superstition Mountains and West Mountains REEA areas. It does not appear that there are commercially viable geothermal fields on lands in West Mesa. There are no federal KGRA's in that area and BLM's study of the area indicates that potential for geothermal development is relatively low.

Due to uncertainties regarding the economic feasibility of developing the Glamis KGRA CA-670-14-098/DOI-BLM-CA-D070-2014-0033-DNA/(8100)P 670.28 and the unknown potential of West Mesa, there may not be any significant impacts on U.S. Navy operations in Imperial County due to geothermal development.

3. Federal Energy Regulatory Commission (FERC)

The FERC PURPA Rule allows "Qualifying Geothermal Facilities", up to 80 MW, within one mile between separate geothermal facilities.

The development density of a geothermal anomaly will be naturally limited by the amount of heat that can be delivered from the reservoir to a surface utilization facility. Generally, this is related to surface acreage in the range of one MW per five to forty (5-40) acres. Expressed another way, one square mile of surface area over a geothermal reservoir may be able to support development of power generation facilities in the range of 16 to 128 MW.

Some geothermal anomalies underlie large, non-uniform geographical areas, with diverse surface and mineral ownership. The relaxation of the "one mile" rule would allow plant siting to better accommodate geographical, environmental and property ownership restrictions. This would promote more efficient resource and land use pattern. The natural limitation of geothermal reservoir energy deliverable to the surface, or heat loss, during surface transport will limit the distance the resource can be economically utilized.

APPENDIX C

GEOTHERMAL RESOURCE DEVELOPMENT STRATEGIES

(This document has been modified and updated to better reflect current standards and agency responsibilities.)

This section provides a generalized view of the different activities which may occur in the search and development of geothermal resources for both power and direct heat uses. There may be many variations and, depending on the success of each previous activity, all or only some of the activities may be conducted at a particular site.

A. Geothermal Resource Exploration and Production

1. Initial Exploration Phase

Most of the early studies and activities during this phase are not surface-oriented and have no impact. These studies include literature review, broad geologic studies, aerial photography, and possibly airborne magnetic surveys. Geological mapping provides for an understanding of local geology and may be done by foot or off-highway vehicle (OHV). Collections of soil, rock, or water samples from various points in the region may be taken for analysis.

Geochemical studies include water sampling to determine fluid chemistry and temperatures and soil/rock analysis regarding geochemical make-up with age dating analysis if required. These samples are normally collected in small bottles.

If preliminary mapping and soil/rock sampling yield promising results, geophysical surveys are done to attempt to determine information about subsurface temperatures, geologic structures, composition of substratum and other resource data. These surveys can be gravity, magnetic resistivity, magneto telluric, radiometric, passive seismic or active seismic studies. In each of these survey methods, a number of vehicles and people are needed and temporary access roads may be necessary.

Shallow temperature holes are then drilled to measure thermal gradients. These holes, two to four inches in diameter, are usually no more than 2,000 feet deep. Spacing will be determined as exploration continues. The hole is drilled; a plastic tube is placed in the hole, filled with water, capped and allowed to remain undisturbed for about a week. A temperature device is then used to gather water temperature readings at various depths. Temporary access roads may be needed and a clearing of about 900 square feet is necessary for the drill site. This type of drilling is normally completed in one month by truck-mounted or small drilling rig.

Observation holes may be drilled for further information about the subsurface geology. These may be as large and deep as the regular production wells described below. Some may be drilled from truck-mounted rigs. These wells are flow tested to assess the reservoir and brine characteristics. Sumps, tanks, and brine handling equipment

are installed. One to three acres may be occupied during the drilling and testing period.

Once the preliminary exploration stages are complete, and results encouraging, drilling starts to develop the resource. This involves construction of a road, drill pad, well cellar, and sump. The existing infrastructure of roads in Imperial County is generally adequate, but roads may be improved to carry heavier loads, withstand more constant traffic, and function year-round as necessary. The drill pad area must be leveled and cleared of vegetation large enough to accommodate the drilling rig and accessories, temporary structures, and crew parking. The required space must provide room for service and delivery vehicles. A reserve pit called a "sump" may be used for waste fluids and drill cuttings with the size of the sump depending on the expected depth of the well. The sump must be designated to provide adequate containment (from 1 to 2-1/2 acre-feet), subject to the requirements of the RWQCB. Large "Baker" tanks are sometimes used instead of a sump.

2. Drilling Phase

After the road, drilling pad, cellar, and sump are completed, a 26-inch to 36-inch hole is drilled with an auger to a depth of 50 to 100 feet and a 20-inch to 30-inch conductor pipe is inserted and cemented to the surface.

The drill rig may stand up to 175 feet high and may have a variety of accessories generally assembled together on the site. Accessories may include: mud tanks for mixing and/or storing drilling mud, blowout prevention equipment, compressors, pipe rack for storing pipe sections (usually 30 foot segments), mud pumps, engines of up to 1000 horsepower, and facilities for cooling drilling mud during later stages of drilling, fuel tanks, and water tanks. Ancillary equipment used periodically includes large cement pumping trucks, and mud hauling trucks. Trailers, office and storage buildings may be located in the immediate vicinity.

Personnel requirements include geologists, supervisors, subcontractors and information loggers. Service personnel include delivery and specialized service personnel and may number 10 to 15. A drilling rig crew can total from 17 to 22 with no more than five to ten on-site at any one time. The total rig work force during drilling can range up to 100 people.

Drilling operations proceed 24 hours per day, seven days a week until the required depth is reached. Up to 100 days or more may be required to drill each well, depending on workloads, scheduling, depth of well, and any problems encountered. Well drilling operations, including drilling, casing the well, installation of blowout protection equipment, and tests, and abandonment are regulated and inspected by the California Division of Oil, Gas, and Geothermal Resources, BLM or State Lands Commission.

