Appendix N2

Proportionality Estimates

N2 PROPORTIONALITY ESTIMATES

N2.1 Introduction

While the Plan-wide conservation strategy in the Desert Renewable Energy Conservation Plan (DRECP or Plan) describes what would be needed to achieve conservation goals for natural communities and Covered Species in the DRECP Plan Area, Covered Activities in the DRECP include only renewable energy generation and transmission development and do not consider all development likely to occur in the Plan Area during the permit term. Covered Activities under the DRECP therefore should not bear the full burden of achieving Plan-wide conservation goals. The DRECP includes DRECP Natural Community Conservation Plan (NCCP) objectives that represent the contribution of DRECP implementation toward achieving Plan-wide conservation goals.

To assess the relationship of renewable energy development to overall development in the Plan Area over the permit term, an estimate of the total land consumption by all types of future development, including new housing, commercial, industrial, and other infrastructure construction is needed. The DRECP provides estimates for future renewable energy generation scenarios, and the expected land consumption therein described in Volume II, Description of Alternatives. This appendix describes the method for estimating the land consumption by residential, commercial, and industrial developments over the lifetime of the Plan. The non-renewable energy land consumption estimates are then used to calculate the proportional contribution of renewable energy to future land consumption by county.

The best current estimates of future housing employment and population growth, and by extension future land use consumption, are developed by regional government associations to enable the development of region-wide plans such as Regional Transportation Plans (RTPs) and Sustainable Communities Strategies (SCSs). The growth estimates developed by these associations result from extensive research and are subject to vetting by the local city and county governments. In the case of the DRECP, the RTPs developed by the Kern Council of Governments (Kern COG)[1] and Southern California Association of Governments (SCAG) provide the most up-to-date and relevant information from which land consumption and proportionality estimates can be calculated. Each association has developed extensive baseline and future growth-scenario projections that provide a relatively detailed understanding of what regional planners expect to occur over the lifetime of the DRECP. The RTPs provide insight into the expected growth and development of communities and

[1] The Kern COG is the state-affiliated data center for Kern County, with responsibility for transportation planning and transportation-related projects across the unincorporated county and 11 cities of Kern County. Kern COG has a policy to review and update growth forecasts for the region every 3–5 years, and the RTP every 4 years.

enable an estimate of the total land consumption that is likely within the Plan Area over the DRECP permit term.

N2.2 Estimating Non-Renewable Energy Land Consumption

To estimate the proportion of land that may be consumed by renewable energy development, a range of land-consumption estimates was developed based on different plausible future build-out scenarios encompassing those developed by both the Kern COG and SCAG for their RTPs. The use of several scenarios established the upper and lower boundaries of land consumption by non-energy development within the Plan Area, from which the proportional land consumption was calculated. Scenarios were based on housing, employment, and population growth data, combined with general plan land use designations, for the cities and portions of each county within the DRECP.

Both the Kern COG RTP and SCAG RTP analyzed a range of future development scenarios. Each scenario has a different set of assumptions relating to future growth strategies. Factors relevant to the acreage consumption estimates include the relative proportion of high- and low-density housing, development of multifamily housing, use of infill land, and redevelopment of already-urban areas. As discussed in the SCAG 2012–2035 RTP the expected trend across the region is for a shift toward greater use of infill and re-development that will result in denser neighborhoods (SCAG 2012a). This is driven by both the need to address greenhouse gas reduction strategies (per Senate Bill [SB] 375), and by demographic factors, such as expected increases in the need for smaller housing units. Further, SCAG acknowledges that the land-development strategies that have been in play for the last 30–50 years are increasingly less sustainable because it is infeasible to extend transportation networks. Therefore, long-term plans are seeking to consolidate growth and develop more livable neighborhoods that require fewer car journeys. However, the preferences of the local population may result in different land use patterns. Outreach projects such as Directions to 2050 undertaken by Kern COG indicate that local populations have a preference for lower-density single-family units (SFUs), which runs contrary to some future planning scenarios. Consequently, the future development trajectory remains susceptible to contradictory influences that increase the uncertainty of any projection out to 2040.