A rotary drilling rig is most commonly used with mud as the circulating medium. Drilling mud removes cuttings from the hole, controls subsurface pressure, cools and lubricates the drill bit and pipe, prevents bore hole walls from caving in, releases drill cuttings at surface, prevents formation damage, provides maximum information from formations penetrated, suspends cuttings when circulation stops, and supports weight of drill string and casing.

During the drilling process, steel casing is cemented into the hole. Eight inches is a typical completion depth diameter.

A blowout could occur if subsurface pressures exceed pressures produced by the column of fluid in the bore hole. Various types of blowout prevention equipment can be installed to prevent such an occurrence. Blowout prevention equipment is installed at the surface on top of the casing.

Well cleanout is the process of removing the drilling muds, cuttings, and other material from the hole. After the cleanout is complete and the casing has been set, flow testing commences. Flow is directed to the drilling sump or tanks through a series of mufflers, and is composed of fluids, steam, and non-condensable gases. The fluids from Imperial Valley wells can include less than 10 to over 30 percent (by weight) of dissolved solids. Non-condensable gases and vapors make up less than three percent of the gaseous volume. If testing produces substances detrimental to the environment, these constituents must be safely detained in the sump or portable tanks. Flow testing may continue for thirty days or more, and may be repeated several times over a number of months. Temperature, fluid flow rates, drawdown, chemistry, etc., are analyzed.

A completed well, not being tested, consists only of the fenced well head, cellar, and piping. It may occupy 200 square feet. Abandonment is the regulated process (by CDOGGR and BLM) of plugging the hole with drilling mud and cement. Upon abandonment, all of the equipment, structures, and related materials are removed and the site is restored.

3. Typical Field and Plant Development Phase

In this phase, the plant is constructed, pipelines are run from each well to the plant, and from the plant to the injection wells. Also at this time electrical transmission lines and poles are constructed as required.

The first step in plant construction is to select the site. The site is more or less fixed by the location of the resource. The typical completed plant site occupies between 12 and 20 acres. During construction another 12 to 15 acres of laydown area for the storage of materials and large vehicle use may be required.

The power plant will consist of office space, parking facilities, tool storage buildings, turbine generator, steam condenser, brine and gas handling equipment, the cooling

towers, and flash vessels or heat exchangers. The actual plant size and set up will be determined by which method, flashed-steam or binary, is to be used. If there are noncondensable gases present that exceed air quality standards, then additional equipment will be necessary to "scrub" these gases from the plant's emissions.

Pipes from well to plant and to injection wells are installed and must be able to expand and contract. This is normally accomplished by installation of horizontal or vertical expansion loops. The size of the network will depend on the number of wells required to power the turbine, and the number of injection wells necessary. Each well may have a productive capability of three to five megawatts or more.

The production and injection well sites and pipe networks may range over an area of hundreds of acres, but will actually occupy only from 16 to 19 surface acres depending on the design of the plant and its layout. Plant and field construction may last two years with approximately 200 or more workers at peak. This will be the period of greatest environmental disruption, similar to a large construction site.

4. Typical Power Plant Production Phase

During this phase all facilities have been erected; no additional impacts should occur from construction activities. Some noise, noncondensable gases and toxic elements may be produced but can be mitigated through abatement measures. The production rate of the wells may be less than during the testing phase. During the plant production phase, activities will include the operation and maintenance of the power plant and existing wells, the drilling of new replacement production and injection wells, and waste disposal. Continuing exploration and development can be carried on in other parts of the geothermal field simultaneously with the operational and maintenance activities.

One medium-sized drill rig is needed to drill new wells to maintain generating capacity. As the production gradually diminishes the heat flow from the resource or wells scale up, additional wells must be drilled to allow the plant to operate at full capacity. If brine is to be disposed of by injection, new injection wells will be drilled. The technique and effects of drilling these replacement wells would be the same as for development wells.

Repair, maintenance, and monitoring of the operating field will require use of access roads to service the equipment. Existing wells will require occasional repair work or cleanout. The frequency of remedial work depends upon resource characteristics and production technology. Scaling and corrosion of the equipment from the geothermal brine may require frequent maintenance.

Condensate from the condenser can be used to supply all the water requirements for the power plant cooling towers. However, when the power plant is operating in this mode, about 20 percent of the geothermal brine is lost due to evaporation of the steam condensate in the cooling towers. Eighty percent of the brine is then available for injection to replenish reservoir fluid and help prevent land subsidence. Other sources of water for cooling tower needs may be available, such as imported water, agricultural

wastewater, treated wastewater, river water, the Salton Sea, and ground water. Cooling tower water requirements from external sources depend on the temperature of the resource and plant design and may range from 50 acre feet to 100 acre feet per year per megawatt.

During this phase, the disposal of spent fluids becomes significant simply because of the volume of wastes requiring disposal. Disposal techniques vary, depending on the quality and quantities of waste involved. Normally, injection of the brines and the cooling tower blowdown is preferred. Solid wastes can also be generated by the plant's operation, and may require disposal at proper waste disposal sites. A project may seek permits for on-site disposal of solid and/or hazardous wastes. Processing facilities may require an additional 3 to 5 acres at the plant site.

Geothermal liquids are generally injected back into the reservoir from which it came to give mass support. The fluids are injected far enough from production wells so as not to cause breakthrough in the reservoir field. Fresh water aquifers are protected by engineer well design. Those well designs and well programs are approved by either BLM or by the DOGGR. The well designs call for multiple strings of metal casing cemented in place to protect groundwater. In addition, the injection wells have to be inspected every two years to prove that the casing is still keeping the ground water safe. Furthermore, before the startup of any new geothermal project, the operator must submit an “injection plan” for approval to either the BLM or the DOGGR. This plan outlines what zones will be used for injection and how the reservoir and groundwater will be protected.

It may become economically feasible to extract minerals from the geothermal fluids. Desalinization of brines may also become financially feasible for some areas to provide water for irrigation and other uses.

5. Production Closedown Phase

This would consist of site abandonment and occur when the geothermal resource is depleted to a non-economical level. Geothermal reservoir knowledge has not advanced to a stage where a reasonable economic limit can be predicted, but for planning purposes, a period of at least 30 years is assumed, which in many cases is the power plant amortization period or term of the power purchase agreement.

6. Plant Closeout and Abandonment

This includes the removal of all surface facilities, the plugging and abandonment of all production and injection wells, and surface restoration to a safe, permanent condition which is as near original condition as feasible.

The Master EIRs in each of the four Geothermal Overlay Zones have more detailed information regarding the above procedures.

B. Geothermal Technologies - Flash and Binary Systems

There are currently two basic energy conversion cycles or systems utilized in Imperial County: flashed-steam and binary fluid cycles.

1. Flashed-Steam Conversion Cycle

Electricity is generated as follows:

Steam is separated from a liquid-steam mixture produced by a geothermal production well or well field;

The separated steam is expanded through a turbine;

The turbine turns a generator which produces electricity;

Steam exhausted from the turbine is condensed by a condenser; and

The condensate is either sent to an evaporative cooling system (such as a cooling tower) as make-up water or is mixed with the brine and disposed of by injection.

The basic one-stage flash cycle can be modified wherein there are several flash cycles which flash the fluid two or more times and/or a combined flash/binary cycle where, after the flash cycle, the fluid is passed through a heat exchanger (binary) cycle. Below a temperature of 350° F, flash systems generally do not produce adequate steam for economical operations.

2. Binary process

The geothermal fluid is used to vaporize a secondary fluid with a lower boiling temperature than water as follows:

Geothermal fluid from a production well is passed through a heat exchanger where heat from the brine vaporizes a secondary or working fluid (such as isopentane or isobutane);

The working vapor drives a turbo generator which produces electricity;

The vapor is condensed and returns to the heat exchanger in a closed system; and,

After passing through the heat exchanger, all geothermal fluids are injected.

Aside from design differences between the conversion cycles, the amount of fluids extracted for each kwh (kilowatt hour) of electricity produced is primarily a function of resource temperature. More specifically, as the temperature of a geothermal resource rises, the conversion efficiency of a given geothermal power cycle increases, thus reducing the demand.

The cooling tower (or pond) efficiency also increases with resource temperature. The most important consequence of this change in fluid requirements is a reduction in the number of wells and the acre-feet of cooling water needed to support power plants. In other words, the higher the brine temperature, the fewer wells and less cooling water necessary per MW generated.

The quantity of fluids disposed also varies inversely with the temperature of geothermal brines. With lower resource temperatures, larger amounts of fluids are needed to operate a power plant, and therefore larger quantities of spent fluids must be injected.

The principal difference of the binary system is that it allows utilization of moderate temperature resources, and there is in general no release of noncondensible gases, such as H2S to affect air quality.

In the Heber "G" Zone, the San Diego Gas & Electric Binary Project (designed at 45 MW net) when it was operating, utilized a working fluid (approximately 90 percent isobutane and 10 percent isopentane) to generate electricity (designed at 65 MW gross). The Second Imperial Geothermal Company Binary Project was permitted in Heber at 33 MW (net) in July 1992.

In the East Mesa area, Ormesa in its various plants utilizes a "modular" unit, known as a Ormat Energy Converter Module (OEC), which includes equipment such as the following: evaporator/preheater, condenser, turbine, generator, motive fluid (pentane) cycle pump, various control safety valves, switches, pressure gauges/controls, internal piping pneumatic lubrication subsystem connections, and power control boards. This Ormat system is based on a subcritical organic Rankin power cycle which produces 3-phase electrical power compatible with the local Imperial Irrigation District grid and all exhaust vapors are subsequently condensed in a water-cooled condenser and recycled to the evaporator by the motive fluid cycle pump. The size of these OEC units is approximately 8' x 8' x 40' in dimension and depending on the size of the facility can be collocated and interconnected to generate the required amount of electricity. The Rankine cycle can reduce parasitic losses and internal pressures within the power plant, meaning higher equipment reliability, due to lower stresses on the components of these modular units.

C. Water Production

The 1977 Geothermal Element projected that desalinization of water could occur as a by-product of geothermal electrical production.

Congress passed the Colorado River Basin Project Act, Public Law 90-537 (1968), authorizing the Bureau of Reclamation to study the viability of augmenting the water supply of the Colorado River from sources within the Basin.

The University of California, Riverside, was contracted to perform preliminary geophysical investigations. In the summer of 1972, Mesa 6-1 was drilled to 8,015 feet in the East Mesa KGRA. The fluid temperature was 330° F and had a flow rate of about 100 gallons per minute with about 20,000 parts per million of total dissolved solids.

On June 3, 1974, the Bureau of Reclamation awarded a contract to Bechtel Corporation to determine heat transfer, scaling, corrosion, fluid chemistry, and flow characteristics. Systems were employed at East Mesa by the Bureau of Reclamation and Bechtel that are used worldwide for the recovery of potable water from seawater. These systems were the multistage flash and the vertical evaporator designs. The operators concluded:

> ". . .at least 75 percent of the water content of the geothermal brine entering the plant can be recovered, utilizing the energy of the geothermal brine as a source of heat for the distillation plant. . ." and that, ". . .Recovery of water from geothermal brine is technically feasible through the use of either the multistage flash evaporator concept, or the vertical tube evaporator. . ."

The Bureau of Reclamation estimated in 1972 that as much as 2.5 million acre-feet a year of desalinated water could be produced from geothermal resources in Imperial County. Their 1979 *Geothermal Resources Investigations East Mesa Test Site - Concluding Report*, found (largely due to reservoir transmissivity limitations) this to be an unreasonably optimistic estimate. On an economic basis, they could not support water production.

H.J. Vaux, Jr., of the University of California, Riverside, prepared a cost analysis for producing fresh water from geothermal resources by a desalinization plant. He estimated that desalinization would cost about $.45 per 1000 gallons, or $145 per acre-foot.