Furthermore, while consolidation and infill trends hold true for more urban and suburban parts of the DRECP, such as Lancaster, Palmdale, Blythe, and Barstow, the Plan Area is considerably more rural than other parts of Southern California. Therefore, consolidation and infill development may be less prevalent within the Plan Area than in the wider region. However, other county-wide polices may come into play; for example, Kern County seeks to reduce loss of primary farmland to urbanization. Similarly, Imperial County has a long-stated goal to reduce and control non-agricultural development in areas designated as

agricultural land, and to encourage infill of urban areas (County of Imperial 2008). Other counties including Riverside (County of Riverside 2014) and San Bernardino have similar stated polices (County of San Bernardino 2014). It was therefore assumed that conversion of agricultural land is less likely than in previous growth cycles.

Given the complex interplay of influences laid out above, it is important to determine the extent to which the proportionality estimates are sensitive to a range of future development trajectories. Quantifying the sensitivity to future projections enables DRECP planners to develop estimates that account for the uncertainty in the proportional contribution of renewable energy to conservation goals. To assess the sensitivity of proportionality estimates to future trajectories, 10 different build-out scenarios were developed to give the widest range of potential land use consumption estimates. The outcomes of individual scenarios were then cross-checked with the scenarios developed for the RTPs and the alternatives analysis for the relevant RTP environmental impact reports (EIRs). The scenarios that most closely resembled the RTP scenarios were assumed to be the most applicable for purposes of proportionality estimates because they best reflect the expected future growth envisioned by the regional government associations.[2]

Population, Housing, and Employment Growth Estimates

Population, housing, and employment growth estimates from publically available data published by Kern COG and SCAG were used to develop scenarios. Both Kern COG and SCAG developed integrated growth forecasts at the regional and small-geographic-area level that are used as the basis for developing their RTP, SCS, Program EIR, and the Regional Housing Needs Assessment. The regional growth forecasts represent the most likely growth scenario for the regions in the future, taking into account a combination of recent and past trends, reasonable key technical assumptions, and local or regional growth policies. The forecasts are subject to extensive research and consultation and are formally adopted by the respective commissions.

Standardization between each government association was necessary since each uses a different baseline and forecasts to a different horizon. For Kern COG, baseline is based on a growth forecast adopted in 2009 and forecasts are out to 2040, whereas SCAG uses a 2010 baseline and forecasts to 2035. Since both growth forecasts are effectively linear between the baseline and 2040 and cover at least 25–26 years, the household growth projections were considered an adequate estimate of growth for the term of the DRECP.[3] Given the

[2] It should be noted that, since the objective of the model is ultimately to estimate the proportion of development that is non-renewable energy development, the location of development is less important than the assumed ratios of respective land designations in estimating the overall land consumption.

[3] Projections for DRECP regions within SCAG were based on a regional growth rate of 0.9% per year (SCAG 2012b), and projections for Kern were based on a growth rate of 1.2% per year (Kern COG 2014a).

linear projection, it is the change in number of households and jobs over 25years that is important, not the specific start and end dates.

Using the available Transportation Analysis Zones (TAZ) demographics projections for SCAG (2009), and data from the Kern COG RTP (Kern COG 2014a), demographic projections were estimated for the cities and parts of the counties within the Plan Area. For unincorporated areas of Kern County, the population and household growth were assumed to be proportional to the area of the county within the DRECP. Table N2-1 shows the estimated number of new households that are projected to occur within the DRECP by 2040.

Table N2-1
Demographic Estimates for Portions of Counties Within the DRECP1

County[1]	Estimated New Households by 2040
Imperial	42,030
Los Angeles	61,194
Riverside	8,489
San Bernardino	106,871
Kern	18,864

[1] San Diego County was omitted from calculations because there is no expected renewable energy development for those parts of the county within the Plan Area.