There does not appear to have been any notable changes in the desalinization technology since these studies were completed, but a rough estimate of cost in 1984, considering inflation and interest rates might be closer to $1000 per acre-foot. A number of Southern California communities are paying up to $200 per acre-foot. The Imperial Irrigation District currently delivers water to local industrial users for $85.00 (2014) per acre-foot and to agricultural, municipal, and miscellaneous users at $20.00 (2014) per acre-foot. For comparison, the estimated costs for ocean water distillation ranges between $1,200 and $1,500 per acre foot depending on the desalinization process utilized (San Diego County Water Authority, 1990).

D. Direct Heat Uses

In addition to electrical generation, geothermal resources can be utilized in nearly any process or activity which requires heat. Geothermal fluids can be used directly from a well, or users could obtain "cascaded" heat from other projects.

The potential for direct use in Imperial County remains to be seen. The long-term availability of geothermal resources could serve as a catalyst for local economic development. A study sponsored by the U.S. Department of Energy and the County (May 1983) evaluated potential uses of direct heat in five major categories:

1. **Agriculture:** Geothermal energy could be used by farmers, stockmen, ranchers or consortiums of the above; projects could include crop refrigeration and greenhouse and feedlot operations.

2. **Aquaculture:** Warm waters can be utilized to grow certain aquatic species, e.g. catfish, prawns, algae, tilapia and for the hydroponic growing of vegetables.

3. **Food Processing:** Opportunities for processing of food include refining and cold packing, vegetable canning, dehydration and freeze-dry operations.

4. **Ethanol Process:** Imperial County could be a prime location for geothermally-produced ethanol due to the combination of a local supply of feedstock, the geothermal energy resource, and nearby metropolitan markets.

5. **Manufacturing:** Certain industrial and manufacturing applications could use geothermal energy to replace fossil fuel and electricity, e.g. process heat, refrigeration and motive steam.

Since the temperature requirements are generally lower for direct heat projects, more flexibility in location of direct heat projects may be possible. However, in order to minimize the cost of fluid transmission, project locations must be near the geothermal resource.

The growth of geothermal direct use projects continues to be unpredictable at present, since development will be influenced by a number of factors including prices for competing energy sources, labor costs, price of land, and tax incentives, among others. Development of resources for electricity generation could facilitate development of direct applications. Resolution of technical issues and the availability of cascaded heat from power plants may lead to development of direct heat projects. A successful local application of geothermal resources for an industrial project could stimulate development of other projects.

The geothermal aspects of proposed industrial projects are expected to be relatively minor in comparison with the non-geothermal aspects of the projects, i.e. capital costs, operating costs and environmental impacts.

The non-geothermal issues of economic development and industrial projects are analyzed in other portions of the County General Plan.

E. Mineral and Gas Extraction

In various parts of the world, brine has been used to produce minerals. However, the recovery of these minerals from geothermal brine is dependent upon both production costs and market price.

Some portions of the Imperial Valley are underlain, at depth, by hypersaline brines (water that is greater than three times as salty as sea water). In certain KGRA's, particularly the Salton Sea, the brine is very high in minerals such as sodium, arsenic, antimony, mercury, selenium, potassium, iron, tin, manganese, chlorine, boron, bromine, potash, and zinc, among others. Precious metals--silver, gold and platinum--are present in trace concentrations.

Both the U.S. Bureau of Mines and the Department of Energy have sponsored experimental programs on mineral extraction from Salton Sea brines. However, few detailed reports are available. In 1974, the Bureau of Mines funded research to do a study at the Salton Sea. Hazen Research built and operated a 15 gallon per minute pilot plant which was operated successfully. The process was based on selective precipitation of the hydroxides found in the brine utilizing lime.

Another study was performed by SRI International at the San Diego Gas and Electric Geothermal Loop Experimental Facility (GLEF). This study involved precipitation of the more valuable elements in the brine through use of a sulfide. A number of equilibrium calculations were made using aged, spent brine from the GLEF.

SRI's goal was to precipitate all of the silver, lead, and zinc, while minimizing the precipitation of iron and manganese and using as little of the sulfide as possible. After a careful study and analysis for silver in the brines, they concluded that the silver content of the brine used was 0.02 parts per million utilizing Magmamax #1 brine.

Since the geothermal brines of the Salton Sea KGRA have a greater concentration of valuable minerals, this area's resource is being developed. Currently, the flashed-steam technical design has the greatest potential for mineral recovery in the Salton Sea area.

Some of the minerals being extracted from geothermal brines are of strategic value to our national defense. Cal Energy owned and operated a zinc extract plant at their existing geothermal plants before closing due to production and market declines. Manganese and tin are only two of these metals which may become difficult to import if

world conditions control availability. Table C-1 lists the percentage of metals of strategic value to the United States which are imported from various countries and which could be extracted from geothermal brines. Table C-1 gives typical Imperial Valley brine chemistry.

Early extraction of gas occurred in the Niland area from 1933 to 1954 where a large amount of carbon dioxide was produced to make dry ice. The flow of geothermal brine also releases methane, hydrogen sulfide, radon, benzene, and mercury gases in small quantities. With adequate abatement methods, these gases are not hazardous.

The County recently has approved the SIMBOL Materials, Inc., Simbol Calipatria Plant 1 (CUP #12-0004) adjacent to the existing Hudson Ranch 1 (now known as the John Featherstone 1) Geothermal Flash Power Plant. The County is processing a revised project permit (CUP #14-0006) that will include an 80-foot high communications tower. The commercial Lithium Carbonate Production Plant intends to extract lithium and lithium products from the geothermal brine from this plant.