Converting Growth to Acreage Estimates

Land use patterns for community growth are a complex result of government policies, local economic conditions, and local housing market preferences. The factors affecting these decisions are briefly summarized above and discussed in more detail in respective RTPs. For the purpose of proportionality estimates, several alternative build-out scenarios were developed that placed differing emphasis on different densities of development. The range of scenarios developed was guided by the scenarios used in the RTPs.

Each scenario estimate consisted of two components, (1) residential and (2) commercial/industrial. To identify the areas available for residential development, general plans for cities and counties across the Plan Area were combined to provide a single, seamless geographical layer. Land designations for which residential development would be infeasible were screened out. These include lands over which the counties and cities have no jurisdiction (i.e., federal land, state land, legally and legislatively protected areas [LLPAs], Native American lands, and military lands), but also include land within county and city jurisdiction that are designated for commercial and industrial development, as open space, or for conservation. The land use designations identified as suitable for residential development include designations for low-, medium- and high-density SFUs,

multifamily units (MFU), rural and estate, and agricultural lands, although the latter was only used if all other designations were exhausted. Table N2-2 provides a summary of the land use designations, dwelling unit densities, and estimated ground disturbance per dwelling unit used to estimate land consumption by residential development.

Table N2-2
Land Use Designations to Dwelling Unit Conversion Matrix

Land Use Category	Low-Density Dwelling Units								High-Density Dwelling Units		
	Agricultural			*Agricultural/ Estate and Very-Low-Density SFU1*			*Low-Density SFU*		*Medium- to High-Density SFU and MFU2*		
Dwelling Units per Acre	0.00625	0.025	0.05	0.1	0.2	1	2–4	5–7	8–10	11–15	16–20
Estimated ground disturbance per Dwelling Unit (acres)	2	2	2	2	2	1	0.5–0.25	0.2–.125	0.125–0.1	0.091–0.0667	0.0625–0.05

Notes:
1 Single-family unit.
2 Multifamily unit.

The total potential housing available within the DRECP (i.e., housing capacity of existing general plans) was inferred from the product of the total acreage for each residential general plan designation and the stated dwelling unit (per acre) density for that designation. This set the maximum theoretical total number of dwelling units (households) that could feasibly be accommodated for different land use designations. Since the number of potential dwelling units across the Plan far exceeds the number of dwelling units projected for household growth, 10 scenarios were developed that placed varying emphasis on the development of high- or low-density dwellings and on the actual distribution of development between the different SFU density designations described in Table N2-2. Within the Low-Density Dwelling Unit category, priority was given to areas designated as low-density SFU, with households distributed to very-low-density SFU and agricultural designations only when insufficient low-density SFU designations were available. Further, differential weighting within low-density SFU designations was then applied to provide a greater range of scenarios.[4] Table N2-3 describes the range of scenarios used in estimating the range of possible acreage consumption values for future

[4] The ultimate acreage prediction is highly sensitive to the density designation of SFUs in the projected profile; therefore, application of differential weighting between SFU designations was necessary to provide sufficient variation in the range of models, and to control for unrealistic assumptions relating to the development of very-low-density SFUs.

residential development along with the approximate equivalent scenario developed by Kern COG and SCAG. For example, in Scenario 1, 5% of future households were assigned to low-density dwelling unit general plan designations, with 95% assigned to high-density dwelling unit designations. Within the low-density SFU designations, households were preferentially assigned to designations with a density of 2–4 dwelling units per acre.