TABLE C-1

STRATEGIC METALS VITAL TO DEFENSE AND ECONOMY

Metal	Uses	Percent Imported	Principal Sources
Chromium	Stainless steels, electroplates	90	South Africa, C.I.S.
Cobalt	Super alloys, magnets	90	Zaire, Zambia
Manganese	Steels and steel-making	98	Gabon, South Africa
Platinum Metals	Catalysts, glass-making, electronic contacts	89	South Africa, C.I.S.
Tantalum	Capacitors, super alloys, cutting tools	96	Thailand, Malaysia
Tin	Tin plate, bearings, solder	81	Thailand, Malaysia

Source: Lawrence Livermore Laboratories (1985 Geothermal/Transmission Element)

TABLE C-2

TYPICAL IMPERIAL VALLEY BRINE CHEMISTRY

Dissolved Solids (in mg/1)		Salton Sea	Westmorland	Brawley	Heber	East Mesa
Sodium	NA	52,000.00	10,000.00	22,000.00	4,200.00	2,600.00
Potassium	K	14,000.00	1,400.00	3,800.00	260	190
Calcium	Ca	24,000.00	690	8,100.00	880	130
Magnesium	Mg	106	188	34	5.4	3.4
Chloride	Cl	145,000	18,000.00	46,000.00	7,900.00	3,900.00
Sulfate	SO^4	84	57	----	99	155
Bicarbonate	HCO^3	140	2,900.00	49	27	490
Arsenic	As	11	----	2.6	0.1	0.16
Boron	B	350	63	140	14	5.4
Barium	Ba	433	----	363	3.8	2.2
Copper	Cu	4	0.07	0.11	0.53	0.03
Fluoride	F	9	2.24	----	1.6	2
Iron	Fe	2,300.00	0.3	65	22	2.2
Lithium	Li	211	48	100	9.5	6.3
Manganese	Mn	1,200.00	2.8	190	2.7	0.42
Nickel	Ni	4				0.03
Lead	Pb	100	3.8	1.1	1.9	0.09
Strontium	Sr	500	----	340	53	38
Zinc	Zn	660	0.04	14	0.83	0.07

		Salton Sea		East Mesa	
Noncondensible Gases (in mg/kg)		**Range**	**Mean**	**Range**	**Mean**
Hydrogen Sulfide	H_2S	1.6 - 6.0	3.2	0.12 - 1.6	0.54
Ammonia	NH	20 - 40	35	1.3 - 8.1	4.5
Carbon Dioxide	CO_4	1,100 - 3,800	1,700	270 - 2,300	1,100
Methane	CO_4	10-Mar	6	4.0 - 56	33
Hydrogen	H_2	0.0016 - 0.002	0.0018	0.005 - 0.007	0.0064

Source: Pimental et al. 1978, Ermak et al. 1979.

F. Solid Waste Disposal

Geothermal energy production may create large volumes of waste, some of which contains heavy metals, naturally occurring radioactive materials (NORMS), and salts. Wastes also result from well drilling and testing, and power plant operation. Wastes can include rotary drilling muds, work over and clean out fluids, well testing fluids, geothermal brines and residues, pretreatment sludge from cooling water makeup, and cooling tower and boiler blowdown sludges.

An occasional waste is fill-packs at cooling towers of some geothermal plants. Generally the fill-pack is a Class III waste, but can become a Class I waste due to its copper content from sludge and film build-up. Another common waste generated is the desiccant used to keep moisture out of specified compressor lubricants. Generation of Class I, Class II, and Class III wastes (particularly those having special health risks) are reviewed during the County permit process and a mitigation monitoring program is prepared to reduce potential health risks to project employees and the public.

The regulation of geothermal solids depends on the area where the solids originate. The East Mesa Power Plants are permitted by the Bureau of Land Management which would handle disposal issues in conjunction with Regional Water Quality Control Board. In the Salton Sea, North Brawley, Ormesa, and Heber KGRA's, the County Department of Public Works, Planning/Building Department and the Regional Water Quality Control Board (RWQCB), would review and monitor the disposal/storage of geothermal solids in appropriate landfills. Some clean-up efforts in various parts of Imperial County are within the Regional Water Quality Control Board's jurisdiction.

The RWQCB requires that geothermal wastes which contain in excess of 6,000 parts per million (ppm) total dissolved solids, be disposed of in a Class I landfill, and those wastes with less dissolved solids may go to certain Class II sites. Five sites in Imperial County are authorized for the acceptance of geothermal wastes: Clean Harbors (Westmorland), Inc., site accepts hazardous and non-hazardous geothermal wastes, and the County-operated landfills located in Brawley, Calexico, Holtville, and Salton City may accept non-hazardous geothermal wastes.

Desert Valley Company's Class II "Monofill" is permitted to store and dispose of geothermal solids only from CalEnergy's existing geothermal plants in the Salton Sea area. Desert Valley Company also owns two contiguous sections of land which are to be developed in two Phases: Phase I consists of one "monofill" of approximately 7 acres with a capacity of 300,000 cubic yard; and 160 acres of land has been permitted for landfill use.

The County's Integrated Waste Management Plan (COIWMP) has been prepared by the County Department of Public Works, and adopted by the Board of Supervisors and the cities. The COIWMP addresses the need for disposal sites to receive appropriate geothermal wastes. All waste management activities in the County must comply with the COIWMP as adopted and/or amended.

G. Transmission Corridors

It is the intent of Imperial County:

- To recognize the necessity for transmission corridors within and through Imperial County;

- To plan for the least disruptive corridor routing and to encourage the development of joint use corridors; and

- To formalize the County's input to the appropriate public and private entities in terms of goals, policies, routing criteria and specific corridor location plans.

The following goals are established and adopted:

- To protect the health and safety of Imperial County's residents and their communities by assuring that the corridors will be so located as to have the least possible adverse impact upon them.

- To protect the health and well-being of Imperial County's agricultural economy by assuring that the placement of transmission towers and lines will have the least possible adverse impact on agriculture to the extent practicable.

- To protect, as much as possible, the fragile ecological balance of our wetlands and surrounding desert by assuring that natural resources will be considered in the location of transmission corridors.

- To support IID’s transmission plan of service, which utilizes to the extent possible existing transmission systems and capability prior to constructing new transmission lines and enhances grid reliability?

- To utilize, wherever practicable and approved by appropriate permitting authority, existing rights-of-way (such as existing lines, roads, canals and railroads) for the placement of transmission towers and lines so as to maximize efficient use of land and minimize impacts to our surrounding environment.

- To minimize, as much as practicable, the impact of transmission towers and lines upon our aesthetic environment by encouraging appropriate location and design features.

- To participate in State and Federal licensing procedures for the location of transmission lines, towers and related substations where it is deemed that such participation would serve the best interests of the County.

The following guidelines will be followed regarding transmission routes, except where competent and responsible advice indicates otherwise.

- Transmission rights-of-way, including the towers and lines, be located adjacent to existing roads, canals and property lines. Towers should be sited at the end of fields wherever possible.

- Diagonal alignments of transmission lines and towers through agricultural fields should be avoided.

- To the extent consistent to prudent utility practices, the use of H-frame transmission towers or mono poles should be considered in the agricultural area where their placement would minimize the removal of land from production and facilitate the operation of farm equipment.

- When the need arises for a second transmission line, it should be placed within the same right-of-way as the first line, parallel to and alongside existing towers, in order to avoid the staggering of tower placement and further impacts to agricultural activities.

- All transmission towers near airports or crop duster strips shall comply with FAA regulations.

- The operating entity shall provide grounding of stationary structures where necessary in order to minimize the build-up of electrical charge and protect avian species.

- Questions concerning payments for rights-of-way, liability in the event of damage to transmission structures, and weed clearance at the tower footings are subject to negotiation between the utility company and the landowners.

- Any new transmission lines shall include a Record of Survey of the route.

- The Line route shall be monumented at points that insure the right-of-way can be established on the ground in the field.

- Any new route surveys or resurveys of existing route shall have California Coordinates. These Coordinates shall be of the right-of-way and section/tract corners used to establish the right-of-way.

- Copies of all coordinates shall be in a format to be used for Geographical Information System (GIS) and submitted to the County Surveyor.

Due to the direct impacts renewable energy development has on existing and future transmission lines in Imperial County, it is necessary to consult with the Imperial Irrigation District and other affected agencies. The District's owns and operates transmission lines within its service area. The primary exception to this is ownership/operations of the two 500-kV transmission lines traversing east-west through Imperial County.

The IID and the geothermal developers have worked jointly in the building of the 230-kV line running from the East Mesa area north to the Southern California Edison system. The IID is currently constructing capacity expansion to Path 42, located east of the Salton Sea.

The following figure is included to provide a general overview of the designated transmission line corridors in Imperial County for renewable energy development. The figure outlines the various switchyard areas for the collector system, and the location of the 230-kV and 500-kV transmission lines in relation to this collector system

The following figure also indicates the four federal BLM planning corridors (J, L, M and N), the CFE-SDG&E 500-kV 230 kV line from the La Rosita Substation in Mexico to the Imperial Valley Substation, geothermal 230-kV line, SDG&E 500-kV line stretching from the Arizona border to the San Diego County line and the new Sunrise Powerlink, 500-kV line. The environmental impacts associated with these transmission lines have been addressed in NEPA/CEQA documents prepared by BLM and SDG&E.