Table N2-3
Scenario Descriptions and Comparison to Kern COG and SCAG RTP Scenarios

Model	Ratio of Low- to High-Density Dwelling Units	SFU Preferential Weighting (Dwelling Units per Acre)	Kern COG Scenarios	SCAG Scenarios
1	0.05:0.95	2–4	Alt 5 Draft EIR Kern RTP scenario	Scenario 1 (0.033 low density)
2	0.35:0.65	2–4	Alt 4 Draft EIR (0.33 low density)	Scenario 2 (0.3 SFU)
3	0.5:0.5	2–4	Alt 3 (0.47 SFU)	—
4	0.65:0.35	2–4	Public Preference	—
5	0.95:0.05	2–4	—	—
6	0.05:0.95	5–7	Alt 5	Scenario 4 (0.96 MFU)
7	0.35:0.65	5–7	Alt 4 Draft EIR (0.33 low density)	—
8	0.5:0.5	5–7	Alt 3 Draft EIR	—
9	0.65:0.35	5–7	Kern RTP scenario	—
10	0.95:0.05	5–7	Kern RTP scenario	—

Source for scenarios: Kern COG 2014b; SCAG 2012a

Estimated expansion of commercial and industrial land use was based on the projected job growth over the period from 2014 to 2040. It is expected by the regional associations that job growth will keep pace with housing growth with an assumed ratio of 1.1–1.3 jobs per household. It is possible to estimate the additional acreage needed for commercial and industrial facilities. Multiplication factors for industrial and commercial land consumption patterns were used to estimate the range of acreages consumed (Kern COG 2014c). Although there are a range of potential job densities based on land use designations (Table N2-4), for the purpose of estimating commercial and industrial land use consumption for proportionality estimates, a low multiplier of 11 jobs per acre and a high multiplier of 17 jobs per acre, which bracket most commercial and industrial uses, was used.

Table N2-4
Combined Land Use – General Plan Jobs to Acres Conversion Matrix

Land Use Designation	Typical Jobs/Gross Acre
Residential High Density, Residential Medium Density, Residential Low Density, Residential Very Low Density, Public Use, Federal/State, Resources	0
Urban Reserve	1
Mixed Use, Retail Heavy, Retail Medium, Service Warehouse, Basic/Production	11–17 (average used 15)
Retail Services	34
Service/Office	26

Source: Kern COG 2014c, Appendix G

N2.3 Estimating Renewable Energy Land Consumption

The method for estimating renewable energy land consumption is discussed extensively within the renewable energy planning process in Section I.3.5, Renewable Energy Goals and Planning Process, and in Appendix F, Megawatt Distribution, and the results are presented in Volume II. The total expected land consumption for the Preferred Alternative was used for the calculations in Section N2.4.

N2.4 Proportionality—Estimating the Future Contribution of Energy Development to Conservation Goals

Estimating the proportion of future development that would be renewable energy in 2040 is subject to a wide array of assumptions with a high degree of uncertainty. Many different scenarios are plausible and are subject to influence from county, state, and local policies, as well as market preferences. To capture the degree of uncertainty associated with any future projection of land consumption, those scenarios most similar to the various RTP scenarios were combined, and each had a slightly different set of assumptions (as described above). This allows us to both provide an estimate of future land consumption and also characterizes the degree of uncertainty associated with each estimate.

The low-land-consumption scenarios assume that future community development will follow compact growth strategies, and seek to maximize the density of housing, commercial, and industrial development. Such assumptions reflect an aggressive application of a countywide SCS in line with the Sustainable Communities and Climate Protection Act of 2008 (SB 375). Conversely, the high-land-consumption scenario assumes that no preference for compact grow is pursued by the counties or cities within the Plan Area, resulting in greater development of lower density housing and commercial units.

Estimates of the proportion of future development that would be renewable energy vary from 94% in Riverside County to as low as 29% in Los Angeles County (Table N2-5). For Imperial County the estimated proportion of renewable energy is 65%, with an11% spread between high and low estimates. Kern County has a higher expected proportion of renewable energy at 85%, but it has a similar spread between the high and low estimates of 13%. The lowest proportion renewable energy estimates are for San Bernardino County and Los Angeles County, with midpoint estimates of 54% and 45%, respectively. Both of these low-proportion counties have much larger spreads between high and low estimates of 33 and 31 percentage points, respectively, indicating a much greater potential range of future development trajectories.