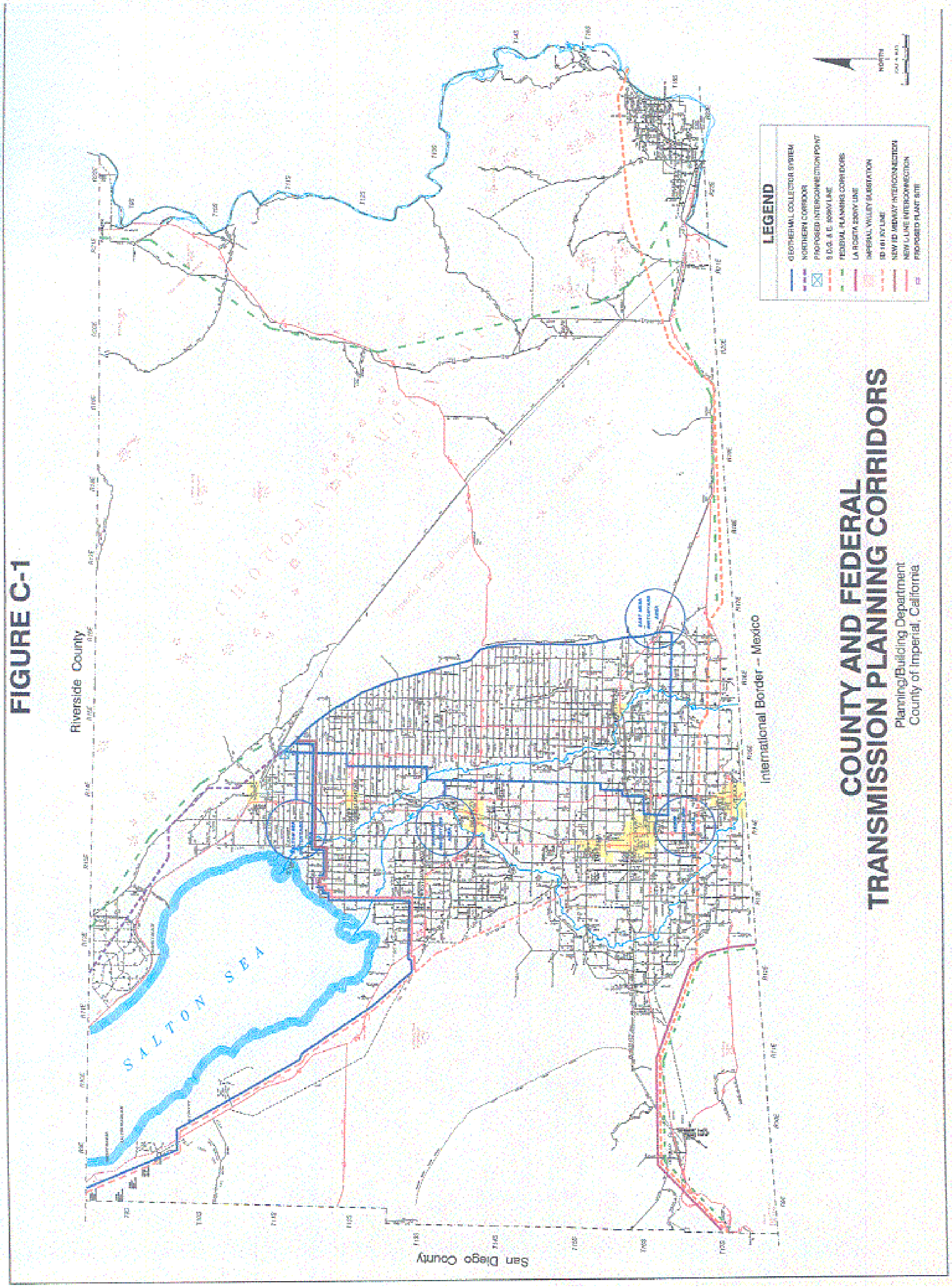


FIGURE C-1
Riverside County
San Diego County
SALTON SEA
International Border -- Mexico
LEGEND
COUNTY AND FEDERAL
TRANSMISSION PLANNING CORRIDORS
Planning/Building Department
County of Imperial, California

APPENDIX D

BENEFITS OF RENEWABLE ENERGY AND TRANSMISSION DEVELOPMENT

(This document has been modified and updated to better reflect current standards and agency responsibilities.)

The benefits of renewable energy development in Imperial County are:

- Fiscal benefit of expanded property tax revenues (with the exception of solar plants and projects on Federal lands (BLM) that are taxed differently);
- Fiscal benefit of sales tax revenues from the purchase of equipment, goods and services;
- Royalty and lease benefits to local landowners and County;
- Social and fiscal benefits from increased economic activity and local employment opportunities that do not threaten the economic viability of other industries;
- Improvements in technology to reduce costs of electrical generation;
- Reduction in potential greenhouse gases by displacing fossil-fuel-generated electricity with renewable energy power which does not add to the greenhouse effect;
- Contribution towards meeting the State of California's Renewables Portfolio Standard (RPS); and
- Minimization of impacts to local communities, agriculture and sensitive environmental resources.

The benefits of increased transmission line development in Imperial County are:

- Increased regional transmission capacity to support regional energy demand while increasing regional reliability.
- Increased local transmission capacity and associated reliability while supporting local residential, commercial and industrial growth.
- Increased opportunity for the development of renewable energy generation facilities, e.g. wind, solar, geothermal, bio-fuels, bio-mass, algae, deep solar ponds, and hyper-saline brine ponds, for local construction and permanent job creation.

- Provide support to companies developing renewable energy facilities that will provide a significant contribution to the RPS.

- Potential to develop joint use utility corridors that will provide a more balanced approach to addressing zoning and land use conflicts between the renewable energy industry, local development, and agricultural interests.

- Foster the growth of energy parks with attendant jobs and increased sale and property tax revenues.

A. Fiscal benefit of expanded property tax revenues

Assessments and tax revenues have increased because of the development of geothermal properties in the Imperial County. The assessments of the rights to exploration, development and production of useful geothermal energy are controlled by Proposition 13, Article XIII A of the California Constitution. Under Article XIII A, property taxes are limited to 1% of the assessed value of the property. Once the base year assessment has been set by the Assessor the assessment will not increase by more than 2% per year, unless there is new construction or a change in ownership that triggers a new assessment as of the date of completion or as of the date of the change in ownership.

The Imperial County Assessor is responsible for the assessment of all Qualifying-Facility geothermal power plant projects. The State Board of Equalization (SBE) is responsible for the assessment of all non-Qualifying-Facility geothermal power plant properties and the associated power lines and equipment owned that State Board assesses. The state-assessed properties are not controlled by Proposition 13 or its limitations on market value, but are taxed at 1% of their assessed value.

The right to explore for geothermal energy is taxable. The right to explore is valued by any appropriate method allowed in the Revenue and Taxation Code. The Assessor can use the cost, market or the income approach to value the right to explore. The approach used generally is the one that the Assessor has the most reliable information on.

The right to develop useful geothermal energy prior to production is assessable but usually unascertainable unless there is a sale during the development stage. If the sale is considered to be an open market transaction meeting all of the requirements of a fair market value, the sale price will then be enrolled.

The right to produce useful geothermal energy is assessable. Once the power plant is in production, the Assessor can assess the power plant and the proven reserves as of the date the plant comes on line. The Assessor uses the cost approach, the market approach or the income approach to value the geothermal property. Because of the lack of comparable sales data pertaining to geothermal properties, the market approach to value is difficult to use. The Assessor uses the cost approach to value the

improvements. Usually the historical cost approach is used because the actual costs of construction have proven to be the most reliable. The income approach is one of the most reliable tools the Assessor has to value the entire geothermal power plant project including well field and geothermal reserves. The Assessor will use the discounted cash flow analysis. Gross income from sales of electricity will be estimated over the estimated remaining economic life of the project from the gross income and the appraiser will deduct expenses, capital costs to the field, resource, plant, land, wells, fixtures, and personal property. Then the Assessor will arrive at a discount rate and the discount rate will then be used to arrive at a present value of the entire property. From the value of the entire property the Assessor will deduct the value of the improvements, fixtures, and personal property arrived at by the cost approach. The residual value is allocated to the geothermal reserves.

Once the base year value is established and enrolled by the Assessor in accordance with Proposition 13, Article XIII A of the California Constitution, all geothermal energy power plants, inclusive of other renewable energy facilities, are annually reviewed and appraised to determine the fair market value of the power plant as of the current tax year lien date. This annual analysis provides the Assessor the necessary data to determine if a decline in market value of the power plant exists. Property Tax Rule 473 (C) states "Declines in market value of the mineral property shall be recognized when the market value of the appraisal unit (land, improvements, fixtures and proved reserves), is less than the current adjusted base year value of the same unit. " Declines in value will be determined by comparing the current market value of the property to the indexed Prop 13 value of the same property for the current lien date. When the current market value of the property is less than its base year value indexed to the current lien date, the established market value shall be enrolled as the current taxable value.