The proportionality estimates for some counties are more sensitive to scenario assumptions than for other counties (Exhibit N2-1). Where renewable energy development is a smaller proportion of the overall land consumption, either because substantial growth is expected in this region or because relatively little renewable energy development is expected (i.e., in Los Angeles and San Bernardino), the proportionality estimates show a large spread of values (Table N2-5). The theoretical permutations of housing distribution within the general plan and the predicted growth in these counties combine to reduce the overall certainty with which the proportional contribution of renewable energy development can be estimated.

As shown in Table N2-5, for other counties (i.e., Imperial, Riverside, and Kern), renewable energy development is expected to be a much greater proportion of the overall growth. In these counties, the proportionality estimates are less sensitive, with a much smaller spread in likely values. The interaction of general plan designations, combined with the relatively high proportion of renewable energy development, act to reduce the uncertainty in the estimates. Any estimate of the proportionality for these counties is likely to be more precise because there are fewer likely permutations of the non-renewable energy development scenarios.

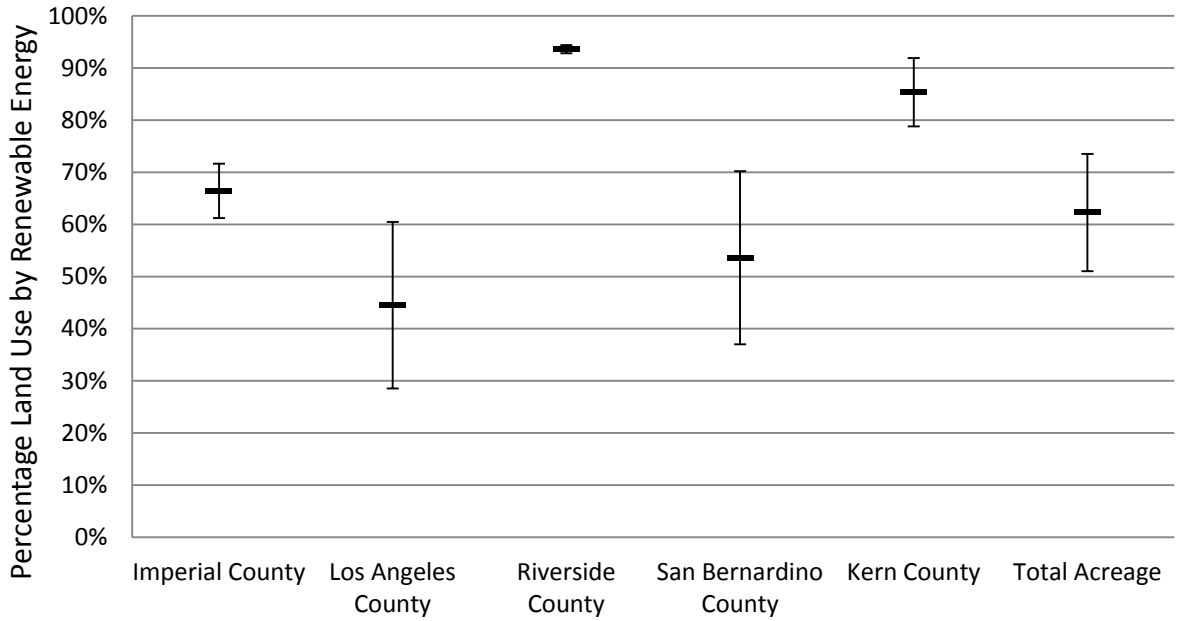

Exhibit N2-1 Predicted Mid-Points with the Spread of High and Low Estimates Percentage Land Consumption by Renewable Energy Development for Parts of Counties Within the Plan Area

Table N2-5
Low and High Renewable Energy Proportionality Estimates for Counties within the DRECP

County	Community Growth Land Consumption				Renewable Energy	Total Dev (Acres)		Proportionality Estimates		
	Low Residential Dev (Acres)	*Low Commercial/ Industrial Dev (Acres)*	*High Residential Dev (Acres)*	*High Commercial/ Industrial Dev (Acres)*	*Preferred Alternative RE Dev (Acres)*	*Sum of All Dev (Low)*	*Sum of All Dev (High)*	*Percentage Dev RE (Low)*	*Percentage Dev RE (High)*	*Percentage Dev RE Midpoint*
Imperial County	21,475	3,429	34,559	5,300	62,903	87,807	102,762	61%	72%	66%
Los Angeles County	5,232	1,988	24,623	3,072	11,054	18,274	38,749	29%	60%	45%
Riverside County	1,426	510	1,730	787	32,573	34,509	35,090	93%	94%	94%
San Bernardino County	9,616	5,222	51,432	8,071	34,968	49,806	94,471	37%	70%	54%
Kern County	1,371	676	5,027	1,235	23,291	25,338	29,554	79%	92%	85%
Plan Area	39,119	11,825	117,371	18,465	141,498	192,442	277,334	51%	74%	62%

N2.5 Literature Cited

County of Imperial. 2008. "Land Use Element." In *Imperial County General Plan*. Adopted November 9, 1993; last revisions adopted January 29, 2008. Accessed June 2014. http://icpds.com/CMS/Media/Land-Use-Element-(2008).pdf.

County of Riverside. 2014. "Land Use Element." In *County of Riverside General Plan*. Adopted March 11, 2014. Accessed June 2014. http://planning.rctlma.org/Portals/0/genplan/general_plan_2013/1%20General%20Plan/Chapter%203-Land%20Use%20Element%20Adopted-Final%20Clean.pdf.

County of San Bernardino. 2014. Chapter II: "Land Use Element." In *County of San Bernardino 2007 General Plan*. Prepared for the County of San Bernardino by URS Corporation. Santa Ana, California: URS. Adopted March 13, 2007; amended April 24, 2014. Accessed June 2014. http://www.sbcounty.gov/Uploads/lus/GeneralPlan/FINALGP.pdf.

Kern COG (Kern Council of Governments). 2014a. Chapter 3: "Planning Assumptions." In *Draft 2014 Regional Transportation Plan/Sustainable Communities Strategy*. March 12, 2014. Accessed June 2014. http://www.kerncog.org/regional-transportation-plan/preliminary-2014-rtp.

Kern COG. 2014b. *2014 Regional Transportation Plan Draft Program Environmental Impact Report*. Prepared for Kern Council of Governments by Impact Sciences Inc. Pasadena, California: Impact Sciences Inc. March 2014. Accessed May 2014. http://www.kerncog.org/images/docs/rtp/2014/draft_2014_RTP_EIR.pdf.

Kern COG. 2014c. *Kern SB 375 Modeling Methodology – DRAFT.* Version 13. February 28, 2014. Accessed June 2014. http://www.kerncog.org/images/docs/transmodel/uplan_documentation_v13_02282014.pdf.

SB (Senate Bill) 375. Sustainable Communities and Climate Protection Act of 2008.

SCAG (Southern California Association of Governments). 2009. Traffic Analysis Zones. Accessed June 2014. http://gisdata.scag.ca.gov/Pages/GIS-Library.aspx.

SCAG. 2012a. *2012–2035 Regional Transportation Plan/Sustainable Communities Strategy*. April 2012. Accessed May 2014. http://rtpscs.scag.ca.gov/Pages/2012-2035-RTP-SCS.aspx.

SCAG. 2012b. "SCS Background Documentation." Appendix to *2012–2035 Regional Transportation Plan/Sustainable Communities Strategy*. April 2012. Accessed May 2014. http://rtpscs.scag.ca.gov/Documents/2012/final/SR/2012fRTP_SCSBackgroundDocumentation.pdf.

INTENTIONALLY LEFT BLANK