In addition to the taxes levied on the resource, also subject to tax assessments are the land, power plant, transmission lines, and other facilities. When owned by a public utility, these facilities are assessed by the State Board of Equalization. The Board uses a unitary value concept to determine the fair market value of the land and improvements owned by the public utility in the state. The following factors are used by the Board to determine fair market value: Original/historical cost of land and improvements less depreciation; capitalized earnings; and market value of stock and debt issues.

The State Board of Equalization determines annually the fair market value of all State taxable property and then allocates this value to the County tax areas where the property is located.

The renewable energy operating plants in Imperial County are assessed by the Imperial County Assessor's Office. The top five property tax payers in the County for FY 2012-13 (out of the top 100) are as follows: CalEnergy ($7,641,846), Energy Source ($2,343,990), SDG&E ($1,460,633), Ormat ($1,120,462) and US Gypsum

($1,114,375). The taxes paid annually into the County Treasury by these entities is for disbursement to various local taxing agencies.

In 2012, a 50 megawatt geothermal plant and associated resource development is estimated to have a cost of construction up to $400 million dollars. According to the above, the cost for a typical field and plant facility is approximately $8,000 per installed kW in the United States, but can vary significantly based upon a series of factors with costs changing over time with economic conditions.

Due to the SBE's method of determining fair market value and allocating assessed value of the state-assessed property, the exact amount of Imperial County's share is unpredictable. The State assesses no power plants in Imperial County but do assess Southern California Edison power lines.

B. Fiscal benefit of sales tax revenues from purchase of goods and services

Retail sales and resultant sales tax revenues will increase temporarily during peak construction phases. Geothermal service industries, cascaded heat users, and direct heat industries will also be established bringing additional demands upon local business for goods and services. A portion of sales tax revenues generated locally by geothermal development will be returned to Imperial County by the State Board of Equalization.

C. Royalty and lease benefits to local landowners

Local landowners profit from the development of the geothermal resource in three major ways: Annual rental payments for leased land; monthly royalty payments for a percent of gross or net production; and payments for any surface use of land (such as for pipelines and well pads).

Increased revenues to local landowners can provide local benefits through increased expenditures and investments. A secondary benefit to local landowners would be improvements to adjacent roads.

D. Social and fiscal benefits from increased economic activity and employment

Based on estimates and experience, a 50 MW geothermal plant and related facilities could require the following workforce:

Site preparation/drilling	45 workers/average for 9 months
Construction (structure/equipment)	70 to 180+ for minimum 18 months
Operation & Maintenance (once construction is complete)	35 workers (more or less depending on the design of the plant)

Of the local work force who operate and maintain the various electrical plants, the vast majority are local residents. However, for construction of renewable energy power facilities, a large number are Mexican national who have permits to work in the United States. The non-local labor force estimated to be needed would increase local retail sales through purchases of food, lodging, gasoline, car maintenance, medicine, entertainment, drugstore items, and laundry services. It is assumed that on weekends and scheduled days off, the non-resident work force would either return home or stay in local establishments.

Direct heat employment opportunities are not included in the above analysis. Recent estimates indicate that employment could range from 6 to 75 persons per project in the related industries such as crop cooling/packing, vegetable dehydration, food processing, greenhouses, and aquaculture.

New geothermal-related jobs will not be seasonal, so the development of geothermal energy could help to stabilize the County's economy.

Local statistics continue to indicate that young adults now tend to leave the County shortly after high school. This emigration might be reduced if geothermal development offers a variety of jobs for those wishing to remain in the County. The employment generated will also produce jobs in other sectors of the local economy, utilize a greater range of job skills, and provide new employment opportunities for local unemployed residents.

F. Contribution to the Renewables Portfolio Standard

The guidelines included in the Element also address aspects of the Renewable Energy Program related to the state's Renewables Portfolio Standard (RPS). This law and any recent revisions requires certain retail sellers of electricity to increase the amount of renewable energy they procure each year by one (1) percent until the renewable energy content of their electricity portfolios equals 33 percent of their power from renewable energy sources. Retail sellers of electricity must meet this 33 percent level by 2020. Under this law, the California Energy Commission is charged with certifying eligible renewable energy resources that may be used by retail sellers of electricity to satisfy their RPS procurement requirements and for developing an accounting system to verify a retail seller's compliance with the RPS. Eligible renewable energy resources identified within the County may qualify for funding under the Renewable Energy Program.

To assist meeting the RPS, the BLM has prepared Programmatic Environmental Impact Statements (EIS) to process BLM-wide programs for geothermal, wind, and solar energy development as follows.

> "...A PEIS evaluates the environmental impacts of broad agency actions, such as the development of major programs or the setting of national policies. These PEIS documents examine a range of alternatives for establishing renewable

energy programs on suitable BLM-managed land and amend resource management plans (RMP), a necessary first step before specific projects can be authorized on BLM-managed lands. The BLM published the Wind Energy PEIS in 2005...The BLM published the Geothermal PEIS in 2008...The BLM and the U.S. Department of Energy (DOE) jointly published the Draft Solar Energy PEIS in December 2010. The Draft Solar energy PEIS estimates that up to 214,000 acres of public land could be needed over the next 20 years for solar energy projects...The BLM's establishment of its Renewable energy Coordination Offices (RECOs) in Arizona, California, Nevada, and Wyoming...has facilitated the efficient processing of applications for large-scale solar, wind and geothermal projects..." (Statement of Robert V. Abbey, Director, Bureau of Land Management, U.S. Department of the Interior, Before the House Natural Resources Committee, Oversight Hearing, "*American Energy Initiative: Identifying Roadblocks to Wind and Solar Energy on Public Land and Waters*", May 13, 2011).

APPENDIX E

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